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in South Asia

## BEYOND CONVERSATIONS ON EXTENSION:

Enhancing capacities to  
address emerging challenges



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## BEYOND CONVERSATIONS ON EXTENSION: Enhancing capacities to address emerging challenges

**Editors:** Rasheed Sulaiman V, Bhuvana N, Ditty Maria Dominic, Nimisha Mittal and D Alagu Niranjan

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**December 2023**

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## Agricultural Extension in South Asia

### About AESA

**Agricultural Extension in South Asia (AESA)** is a network of all those who are interested and involved in Extension and Advisory Services (EAS) in South Asia ([www.aesnetwork.org](http://www.aesnetwork.org)).

Our vision is to improve food and nutrition security through effective and efficient EAS in South Asia. Our mission is to promote sharing, learning and networking for building effective and efficient EAS.

AESA is part of the **Global Forum for Rural Advisory Services (GFRAS)**.

**The Centre for Research on Innovation and Science Policy (CRISP)** hosts the Secretariat of AESA. CRISP conducts policy relevant research on agricultural extension and rural innovation.

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Additionally, we express our thanks Mr. Anthony Christopher and Mr Leonard for their contributions to the design and layout of this publication.

It is important to note that any opinions expressed in this publication are solely those of the authors of the respective blog pieces.

## **Editors**

# Background

During the past decade (2013-2023), the Agricultural Extension in South Asia (AESAs) Network ([www.aesanetwork.org](http://www.aesanetwork.org)) has functioned as a platform for those passionate about Extension and Advisory Services (EAS). It serves as a space to share experiences and perspectives related to strengthening the contribution of EAS to agrifood systems transformation and to learn from these insights. We have consistently published the experiences and insights of our contributors in various formats, including blogs, good practices, meeting notes, face-to-face interviews, and book reviews.

In 2019, we released our inaugural blog book, "Conversations on Extension: Taking Stock and Shaping the Future," organizing the first 100 blogs under 11 different themes. This publication was a response to the demand from our readers to consolidate these blogs into a single volume, making them available as a comprehensive reference document for a diverse audience involved in EAS. This includes scholars, practitioners, trainers, faculty, innovation intermediaries, analysts, mentors, leaders, and managers—all of whom recognize the potential of EAS in facilitating innovation in agrifood systems.

This second volume represents our ongoing effort to compile the next 100 blogs (101-200) published between 2019 and 2023. Notably, this period coincided with the global struggle against the COVID-19 pandemic and its adverse impact on agrifood systems. In many places, EAS took a leading role in supporting farmers to adapt to the restrictions imposed by the pandemic. During this challenging time, we invited EAS professionals to share their experiences on how EAS are aiding farmers in coping with the pandemic. We are also incorporating these COVID-19 Field Notes in this volume, recognizing the valuable lessons they offer for organizing EAS more effectively in similar challenging situations.

# Introduction

Globally, everyone recognizes the importance of transforming agrifood systems to be more efficient, inclusive, sustainable, and resilient. However, this transformation is only possible when all actors in the agricultural innovation system (AIS) evaluate and implement necessary changes in technologies, institutions, policies, and practices. Each actor must develop and promote these changes to contribute effectively to the overall transformation.

Extension and Advisory Services (EAS) play a crucial bridging role within the Agricultural Innovation System (AIS), supporting the transformation of agrifood systems. However, EAS is currently struggling to fulfill this role effectively, as its capacities to enable innovation are yet to be upgraded. Despite the increased pluralism in EAS with the emergence of several new actors possessing new capacities, the major workforce, particularly in the public sector EAS is lagging behind in many areas where they should have taken a lead.

## Enhancing capacities to address emerging challenges

The blog conversations in this book focus on enhancing the capacities of Extension and Advisory Services (EAS) to support its clients, primarily farmers but also other actors in the Agricultural Innovation System (AIS), in addressing emerging challenges. South Asia continues to host the world's largest concentration of poverty and malnutrition. Its agriculture grapples with climate change, natural resource degradation, a lack of reliable access to markets and site-specific advisory services, and youth outmigration leading to labor scarcity.

Given the increasing feminization of agriculture, women farmers in South Asia require improved access to technology, advice, inputs, and markets. They also need support to strengthen their leadership and governance within the groups and institutions they are part of. To attract and retain youth in agriculture, there is a need to introduce and train them to establish and manage agri-enterprises and explore agribusiness opportunities that provide meaningful employment. While the agricultural sector strives to recover from the impact of the COVID-19 pandemic, the current spread of a new strain of SARS-CoV-2 in several countries raises new concerns, prompting us to draw lessons from EAS support to farmers during the pandemic.

In this emerging context, EAS needs to assist farmers in adapting to the changing climate, mobilize them to access new markets, aid in their transition to a more sustainable, agroecologically sound, and nutrition-sensitive agriculture, and adopt new digital tools for more accurate and actionable advice. To achieve these goals, EAS personnel must enhance their capacities to provide diverse support and employ a wide range of educational tools and approaches that are appropriate to the topic and the target audience. At the organizational level, EAS should establish relevant governance arrangements, policies, and operational strategies that foster collaboration with other AIS actors to facilitate innovation and scale up new knowledge.

Recent discussions on applying the AIS framework in agriculture offer EAS a new opportunity to broaden its agenda from being a mere technology transfer agency to a bridging organization, linking different elements of knowledge held by various actors. To enable innovation, EAS should focus on facilitating change not only at the farmer level but also at the landscape level where different actors must interact and solve emerging problems. Instead of remaining as a technology transfer agency, EAS should reinvent its role as an agency for scaling up new knowledge.

One of the main challenges facing EAS is enhancing its capacities to fulfill these broader roles, as expected by stakeholders. This involves strengthening both its technical and functional capacities. EAS needs to enhance its technical capacities in climate-smart and agroecological approaches and new practices to incentivize mitigation, ranging from the use of solar irrigation to carbon trading and payment for ecological services. There is a pressing need to quickly enhance functional capacities, or soft skills, related to facilitation, co-learning, behavioral change communication, coordination, and innovation management among current EAS personnel engaged in extension field practice, management, teaching, and training. Those involved in extension research should possess sufficient expertise to apply a broad range of research approaches, including the application of qualitative research methods. Additionally, new capacities need to be developed in the future workforce currently studying extension courses at different levels, including vocational education, diplomas, degrees in agricultural and allied sciences, and those pursuing master's and Ph.D. degrees in extension education.

The conversations in this compilation discuss many of these issues and suggest potential ways forward to address these challenges.



## Organisation of this document

The 111 conversations that we published over the last 5 years are grouped under the following 13 themes:

- Strengthening Extension Research
- Livestock Extension
- Digital Extension
- Gender, Youth, and Entrepreneurship
- Private sector and Farmer collectives
- Education and Teaching
- Approaches for Strengthening EAS
- Nutrition-Sensitive Extension
- Natural Resource Management
- Forestry Extension
- Governance and Policy
- Response of EAS to COVID-19
- Impact of COVID-19

The book concludes with a reflection on what else is needed beyond conversations to strengthen EAS.

We hope this publication will significantly contribute to the process of strengthening EAS in South Asia and beyond.

**Rasheed Sulaiman V**  
**Bhuvana N**  
**Ditty Maria Dominic**  
**Nimisha Mittal**  
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# Strengthening Extension Research

01



# 01

## STATUS OF EXTENSION RESEARCH: THE QUESTIONS WE NEED TO ASK AND THE LESSONS WE CAN LEARN

As extension researchers, are we doing the right things and doing it right? **Mahesh B Tengli** raises several such questions in this blog and urges us to introspect on the current status of extension research.

Agricultural Extension is a responsible and dedicated profession. Extension research provides the conceptual and operational principles for this profession. Sivakumar et al. (2017) has rightly raised concerns about the dwindling quality and contribution of extension research. The authors further raise the issue of limited influence of extension research on improving extension practices, designing new programmes and policy matters, which has lowered the respect and recognition accorded to extension researchers. To re-orient extension research we need to identify the direction in which extension research is moving and the deviations of the researcher from the specified professional standards.

This blog piece is based on an analysis of an auto-ethnographic study entitled 'What is the state of hospitality and tourism research – 2018?' by Bob McKercher, a veteran in the field of hospitality and tourism research. The main objective of this blog is to make extension researchers aware of the issues that could be taking us on a wrong path. We need to deliberate on the questions raised by McKercher (even though in another field his concerns are valid for us as well) and examine our own approach and the options available to us.

### SHOWER OF QUESTIONS, LET US BATH IN IT

The very first question we need to ask ourselves is: how much do we really know about the extension discipline? Let us pose the questions raised by Tribe (2006) in the extension context. Is it possible to tell the truth about the quality and utility of extension research? What can we tell based on the findings and recommendations of elaborate and expensive knowledge production systems – agricultural universities, extension research departments, extension journals and extension conferences? But could it be that the thousands of research articles that have

been published have failed to uncover the real truth? We need comprehensive and precise answers.

The gratifying part of our discipline is that we have specialised journals on extension, but we choose to publish in several journals that are irrelevant to our discipline, which thus becomes a cause for concern. A very serious question arising out of this is whether we really read extension journals? Is it always necessary to publish in non-extension high NAAS (National Academy of Agricultural Sciences) -rated journals? It is a systems demand (minimum NAAS 5.00 or sometimes 6 and above) and we are forced to comply with it. An extension scientist or a research scholar with a low NAAS-rated publication is not recognised as a good scientist and researcher. I remember one of the scientists saying "NAAS rating ke peeche mat bhago satyanaas ho jaoge" (Don't run behind the NAAS rating you will be destroyed). Aren't we greedy about high impact factors and NAAS ratings? Have we forgotten the basic principles of farm journalism and research article publication? Who should be the reader of our research papers – entomologists, microbiologists, pathologists? Are we writing for an unintended audience? For instance, does an agronomy researcher read a genetics journal to know about core agronomy concepts? Though we have published thousands of research papers which have added to the body of extension knowledge, we are still no closer to understanding what extension education, research and service are, and how they work for farmers and the extension discipline.



Based on his 30 years of academic and research experience Bob Mc Kercher (2018) says, "More that gets published and the more

*journals that publish material, the further away we seem to be moving from being able to answer those questions. More papers do not necessarily mean more knowledge, and more knowledge doesn't necessarily mean better understanding".*

We may not want to agree with him, but it is worth questioning ourselves. The beauty of extension is that there is a plethora of topics to do research on, but the irony is that the research outcome gets disseminated into non-extension journals, informing non-extension professionals first, yet keeping our own people in the shadow of others informed knowledge of extension. From the observations of Huang and Chen (2015) another question can be raised: what is the status of theoretical or conceptual foundation of extension research and its statistical rigor?

If we find it difficult to answer these questions let us examine the probable causes that have led us into this quandary, through the thematic questions posed by Mc Kercher.

These include:

- How are we addressing changing academic research?
- Are we lacking in critical thinking?
- Are we becoming method robots?
- Are we facing any pressure to meet publishing targets?
- Do we know what we are talking about?

### **How are we addressing changing academic research?**

We have done much ground-breaking academic work in the past, such as development of theories, methods, models, psychological scales, assessments, evaluations, awareness, knowledge, adoption, perception and so on. We are expanding our search into new topics which is a good indication for the growth of extension's body of knowledge. The question we need to answer is: "With what purpose are we conducting research?" Is it to churn out as many papers as possible in as short a time as possible, and to get a large number of citations? The answer to this will help us correct ourselves, in case we have deviated.

### **Are we lacking in critical thinking?**

CCP: cut copy paste, and BRCR: borrow research and conduct research, are the two easy ideas of research problem identification, is it true? May not be true all the time. One can test hypothesis H1: CCP and BRCR are the least preferred philosophy of research problem identification, (use, level of significance= 0.95).

Sivakumar and Sulaiman (2015) have suggested that in order to re-orient extension research, a creative generation of relevant research ideas using an intuitive or common sense approach is imperative. What is the extent of novelty in our selected research problem? How have we identified our research problem? How is a systematic review of literature done? In what way is the research going to address the needs of extension education, research, service and policy? ...Answers are called for.

### **Are we becoming method robots?**

We have to learn and adopt new methods in our research in order to enhance the validity of our research findings. But before that, are we really concerned about the validity of our findings? Have we become method robots? Perhaps yes, with full confidence we use the methods applied by other researchers, because they produce 'good' results and more importantly get published in high impact journals. For example, we apply Principal Component Analysis (PCA), without knowing its assumptions and applicability and thus paralyse our research. The same may happen with wrong usage of Structural Equation Modelling (SEM) in the near future. We have to know PCA, SEM and many other advanced techniques – provided we learn to use them with caution.

To quote the words of Beritelli et al. (2016): *"The use of increasingly and unnecessarily complicated methods to produce significant statistical test score results does not mean the findings are necessarily relevant"*.

### **Are we facing any pressure to meet publishing targets?**

To go back again to McKercher (2018), he says that people get into research collaborations in order to address the pressure of meeting publication targets. Further he suggests that team work is better as it is built on the expertise

gained by different team members and that can produce higher quality research.

But he cautions us by drawing our attention to the observations made by Fisher et al. (1998) about how collaborations lead to intellectual compromises and make projects less innovative. Further, he has also noted that higher the division of responsibilities among authors lower is their professional development. He was seriously concerned about young scientists becoming sub-scientists, almost like factory workers who get specialized in one aspect of the project and fail to learn how to complete the full project on their own. Is this observation seen in our system too?

### **Do we know what we are talking about?**

Here McKercher speaks about practical exposure for academicians and doctoral candidates. He was of the opinion that by developing the key employment criteria all through from Master's level to PhD by means of an extensive publishing track record one could have a candidate who can become a good academician with just one missing qualification – field experience.

### **The last question McKercher asks and also answers is: what can be done?**

McKercher answers the last question by stating, *"It's easy to point to problems. That's what a lot of people who have tenure and job security do. Finding solutions is hard. But there are some solutions at hand. To begin, let's acknowledge that life as an academic is great! We get to research what we want, teach what (we want), how (we) want, providing the subject outcomes are met, and have a great deal of freedom to explore ideas. Not many people have that luxury. But, let's also acknowledge that the world of academia has changed, and not always for the better. The five issues identified above represent an existential threat to the future development of the field of study and potentially a personal threat to someone's career development."*

### **WHAT DO WE NEED TO DO?**

- We need to be pragmatic.
- if we want to survive as an academician, we have to do the things that will allow us to get and keep a job.

- We shouldn't be a slave to metrics/statistics.
- McKercher shares what his director said to him, "Look after your own best interests because the university won't. It will only look after its own best interests!"
- Do not target numbers and thus forget how to do quality research without relying on a senior academic to lead.
- He also says, "Being a slave to numbers is a good way to rise to the middle. It may get you tenure, but at the cost of learning how to do good research."
- We need to challenge ourselves to produce good research.
- We need to question, question and question again to develop critical thinking. McKercher advises us: "Ask yourself 'do I really believe the findings?' If they are too good or too unbelievable, then maybe you need to rethink the work. The same applies when writing a paper. Does it have a logical plot that flows from beginning to end? Or does it require some magic or great leap of logic to prove your point?"
- We need to question the procedure to overcome the problem of being a method robot.
- His advice for handling publication pressure: "Indeed, a single authored paper is a great way for a young academic to truly test her or himself. If you can publish a good paper on your own, then you have the ability to lead research. If you must rely on the help of others, then you will be a follower your whole career".
- It is always better to have academic guidance from experienced academicians to handle academic pressure in general, and publication pressure in particular.
- To tackle lack of field experience we need to get out of the comfort of an AC office, smart classroom, or nostalgic hostels, and step into the field and sit with farmers, extension practitioners, academicians, fellow researchers and policy makers.
- We need to read and question.
- We need to read and publish in relevant journals.

- We need to read online reviews, newspaper articles and many other sources.
- We need to ask ourselves why?

McKercher says, "Teaching is also a great way to identify research ideas for sometimes what is accepted as fact does not ring true. Question, don't be afraid to question the status quo".

McKercher's last message to all of us:

"The future of our field of study is in the hands of young academics entering the field. Each generation of academics has changed the field and taken it to the next level. As an academic who is staring retirement in the face, the comments and advice given in this viewpoint are designed to help the next generation maintain the tradition and continue to elevate our field of study".

**Author's note:** With a lot of respect to the current body of knowledge and gratitude to extension veterans, researchers, budding students and field level extension personnel, I have made an attempt to take on the questions that Bob McKercher raises apropos his own discipline and applying it to our extension research, just to sensitize myself and the fraternity. I was cautioned by my inner conscience of being vocal and straight, and reminded of the unnecessary dire consequences that may ensue as I am still a budding researcher among professionals. Despite this warning I dared to take this risky opportunity in order to pose these serious questions at the very beginning of my undecided and uncertain career in extension discipline, due to the fact that we extension fraternity are pro-change, progressive, optimistic, and change agents, innovators, good managers, dedicated, critical, and believe in self-correction. We must welcome criticism so as to become more creative and contribute not only to this discipline but also to society as a whole.

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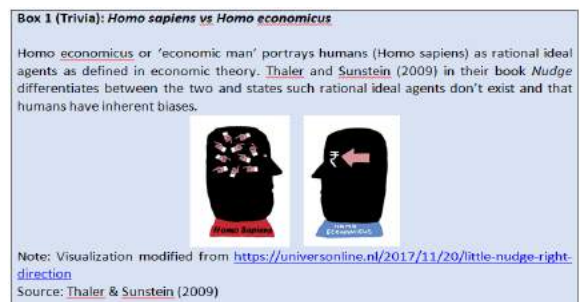
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# 02

## WHAT, WHY, AND HOW TO DO IMPACT ASSESSMENT

Investors and policy makers often need to know how far the programmes they are financing or implementing are having the intended impact. In this blog **Aditya KS and SP Subash** take us through the different methods of impact assessment and explain 'why' and 'when' to use these.

This blog is an honest attempt to explain the basic concepts of Impact Assessment in a language that Homo sapiens can understand and not just Homo economicus (Box 1). In a nutshell, we will be trying to convince you that scary methodologies used (sometimes many of us might have not even heard of these) and econometric juggleries that we employ in assessing impact is perfectly justified. However, a word of caution before you read any further, if you expect this blog to give you the 'best method to assess impact' we are very sorry to disappoint you – there is no 'gold standard' method, best fit for all cases. Our aim is just to introduce you to the different methods of impact assessment, and more importantly, to tell you why and when to use them, and also when not to use a particular method!

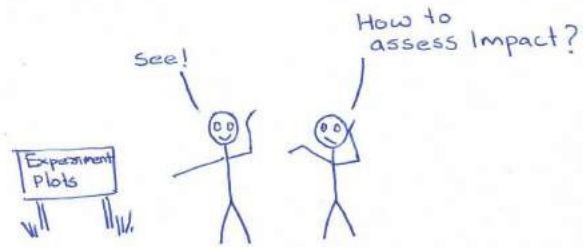


### WHY IMPACT ASSESSEMENT?

*"In God we trust, rest bring data"*

- **Edward Deming**

Policy makers need scientific and reliable estimates of how effective a programme or intervention (technology) is. Even the most promising projects might fail to generate the expected impacts. So, policy makers need to know how far the programmes are generating the intended impact. This equips them to take calls on reorienting the programmes as well as in allocating funds. In this line Impact Assessment is an effort to understand whether the impacts of a programme (Net welfare gain - only for readers who belong to species Homo economicus) are



**Source: Illustrated by authors**

attributed to the programme and not to some other causes. Ultimately, the aim of Impact Assessment is to establish the causal link between the programme and the impact, and to arrive at reliable estimate of the 'size of impact'.

Let us take one case, where a new programme is launched to increase the income of beneficiaries. After a few years, the government wants to know the impact of the programme. One common and very popular approach is to collect data from a few beneficiaries (treatment) and non-beneficiaries (control) and estimate the difference in income between the two groups as impact. However, the difference in mean income between the two groups cannot be called impact, as we haven't yet established 'causation' - how can we say that the difference in income is only due to the programme and not due to other factors? How then to assess impact?

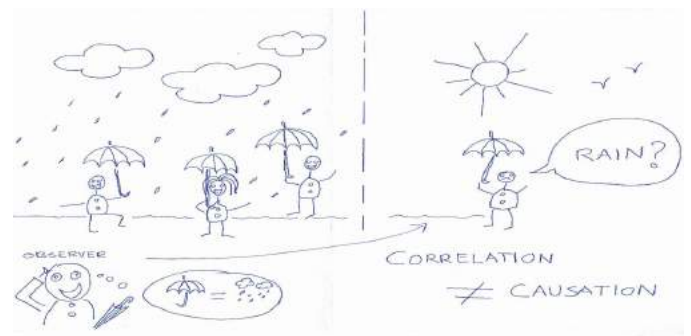
## ATTRIBUTING IMPACT

In lab and field experiments carried out by biological scientists, three principles are used to establish causation: replication, randomization, and local controls. Randomization makes sure that the unobservable characters remain the same across treated and control groups. Local

control ensures that all the variables, except for the treatment, are same across treatment and control.

For example, if the purpose of the experiment is to know the effect of organic manure on crop yield, all other factors like variety, soil type, seed rate, chemical fertilizers, date of sowing, etc., must remain the same across treatment group and control group. If the only difference between treatment and control group is

organic manure, we can safely say that increase (or decrease) in yield is due to manure use. To sum up, local control and randomization in case of experiments ensure that the treated and control groups are similar, which enable us to make 'causal claims' by simply taking the mean difference across groups (for which you need to test statistical significance).



**Source: Illustrated by authors based on Doug Neill's work (read further <https://commons.trincoll.edu/cssp/2013/12/09/10886/>)**

Let us shift our focus back to social science research. Mostly we do research based on 'observational data'; we collect data from observations (samples) where the researcher has no control over the variables unlike an experiment. So, in most cases, the treated and control groups are not similar with respect to many variables and the difference in outcome

### Box 2: Example

Allow us to give you another hypothetical example. Suppose you want to measure the impact of a particular 'badminton coaching center'. You enroll me into the coaching classes for a training course of one-month's duration. So, I belong to the treated group. To measure the impact, you have to pick someone else, who has not attended the one-month coaching class in that center as counter-factual or control. If you pick Saina Nehwal to play against me as control, does it make sense? Based on this, can you say that the coaching class is a total waste because the training did not help me to score a single point? Ideally speaking, if you like to measure the impact of the training, the opponent has to be a clone copy of me, minus the training!

variable (Income for example) cannot be attributed to treatment (Programme or intervention) and would result in bias (Bias can be considered as a cousin of error!). More specifically, bias in estimate of impact arising due to the pre-treatment difference in covariates is called 'Selection Bias'. For example, let us say that we would like to know the impact of rice seed treatment on farmer's income. The usual research design would be to collect income and other data from both adopters and non-adopters. However, as per theoretical expectations, adopters of a technology are more motivated, have better education and extension contact compared to non-adopters. So, we cannot say that higher income of adopters is only due to seed treatment as it could also be due to pre-treatment differences in education, motivation, extension contact, etc. We can say that 'difference in income across treatment and control' as an estimate of impact suffers from 'sample selection bias'.

You might wonder if there are cases where there can be no sample selection bias. Yes, if the beneficiaries for a programme is selected 'at random' then, by definition, the beneficiary group and non-beneficiary group would be similar on average (please note that we are using the term 'similar', not 'same'). Also, the two groups will be similar on average, you can't expect each person in the beneficiary group to be similar to each person in the non-beneficiary group (on different variables). In this case, simple difference of means across treatment and control can be treated as impact and hence we say 'randomness is economists' best friend'. Unfortunately, in most programmes, the selection of beneficiaries is based on some observed characters and not a random assignment (except for one or two programmes in the world, like conditional cash transfer scheme for improving school enrolment in Mexico known as 'Progressa'). It is because few programmes are targeted for a specific target group (like people below poverty line or small farmers) where random assignment is impossible by design. In the case of other programmes, random allotment is simply not practical on a large scale due to socio-political factors.

Isn't sample selection bias due to sampling error? Definitely not. Let me try to convince you that 'random sampling' cannot cure selection bias. Selection bias arises due to pre-treatment differences in beneficiary and non-beneficiary groups with respect to some variables, say education and land holding size, for our convenience. Let us assume that the beneficiaries of the programme are mostly large farmers and well-educated farmers. So, when you take random sample, it is quite obvious that most of the beneficiaries are large farmers and well-educated and vice versa with non-beneficiaries, so random sampling cannot eliminate selection bias. The point we want to make is that random sampling is not the solution for selection bias. However, we acknowledge the importance of random sampling in social science research.

If selection bias is the problem, then why not take the value of outcome variable before implementing the programme as a baseline, and take a second measurement after implementation? Will the difference between the value of outcome variable after the programme and before programme become a measure of impact? Sadly 'no'. The outcome variable is measured at two different periods of time and in between many things might have changed. We cannot attribute the effect only to the programme and causation cannot be established.

The next common misconception is regression of outcome variable against a dummy variable indicating that treatment and all other control variables will be sufficient to account for selection bias and partial regression coefficient of the dummy variable as an unbiased estimate of impact. However, in this scenario, the dummy variable for treatment is not exogenous (as the selection into either treated or control group depends partly on the observed control variables included in the model), which is a violation of ordinary least square (OLS) assumption. Also, if the selection of treatment and control depends on unobservable (like motivation), then the error term will be correlated with dummy variable which is again a violation of OLS assumption. In this case, the estimate of impact will be biased.



By this time, we have made our point clear that selection bias is inherent in observational studies and estimation without accounting for selection bias, which tends to be biased (over/underestimation). Next important question is what should/can we do to account for sample selection to minimize the bias? We would like to make one thing clear: if anyone tells you that some method will eliminate bias don't trust them. Because, no method can completely eliminate bias, each of the methodologies that we discuss here have their own advantages and disadvantages. The purpose is to minimize the bias in estimates and make it as accurate as possible. Moreover, there is no statistical test to tell us the best method for a particular data set, unlike the Hausman test for selection between fixed effect model and random effect model in panel data regression (econometric juggleries). So, the selection of method is left to the discretion of the researcher, who has to take a call based on the research question, size of sample, type of data and other factors. There are different approaches available in literature which could help us in doing impact assessment. We will now briefly discuss these approaches.

## IMPACT ASSESSMENT METHODS

### Randomized Control Trials: The gold standard of impact assessment

We hope you are clear by now that observational studies suffer from selection bias because of 'non-random assignment'. What if we can assign the units into either of the groups randomly? Or in other words, if the researcher has control over the treatment assignment, he could conduct an experiment where the treatment allocation is done randomly such that participation in the programme is independent of either observed or unobserved covariates. By definition, random allotment would mean that the treated unit and control unit are similar to each other on average and are comparable (we need to perform balancing test after randomization to make sure of this). Simple difference in mean outcomes across the group will be an estimate of impact. This looks simple on paper, however, it is difficult to implement in the field. This approach can be used only when the treatment allocation is under the control of the researcher. RCT needs to be planned before

a programme/ intervention is implemented. Furthermore, in cases where there is possibility of spillovers, villages or clusters may need to be randomized. Even after taking care of all these things, the RCT method is criticized for lacking External Validity.

Do you know about any RCTs that provide evidence that we should use RCTs?



freshspectrum.com

Source: <https://designmonitoringevaluation.blogspot.com/2010/05/quotes-related-to-evaluation.html>

This is an ideal approach for impact assessment, regrettably, most researchers won't get the luxury of doing it. Most of the impact assessments are ex-post observational studies and for such cases quasi-experimental approaches are available. A few commonly used approaches are discussed below.

### Heckman two step model for impact assessment

In this approach, in the first step, a selection equation is estimated to capture the probability that an individual belonging to a treatment group, is dependent on a set of observed explanatory variables. This is usually estimated using Probit regression. From this regression, we estimate expected value of a truncated normal random variable, commonly known in literature as Inverse Mills ratio (IMS) or Hazard function [technically speaking Inverse Mills ratio tell us the probability that an individual will be in a treated group (or beneficiary group) over cumulative probability of the decision. Which explain that part of the error term which captures the difference in outcome variables due to the selection and not the programme itself. Is it too much jugglery? Just ignore]. In the second stage, outcome variable is regressed upon dummy variable for treatment, along with a set of control variables, including IMS as

an explanatory variable to minimize the effect of endogeneity (In simple terms, endogeneity in this context implies that the participation in a programme is determined by a set of observed and unobserved variables and is not exogenous). However, the Heckman model is developed for improving the explanatory power of the model in special case where sample self-selection leads to truncated dependent variable and OLS estimates are biased. So, the Heckman model is not specifically developed to establish the causal relationship. Hence, whenever possible, it is better to use models which are developed specifically for establishing causation. If the choice of method is limited by the smallness of a sample, it is better to use Heckman model in addition to other simple methods, such as Regression Adjustment as robustness check.

### **Regression Adjustment**

Another very simple method (at the cost of efficiency though) for measuring impact is Regression Adjustment. We will try to explain the method in the simplest terms (though at the cost of technical fineness). The Regression Adjustment model fits two separate regressions – for the treated and control units – and estimate the partial regression coefficients for all the control variables included in the model (dependent variable - outcome variable like income). In the next step, the model estimates 'Potential Mean Outcomes' (PMO). PMO is the average value of the outcome if all the units in the sample are either in treated or control. (For example, what would be the mean income in case all the units in our sample were to be a beneficiary of the programme?).

The Regression Adjustment model first calculates the expected value of dependent variable for the entire sample based on coefficients of regression estimated on treated units. Mean of the expected value is termed as PMO of treated group. Similarly, expected value of dependent variable for the entire sample based on coefficients of regression estimated on control units is used to estimate PMO for control units. The difference between PMO of treated and control groups is considered as estimate of impact. Again, a word of caution, the Regression Adjustment method is very sensitive to functional form of the outcome

equation and model specification. In many cases, the estimate of impact changes drastically with addition/deletion of a control variable indicating model dependency leading to bias. In spite of these limitations, RA can be used as a method to assess impact, particularly when the size of sample is not large enough for semi-parametric matching methods, such as Propensity Score Matching.

### **Propensity Score Matching**

Another very popular and widely used (or should we say abused?) method for assessing impact is Propensity Score Matching (PSM). Earlier, we had explained that the problem in observational studies is that we don't have a proper counterfactual for assessing impact because of non-random assignment of treatment. However, what if we can select units from the control group, which are similar to the treated units and construct a quasi-counterfactual group? PSM, and also many related matching methods, use the same logic for impact assessment. The objective is to find the counterfactual for each treated unit from the control group we have. Suppose, in a treated group we have a farmer with 10 acres of land, 15 years of experience, who belongs to OBC group, and similar data on many other variables.

The matching methods try to identify one (or more depending on type of matching we use) farmer from the control group who is very similar to the treated unit with respect to all these characteristic features. If we want to match with respect to one character, it is fairly straightforward, however, as the number of control variables increase, matching becomes increasingly difficult. We call it 'Curse of Dimensionality'. So, Rosenbaum and Rubin (1983) came up with a solution that if we can calculate 'propensity score' for each unit in the sample for each individual, which is a function of all the explanatory variables, then this propensity score can be used as a base for matching. This is as good as reduction of dimension, information on a set of control variables is captured in a single propensity score.

The propensity score is usually calculated based on logit or probit regression of treatment

participation on a set of control variables. All those control variables which can impact either programme participation or the outcome should be included in the model. Once the propensity scores are calculated, the treated units are matched with the control units having similar propensity scores. The mean of difference in outcomes between treated and control units within each matched pair is considered as estimate of impact. (The basic logic is that the treated unit and the control unit in a matched pair are very similar to each other with respect to all covariates except for treatment. So observed difference in outcome is directly attributed to the treatment.) But before that we need to make sure that the propensity scores are good enough to achieve matching on the control units we have used for estimation. For this, the entire data is divided into different strata based on the value of propensity scores. Remember the basic assumption – the matching method will work if, and only if, observations having similar propensity scores also have

similar values of control variables (on an average). This needs to be tested using a balancing test. Further, there could be a chance that many of the treated units have propensity scores for which no control variables are available for matching, which is termed as ‘lack of common support’.

Of late PSM has received a fair share of criticism due to some serious drawbacks. We won’t discuss all of these in detail, however, a few of them are worth mentioning here. PSM being a semi-parametric method, needs a bigger sample size to achieve proper matching and subsequent reduction in bias (so avoid using PSM for small samples). Secondly, PSM is centered on the assumption that selection bias arises due to observed variables (like age, education, caste, etc.) and not on unobserved characters (like motivation). So, if there is selection bias due to unobservable factors, PSM suffers from ‘hidden bias’.

### Box 3: Best practices in using PSM for measuring impact

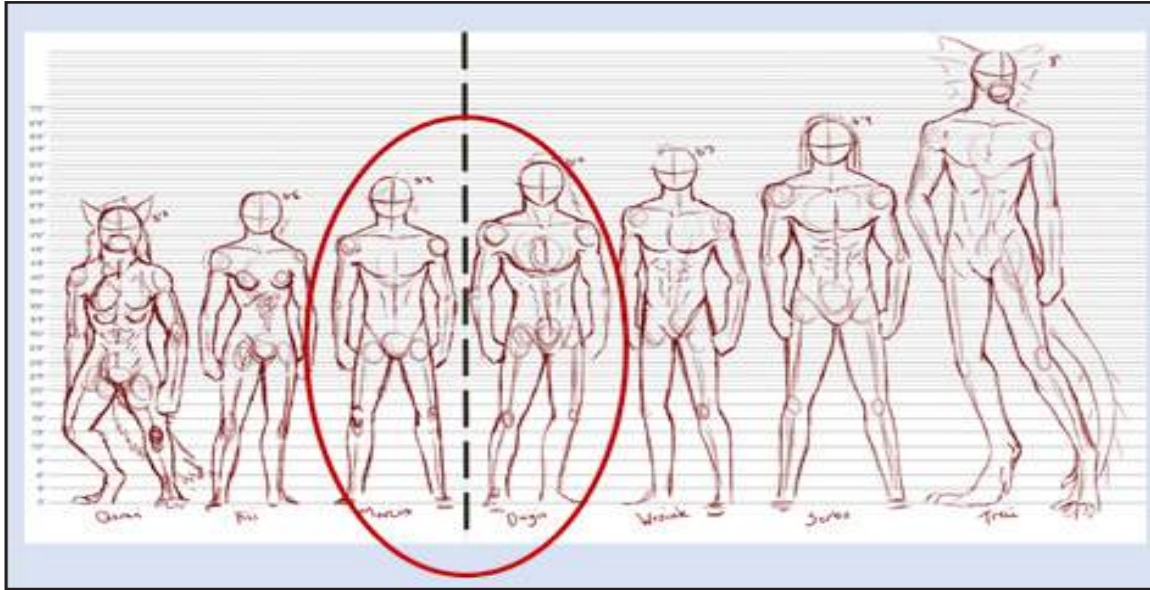
- Use PSM only if you have a large sample size;
- Common support assumption is satisfied;
- All the relevant covariates/controls are used (only those variables which influence programme participation/value of outcome variable must be used in the analysis);
- Ensure that balancing property is satisfied;
- Try different methods of matching (Nearest neighbor, Caliper, etc.);
- Do sensitivity analyses for the estimates.

### Regression Discontinuity Design

Regression Discontinuity Design (RDD) is a quasi-experimental approach of impact assessment just like PSM. RDD suits a situation where the probability of assignment in a treatment changes discontinuously with some forcing variable (Continuous variable). For instance, a particular programme is designed exclusively for small farmers. Here land cultivated by a farmer is the forcing variable and a farmer who has less than 2 hectares of land is automatically enrolled in the programme as beneficiary. So, ‘land cultivated’ becomes the forcing variable and 2 ha becomes the cutoff point. The key assumption is that the discontinuity design creates a randomized experiment around the cut-off value of the forcing variable. (In simpler terms, a farmer who has 2.1 ha of land, who is not a beneficiary of the programme, is a good counterfactual for a farmer who has 1.9 ha of land who is a beneficiary of the programme). In other words, the

units which are near to either side of the cutoff (to both left and right of cutoff point) are good counterfactuals for measuring impact and only those units will be used to measure impact (see Box 4 for illustration). Well, how far must the units go to be included in the model? To decide this, optimum band width is selected (distance of units from the cutoff to be included in the model) based on selected optimization criteria. Then amongst the selected units, find the good counterfactuals, average treatment effect is usually estimated by fitting two separate regression functions (one to left of cutoff and one to the right). The biggest advantage of RDD is that the jump in regression line at the point of cutoff can be easily visualized. However, this method is criticized for using only the observations that are close to cutoff, leading to loss of information. It is also important to note that the method needs a large sample size.

## Box 4: RDD illustration



Let's consider an example where a programme was designed to give benefits to people who are more than 6 feet in height. Comparing the person who is on the extreme right (who is a beneficiary) with a person on the extreme left (who is in the control group) is not the best thing to do as they are not good counterfactuals. As discussed earlier, the RDD approach could be used to compare the impact of the programme by comparing the beneficiaries who are just above and below the programme cutoff (6 feet height). The optimum bandwidth would result in comparing people who are within a specific height parameter (circled).

Source: Modified by the authors based on work by Waspino (<https://www.deviantart.com/waspino/art/Height-Anatomy-chart-WIP-285426107>).

### Difference in Difference method

Another popular method of impact assessment is Difference in Difference estimator. If you remember, we had said earlier that before and after comparisons suffer due to the 'trend effect' – many things (variables from methodology perspective) change over a period of time and observed change in impact cannot be attributed to programme participation. However, DID assumes that average change in income (or any outcome variable) due to 'other factors' or 'trend' would be the same across treated and control group. In other words, average difference in income before and after the implementation of the programme in the control group is due to 'trend effect' as they have not received the treatment. So, by subtracting the average difference in income before and after the implementation of the programme in the treated group from that of the control group (which capture trend effect), can we get the estimate of impact? As you might have noted already, DID rests on one very crucial assumption: DID assumes that

average change in income (or any outcome variable) due to 'other factors' or 'trend' would be the same across treated and control group. (On a technical note, this means 'the variables that affect the value of outcome other than treatment are either time invariant or the time varying variables are group invariant. Confusing isn't it?) This holds true, if and only if, the income in treated and control group moves parallelly in the pre-treatment period. This we call as 'parallel trend assumption', which needs to be tested before using DID. If the parallel trend assumption is violated, we may have to use matching methods before using DID. Also, if there is spillover effect of a treatment, then the DID estimates may be biased.

We are providing one selected paper for each of the approaches discussed below for you to read and understand (Box 5).

## Box 5: Articles using different impact assessment approaches RCT

### RCT

Emerick K, de Janvry A, Sadoulet E, and Dar MH. 2016. Technological innovations, downside risk, and the modernization of agriculture. *American Economic Review* 106(6):1537-1561.

### Heckman two step model for impact assessment

Aditya KS, Subash SP, Praveen KV, Nithyashree ML, Bhuvana N and Sharma A. 2017. Awareness about Minimum Support Price and its impact on diversification decision of farmers in India. *Asia and The Pacific Policy Studies* 4(3):514-526.

### Regression Adjustment

Agula C, Akudugu MA, Mabe FN and Dittoh S. 2018. Promoting ecosystem-friendly irrigation farm management practices for sustainable livelihoods in Africa: the Ghanaian experience. *Agricultural and Food Economics* 6:13.

### Propensity Score matching

Aditya KS, Khan M.T and Kishore A. 2018. Adoption of crop insurance and impact: Insights from India. *Agricultural Economics Research Review* 31(2):163-174.

### Regression Discontinuity Design

Sekhri S. 2014. Wells, water, and welfare: The impact of access to groundwater on rural poverty and conflict. *American Economic Journal: Applied Economics* 6(3):76-102.

### Difference in Difference method

Khan MT, Kishore A, Pandey D and Joshi PK. 2016. Using zero tillage to ameliorate yield losses from weather shocks. IFPRI Discussion Paper 01562. Washington D.C.: International Food Policy Research Institute.

Apart from these methods, there are many other methods/approaches for impact assessment. Some of the others worth noting are: Inverse probability weighting, Inverse probability weighting regression adjustment, Endogeneity Switching Regression, PSM-DID, Coarsened Exact Matching (CEM), Instrumental Variable technique and synthetic control.

## IMPACT PATHWAYS AND THEORY OF CHANGE

Though the objective of the blog is to highlight the need for, and methods of, impact assessment, it would be incomplete if we forget to mention the concept of impact pathway.

The first step of any impact assessment exercise has to be development of impact pathways. Impact pathways are developed based on theoretical expectations regarding the expected outcome of a project and various pathways through which the impact is manifested. Impact pathways are developed based on 'theory of change'- the process through which the changes occur, leading to long term desired changes. Let us take a simple example of women's participation in SHGs. Participation in SHG activities, such as training

and sharing information among participants, helps in increasing knowledge and skill sets. This might lead to a few women going on to explore entrepreneurial options like vegetable cultivation or kitchen gardens, leading to higher incomes. In turn, higher income can empower these women. Empowerment of women can then be linked to better nutritional and health outcomes. Such an impact pathway acts as a guide for conducting impact assessment. Assessing impact without impact pathways is akin to what George Fuechsel says, "Garbage in, garbage out!"

## TO CONCLUDE

As discussed earlier, through this blog we intended to orient readers on the need for impact assessment and to introduce a few methods of impact assessment. The discussion on each method is driven by the principle of parsimony: the simpler is better than the better. However, we acknowledge that, in our endeavor to simplify, we might have missed out on a few technical things. The blog is only for understanding the basic principles behind each of the methods rather than to acquaint readers with the details on how to use it. As you are aware, by this time, there are many methods to

measure impact. Each has its own premise, set of assumptions, advantages and disadvantages. Researchers must cautiously choose the right method after in-depth understanding of the research question, method and data availability. A detailed review of each method should be done so as to understand the 'good practices'

and 'robustness checks' that each method demands. Moreover, reading recent literature is always advisable as Impact Assessment is an ever-evolving field where new methodologies/modifications and post-estimation tests for existing methodologies are developing at a rapid pace.

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# 03

## GETTING SMART WITH SURVEYS: USING COMPUTERS, TABLETS OR SMART PHONES FOR HOUSEHOLD SURVEYS

Tablet-/smart phones-based surveys are better than paper-based surveys as they make it easy to monitor data collection on a real time basis. Also, it saves time in data entry as the collected data is directly retrieved in the form of Excel sheets. In this blog **Aditya KS, Subash SP and Bhuvana N** discuss survey data collection using computers, tablets and smart phones. A detailed step-by-step explanation on using Kobo Tool Box – an open access resource for collecting survey data using tablets/mobile phones – is also provided here.

Surveys are the bread and butter for any type of researcher in the social sciences; be they students (Masters and PhD) or researchers, or organizations, such as the National Sample Survey Office (NSSO), which carry out large surveys for tracking different socio-economic characteristics. Research in the field of social science is mostly observational (except when it uses experimental approaches) and a researcher has no control over the events. The data is collected as they are observed and analyzed to draw conclusions, and the researcher has to depend on either secondary or primary data to draw inferences. As most of the secondary data sources are either macro level aggregates or not suitable to address the specific research question under consideration, primary surveys are inevitable in most research projects. Primary surveys offer flexibility to the researcher to understand different socio- economic and cultural perspectives related to the research problem.

From the perspective of a social scientist in Agriculture (Agricultural Extension or Agricultural Economics), primary surveys are a strategic tool for assessing the demands, aspirations, priorities and challenges of farmers and other stakeholders in agriculture. They are also important for understanding the target population while planning extension intervention or designing policies. Further, surveys are equally important in assessing the impact of interventions (technologies or policies).



## SURVEYS

The history of survey-based data collection goes back to Seebohm Rowntree's first poverty survey in 1899 at York, England (Careletto and Gourlay 2019). Over the years household surveys evolved rapidly. Simultaneously, the evolution of technological aids in surveys – to make it easier and reduce errors – are also progressing. In the next section, we talk a bit about the problems of paper-based surveys before discussing how to do a survey without paper (super cool and ecofriendly too!!).



**A paper-based survey in the mid-hills of Nepal**

### Paper-based survey

Traditionally, surveys use paper-based questionnaires. A set of questions (Structured or semi-structured) are developed based on the research problem and printed on paper (a lot of sheets). Enumerators (surveyors) go to the field and record responses on the paper sheets, which later gets digitized through a data entry process. This is a cumbersome process as it takes quite a lot of time and has several problems and challenges associated with it. For instance, data entry can take a long time and many human errors can creep in. Furthermore, real time monitoring is difficult and often the errors in surveys are detected only after the data is entered and tabulated. By that time, it is too late to do anything about it. Using computer/tablet or mobile-assisted surveys can help to overcome these. We will discuss the advantages of computer-based surveys vis à vis paper-based ones in the later part of this blog.

### Computer-Aided Personal Interviews (CAPI)

Technological advancements have changed the way surveys are carried out now. Computer-Aided Personal Interviews (CAPI) is one such technological advancement in data collection (satellite and big data are the other

advancements). CAPI is a face-to-face data collecting method in which the enumerator uses a small computer, or a tablet, or a smart phone to collect the data. Availability of hardware (like inexpensive computers, tablets and smart phones) and software (both paid and Open Access) has made it easier to carry out CAPI surveys.

This is helpful for two very important reasons:

1. No need for data entry process to digitize the information as in paper-based surveys;
2. Real time data monitoring to minimize errors.

There are many software tools available that are customized to carry out face-to-face surveys. There is a wide variety of software tools to choose from, and they can be used by people with no programming knowledge (like us!). They are increasingly being used by researchers in organizations, such as the World Bank, and CGIAR institutes.

The latest Period Labour Force Survey (PLFS) carried out by NSSO used CAPI for data collection. ICAR- National Academy of Agricultural Research Management (NAARM) and PJTSAU, Hyderabad, undertook a consumption survey of Telangana State using CAPI in 2017 (Kumar et al. 2017). There are several advantages and disadvantages with CAPI which we will discuss here. (The advantages and disadvantages given here are based on DIME 2020 and our own experience.)

### Advantages

- The collected data gets digitized immediately and sent to the server. In places with good networks we could carry out high frequency checks (cross checking the responses on a daily basis). Real time monitoring is really easy unlike paper surveys, a person sitting in the office can cross-tabulate all the responses and test for data consistency.
- Enumerators can be monitored in case of larger surveys. The start time, end time, GPS location can be automatically recorded and supervisors/researchers get to see it. Even the interviews can be



randomly recorded (without the knowledge of enumerators) and later verified by supervisors/researchers.

- It's easy in case of questions with skip logic – goes directly to a different set of questions based on the response to a previous question (e.g., If yes then...? And if No then...?).
- Do calculations and conversions easily by using inbuilt calculators (for instance Bigha to Hectare, and so on).
- Collect data, such as images, farm plot sizes (GIS-based plots), and qualitative data (record statements).
- Avoid errors in data collection (missing questions) and data entry (most common errors).
- Data validation can be incorporated, for example, farming experience cannot be more than the age of the farmer. Such conditions can be imposed while preparing the survey itself to avoid the errors.

In a nutshell, CAPI offers many advantages in terms of features to reduce data collection errors. Irrespective of these advantages, there are certain disadvantages, rather challenges, in using CAPI.

### Disadvantages

- Respondents may not be comfortable with CAPI-based survey. They get suspicious and often distracted seeing the gadgets. (At some rural villages in Byndoor district of Karnataka, our enumerators were forcibly locked up in a room and we had to get police help to get them out. The community was not very open to outsiders and using tablets made them even more suspicious. Gram panchayat election was also close at hand!- Don't worry such situations won't happen all the time.)
- Need trained enumerators (longer training periods) with a bit of knowledge on handling gadgets.

- Difficult to carry computers and tablets in crime-ridden areas (Risk of theft is there - in one of the surveys it happened to us).
- They also require electricity (back up batteries can help) and good network connectivity (although data could be uploaded to a server once a week or later in a place with good connectivity).
- Developing the questionnaire in CAPI is time-consuming compared to paper-based questionnaire (though the overall time saved is unquestionable).
- Language restrictions (unlike paper-based surveys, CAPI has limited options for developing the questionnaire in local languages).

### Software and Hardware essentials to carry out CAPI survey



Satellite image-based plot data

We have different software available for CAPI surveys. A list of commonly used ones are given in Table1. Each of them have their own set of advantages and disadvantages. A detailed discussion on each of them is beyond the scope of this blog. Keeping in mind that many of our readers would like to know about the open source options to carry out CAPI surveys, we have provided a detailed step-by-step guide to use Kobo Tool Box, a free and open access software to carry out CAPI surveys. However, if the researcher has money to go for paid software, he can always buy one.

Before starting our discussion on Kobo, let us try to understand a few points that must be kept in mind while choosing the software and hardware for CAPI. Some of the important questions to be asked while selecting software are:

- What kind of data is needed (text, pictures, audio)?
- How are they managed (does it require its own server?)?
- What is the output file format (most of them have multiple options)?
- Does it have language support (native language questionnaire)?

Similarly, while choosing the hardware (tablet/computer/smartphone), first, the hardware should be compatible with the software requirements; and it also calls for a good quality camera (if pictures are to be recorded).

Further the size of the screen depends on the length of the questionnaire (for shorter questionnaires smart phones are fine, but for larger questionnaires tablets with 7-inch screens are preferable). The hardware should also have enough internal memory (8 GB preferably) and external storage (SD cards), the gadget should also be GPS enabled with better accuracy (10-15 meters), and good battery life.

It is a good practice to purchase tablets at the institute level. However, there is also an option to rent them. If the organization is involved in frequent surveys, it can also purchase cloud storage to store all the survey data at one place. However, the point is that, under resource constraints, android mobile phones are enough to carry out a CAPI survey. The table below provides a snapshot of a few software options for CAPI surveys.

**Table 1: Software for CAPI**

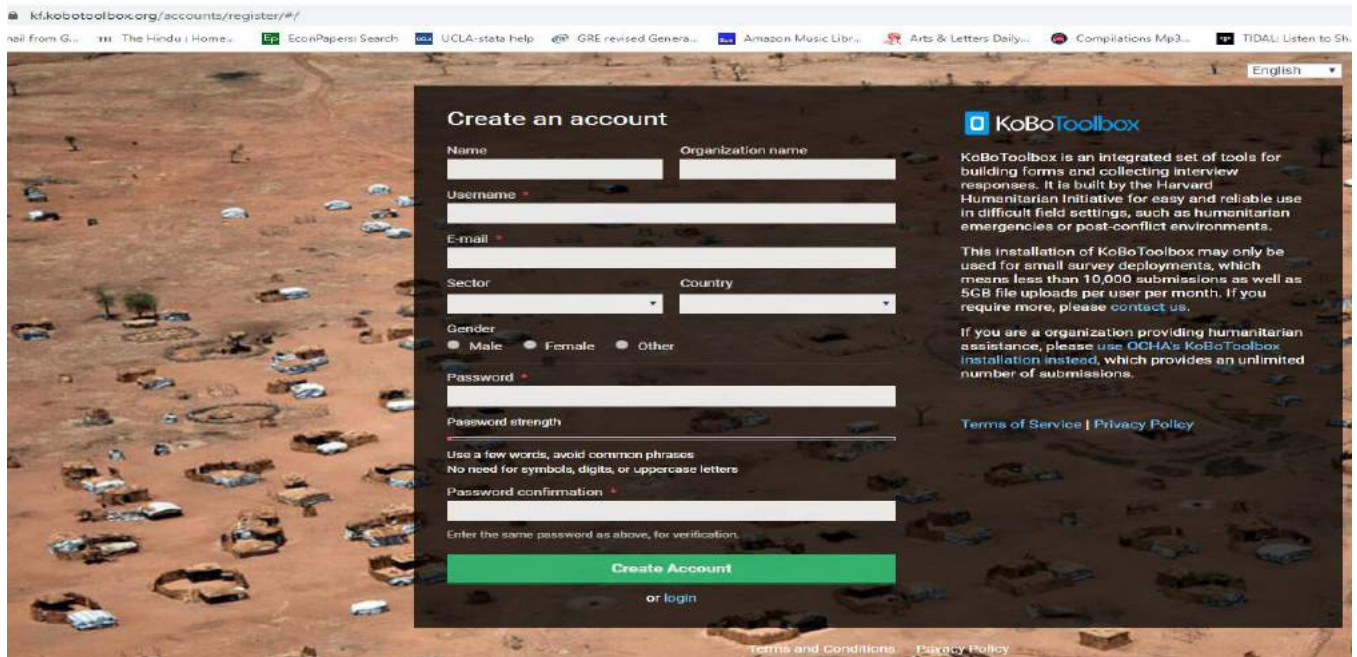
No	Software	Developer	Access option	Link
1	Blaise	Statistics, Netherlands	Restricted	<a href="https://blaise.com/">https://blaise.com/</a>
2	SurveyCTO	Dobility Inc.	Paid	<a href="https://www.surveyccto.com/">https://www.surveyccto.com/</a>
3	CSPRO	United States Census Bureau	Open Access	<a href="https://www.census.gov/data/software/c_spro.html">https://www.census.gov/data/software/c_spro.html</a>
4	Dooblo	Dooblo Ltd., Israel	Paid	<a href="https://www.dooblo.net/">https://www.dooblo.net/</a>
5	SurveyBe	Economic Development Initiatives Limited, UK	Paid	<a href="https://surveybe.com/">https://surveybe.com/</a>
6	SurveySolutions	The World Bank	Open Access	<a href="https://mysurvey.solutions/">https://mysurvey.solutions/</a>
7	Kobo Tool Box	Harvard Humanitarian Initiative	Open access (Researchers)	<a href="https://www.kobotoolbox.org/">https://www.kobotoolbox.org/</a>
8	Open Data Kit (ODK)	University of Washington's Department of Computer Science and Engineering	Open access	<a href="https://docs.opendatakit.org/odk-x/survey-intro/">https://docs.opendatakit.org/odk-x/survey-intro/</a>

As stressed earlier, even though many paid software options are available, in this blog we will focus on a very commonly used one – Kobo Tool Box – a free and open access software for CAPI survey.

### Kobo Tool Box

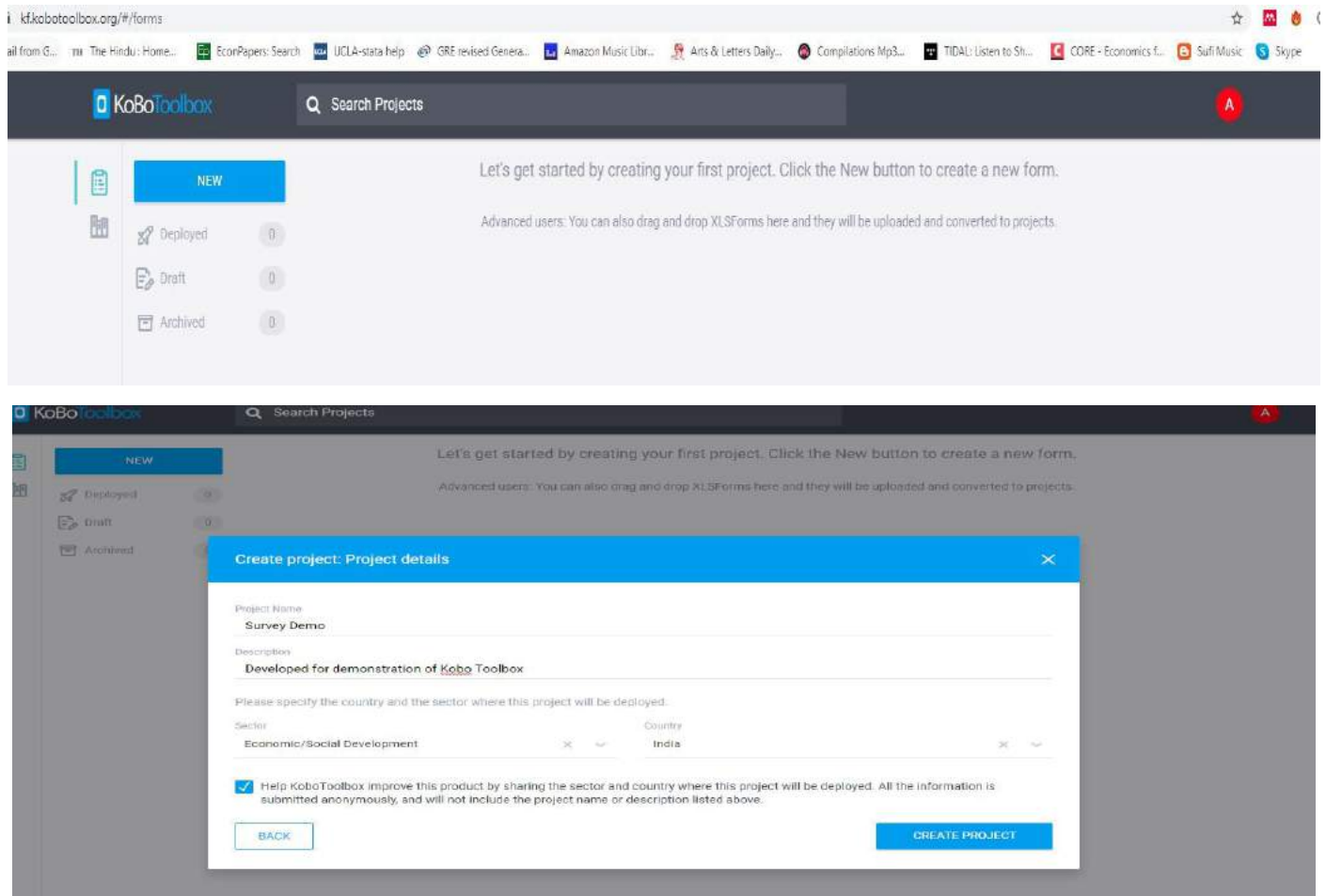
Kobo Tool Box is an open access toolset for collecting survey data using mobiles or tablets. In this section we will elaborate on how to use

Step 1: Register as a researcher at Kobo on the following link <https://www.kobotoolbox.org/>. This offers 10,000 submissions per month with 5 GB of storage space, which is sufficient for most of the surveys done in academia. After registering, please note the username carefully, you will need it later.



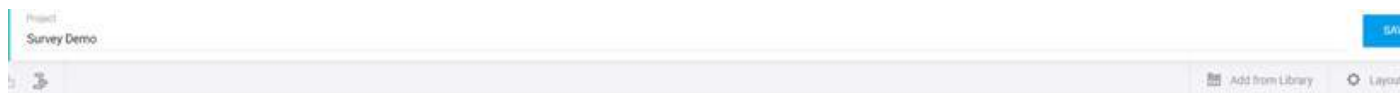
### Step 1

Step 2: Login to your account and click on New to start preparing the survey schedule. Give a project name, select the suitable discipline and select the country. Click 'Create Project' to proceed to the next step.



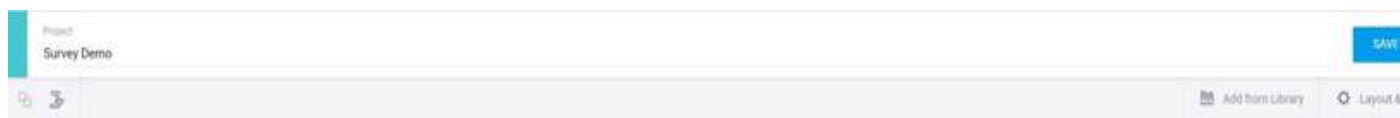
### Step 2

Step 3: Click on +Add Question and select the question type. There are different types of questions available - text, numerical, select one, select many, decimal, rating, ranking, grid, date and time, etc. According to the expected type of answer, select the right question type.

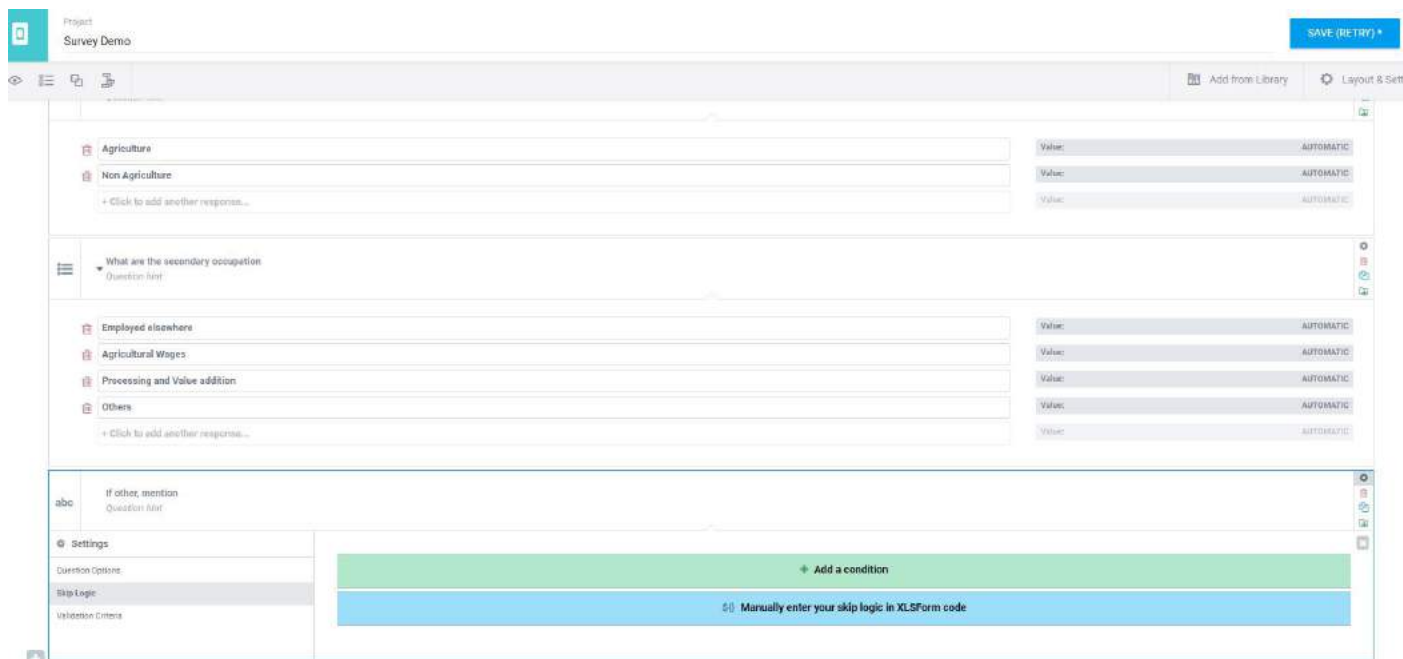


### Step 3

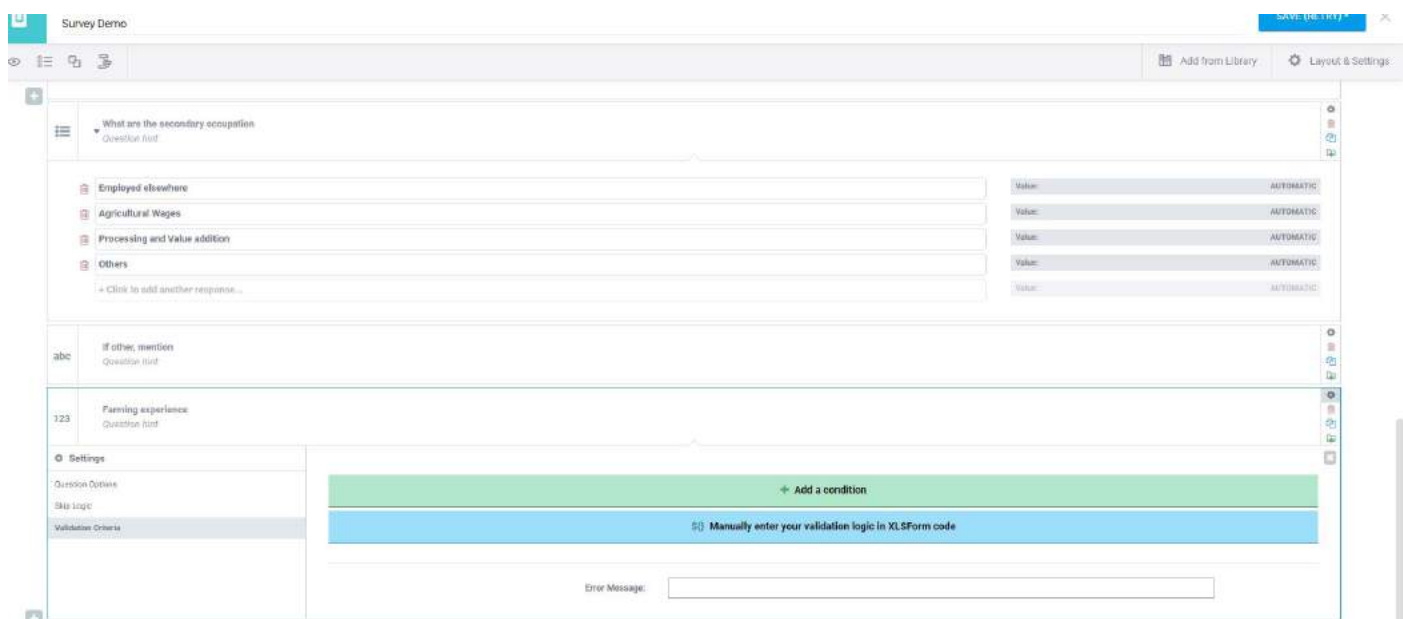
For example, family size will be expressed in terms of whole number, hence the question type has to be numeric. In the question 'Major Occupation', the right question type is select one, where either 'Agriculture' or 'Non Agriculture' has to be selected. In the 'Secondary Occupation' question, farmer can have more than one secondary occupation, hence, select many is the right choice.



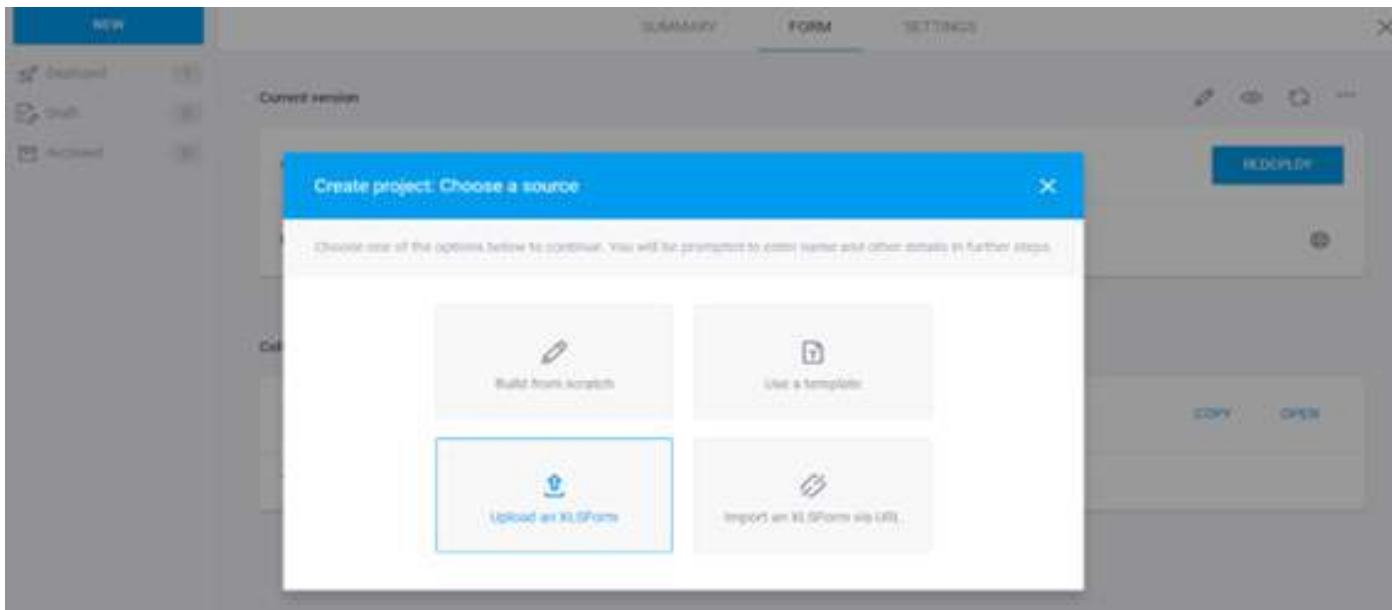
Skip logic is another attractive feature. Based on the response to the previous question, you can impose a condition to display or skip a particular question. For instance, the question, 'mention the other occupation' is displayed only if the respondent has selected the 'other occupation' in the previous question. Or else that question will be skipped. This can save a lot of time. For instance, consider a survey involving two crops. If the farmer is not growing wheat, all the questions pertaining to wheat will be skipped if this logic function is appropriately used.



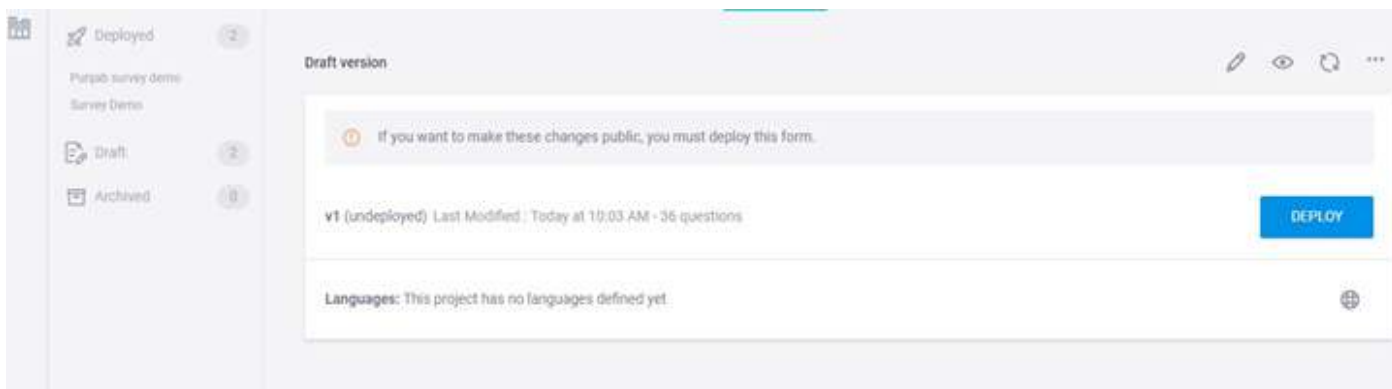
Another useful function is Validation criteria. You can restrict the response values within a limit to avoid data entry errors. For example, the question is 'What is the farm gate price of rice in Rs/kg?' The answer has to be less than 50 even by conservative estimates. But, the enumerator could get confused and enter 1200 (considering it as Rs/quintal). To avoid such errors, we can use validation criteria to limit the response to less than 50. If the enumerator enters any value higher than that an error message will pop up. We can even customize the error message to remind him that the price is in Rs/kg, not in Rs/quintal.



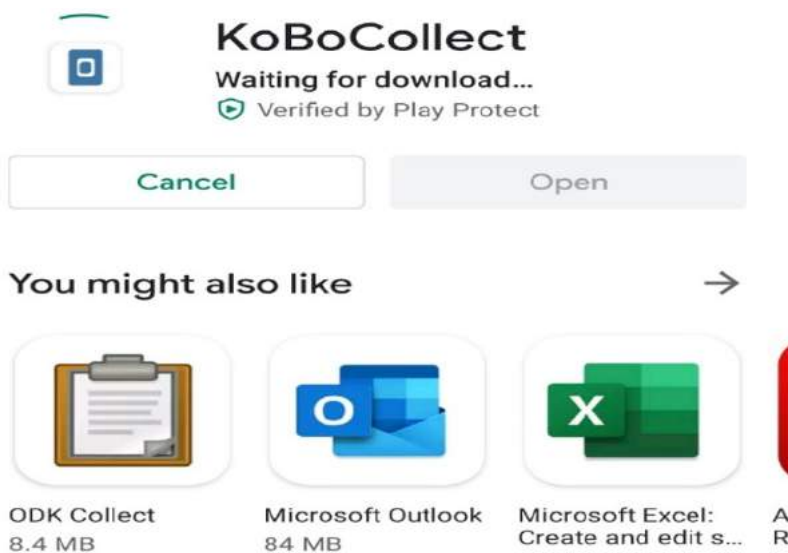
Making the questionnaire directly in the Kobo Tool box can be time consuming and repetitive. The alternative is to prepare the questionnaire in 'Open Data Kit (ODK)' format and upload it directly to Kobo. Understanding the ODK format at the beginning can be a bit tricky, but it will save time in the long run. However, explaining the ODK format is beyond the scope of this blog. One sample ODK file is anyhow provided in the link below, which can be directly uploaded to Kobo (link).



Once the questionnaire is ready, first preview it. If satisfied, then deploy the questionnaire.



Step 4: Next step is to download the 'KoBoCollect' in all the devices which will be used for data collection (preferably Android, in IOS devices Web Form can work).

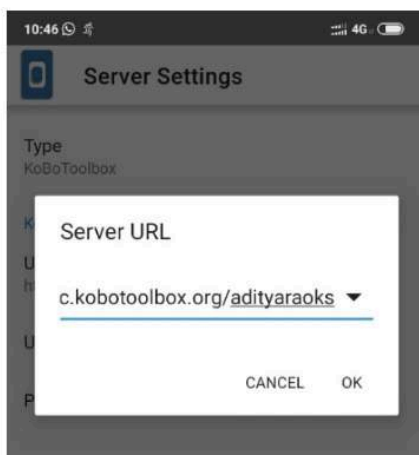


#### Step 4

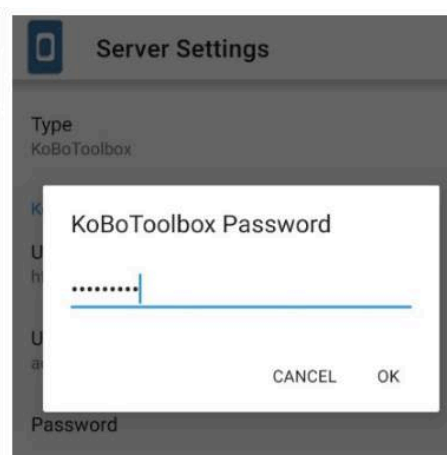
Step 5: Once installed, go to the general setting - server. Modify the server URL as <https://kc.kobotoolbox.org/username> - here in the place of username, you have to input the username that you had used to create the survey schedule. For instance, in the demo survey, the username used is 'adityaraoks'. So the URL is edited to include adityaraoks at the end.



**Step 5a**



**Step 5b**



**Step 6**

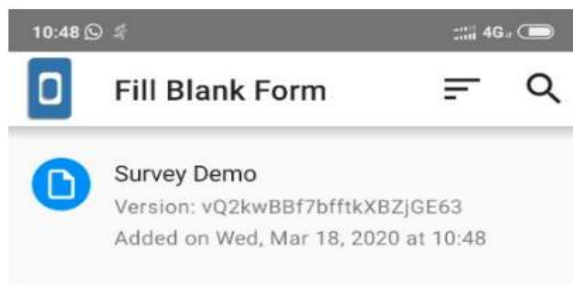
Step 6: Enter the username and password of the Kobo account which is used to generate the survey. This is a onetime process and it won't ask for username and password again.

Step 7: Click on the 'Get Blank Form' tab. All the surveys deployed by the respective Kobo account will be displayed. Select the survey which you want to fill.

Step 8: Now go to Fill blank form. Here you will see the questionnaire that you had developed.

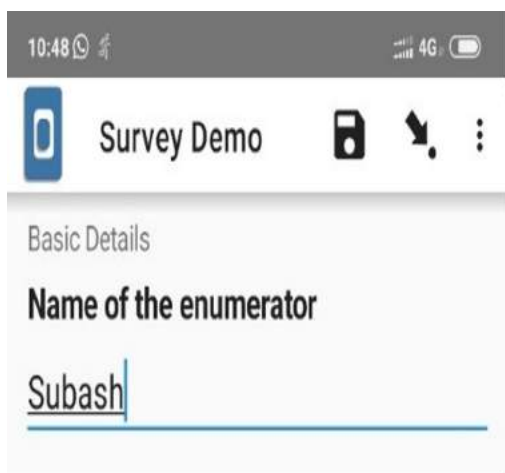


**Step 7**

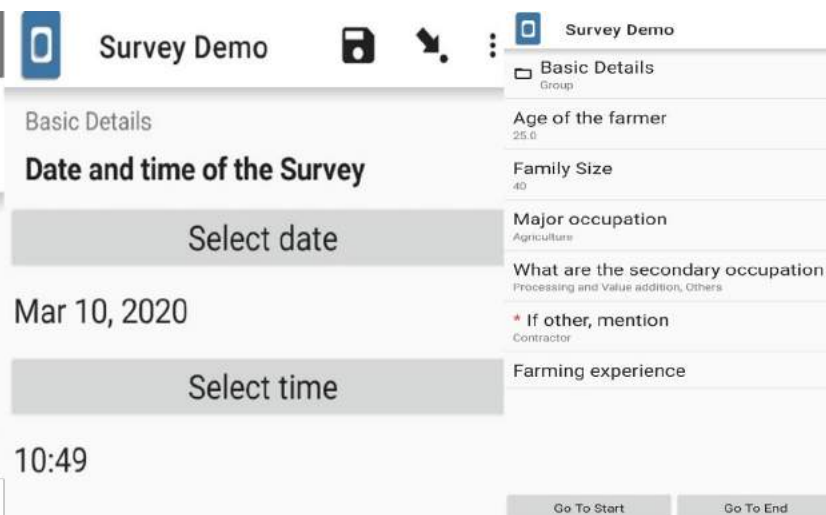


**Step 8**

Step 9: Now you can see all the questions - answer them till you reach the end of the survey.



**Step 9a**

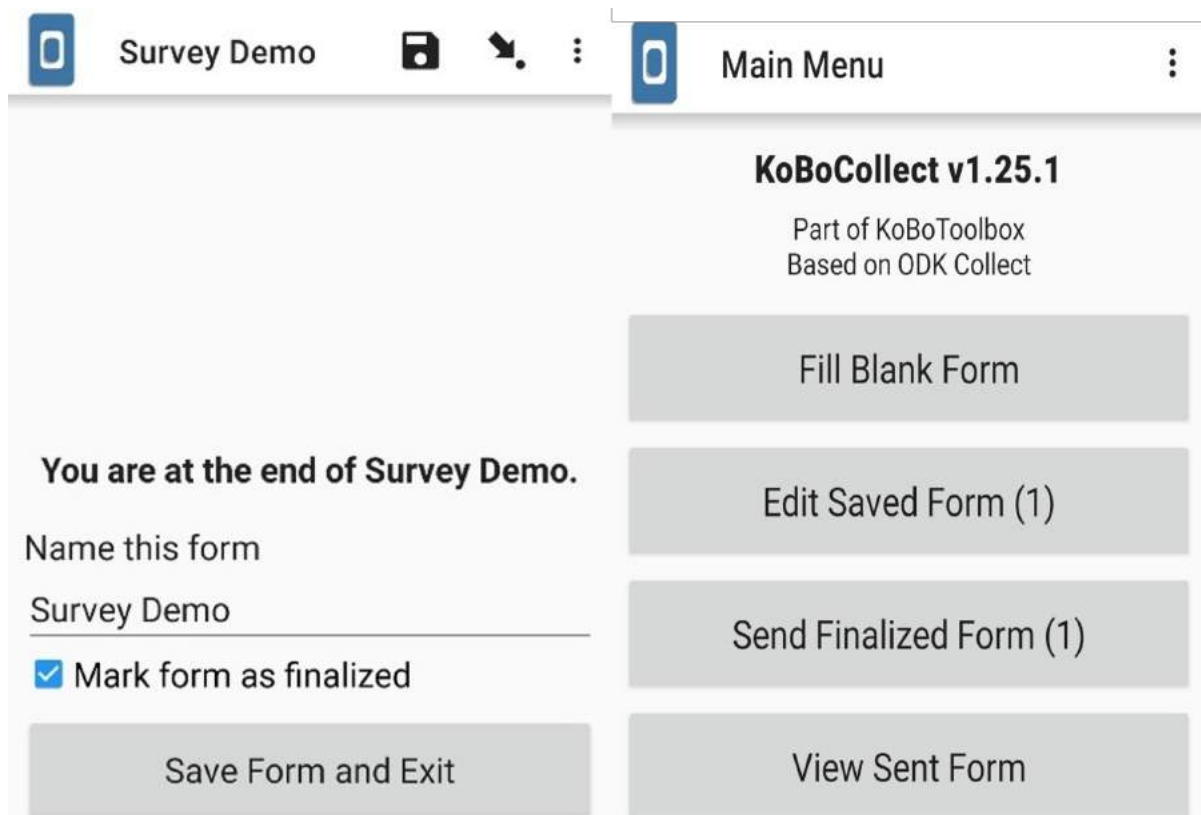


**Step 9b**

**Step 9c**

Step 10: Click on Save and Exit.

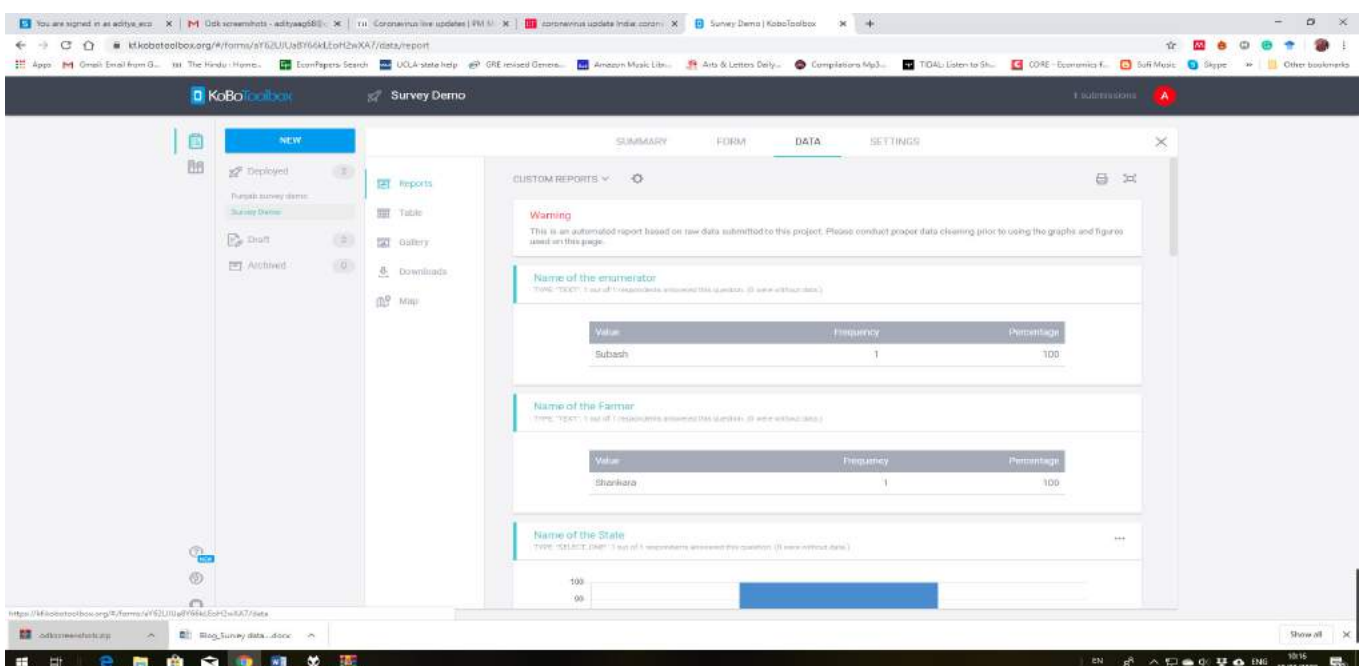
Step 11: Once you have the internet, click on the send finalized form option. The Survey data collected will be sent to the server, which can be immediately accessed. So, the survey can be conducted even when there is no internet connection. Finished surveys can be sent at the end of the day once you have the internet connection.



Step 10

Step 11

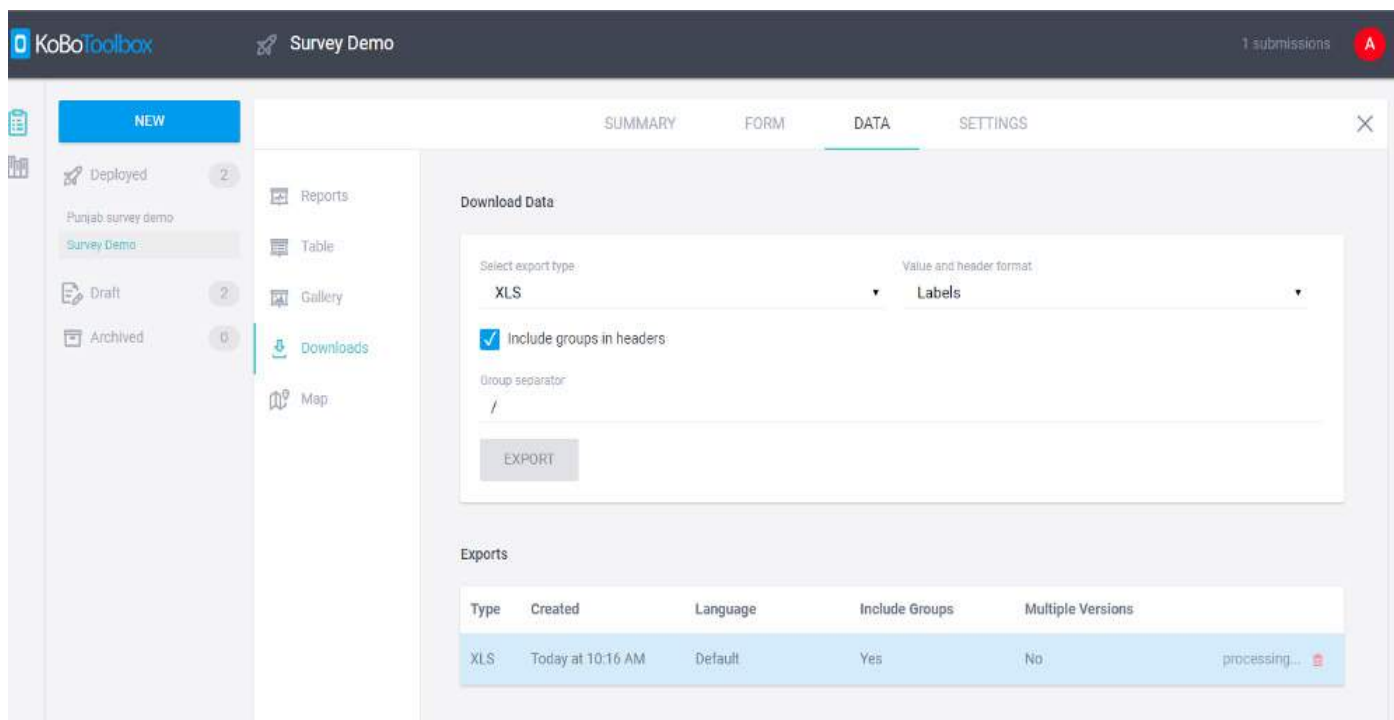
Step 12: Next step is to access the collected data from the server. Once the form is sent by the enumerator, we can access the data by clicking on data tab. Custom graphs and tables are displayed here.



Step 12



Step 13: The data can be downloaded in XLS format. The person monitoring the survey can check for the consistency of data by tabulating or summarizing the relevant information. Tabulating the data by enumerator can also indicate a few enumerator-specific errors in data entry. Immediate feedback can be given to the respective enumerator about the error.



### Step 13

Here are a few tips from our personal experience:

- Predict the common data collection/entry mistakes. Even pre-testing can be used for this purpose. Then use validation criteria to minimize them.
- If you wish to collect the data in the form of a table, see below

Customizing table format in Kobo is difficult. It is better to group the questions – Age, Education, and Employment and repeat the groups as many times as you wish. You can use skip logic to regulate the number of times the question is repeated.

- Pre-testing of the questionnaire in CAPI is a must. Sometimes the skip logic may not work or some question/s may be incorrectly displayed or ordered. The errors can be minimized by identifying them during pre-testing.
- Tabulate the data as frequently as possible during real time monitoring. Tabulate responses by enumerator and observe for patterns in response. For instance, in a question to rank

the constraints faced by farmers, if an enumerator follows a typical pattern like 3, 2, 4 and 1 for all the farmers, then there is a possibility that he might be filling responses on his own without even asking. You can talk to the enumerator about it and verify the details.

- On similar lines, another common error is 'average value of response'. Once an enumerator finishes maybe 5 or 10 surveys, he gets a vague idea of how much fertilizer is used, what is the seed rate, etc. There is a possibility that he starts to enter those average values for all the future respondents. So, closely observe for such errors.

### CONCLUSION

CAPI is emerging as an alternative to paper-based surveys. Though this method is very common across CGIAR institutes and other international research institutes, the use of these in National Agriculture Research and Education System (NARES) in India is low, to the best of our knowledge. (We request those readers who have used CAPI for their survey to share their findings and experience in the

comment session.) It's been taught in extension courses (E-extension, Advanced Research Methods) for quite some time. A common notion is that CAPI is only for larger surveys with huge funding, which as discussed is not a fact. There were several reasons, such as lack of accessible hardware, software and issues with user-friendliness, which kept them beyond the reach of researchers and students in NARES.

Availability and prevalence of smartphones/ cheaper tablets and open access software which are user-friendly are opening up those doors. We strongly feel that it's time for us to get smarter and embrace CAPI as it offers many advantages over paper-based surveys. In the initial phases this could pose some challenges, but as the saying goes 'life without challenges is boring'!

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Kumar S, Kumar R, Seema, Dhandapani A, Sivaramane N, Meena PC and Radhika P. 2017. Food consumption pattern in Telangana State - 2017. Hyderabad, India: ICAR-National Academy of Agricultural Research Management.

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# 04

## INTEGRATING BEHAVIOURAL ECONOMICS AND EXTENSION EDUCATION: SOME INSIGHTS

In this blog, **RM Prasad** argues for integration of Behavioural Economics theories into the domain of Extension education as it will help in understanding the decision making behaviour of farmers better.

Behavioural Economics is different from classical economics. Classical economics assumes that people are perfectly rational. Rationality in economics means that the individual has perfect knowledge of all the alternatives and expected utilities, which allows choice of an option that maximises net utility. Behavioural Economics evolved with insights from the field of psychology as applied to the economic decision-making processes of individuals and institutions. The effects of psychological, emotional, cultural, and social factors on the decisions of individuals and institutions are studied by Behavioural economists, which were relatively ignored by classical economists. Extension education is an applied science which deals with the creation, transmission and application of knowledge designed to bring about planned changes in the behavioral complexes of farmers.



In this context, integration of Behavioural Economics theories into the domain of Extension education will help in understanding the decision making behaviour of farmers better. A brief history of Behavioural Economics is presented in Box 1.

## Box 1: Behavioural Economics - A Brief History

Historically, it seems that economics was much more connected to psychology, as evident from Adam Smith's classic work, *The Wealth of Nations* published in 1776, in which he famously argued that economic behavior was motivated by self-interest. Jeremy Bentham also wrote extensively on the psychological underpinnings of utility, whose ideas influenced the development of welfarism. With the emergence of neoclassical economics that focused on supply and demand as the driving forces in production, economics became more mathematical and started forgetting that they are dealing with human beings.

The neoclassical economists seeing unpredicted behaviors as random errors and ignored them as 'errors' in the statistical models. But over the years, there were economists who felt that they were missing the human part (Psychology). The importance of psychology in economics regained importance as Economic Psychology in the 20th century in the works of Gabriel Tarde.

Herbert Simon proposed 'bounded rationality' as an alternative to the mathematical modeling of decision making. In the early 1970s, Daniel Kahneman – through his 'prospect theory' – indicated that our intuitive understanding of probability often departs systematically from what the mathematical theory of probability and statistics dictates. Kahneman has shown that we can take actions to overcome the biases that cripple our decision making, dampen our thinking and limit our effectiveness. Behavioural Economics took centre stage after Richard Thaler started working with Kahneman and Travesky.

## WHY BEHAVIOURAL ECONOMICS?

Researchers in Behavioural Economics figured out that the biases exhibited by humans have a pattern and we could exploit those biases to influence decision making. As a response to the predictions about the future of economics, Thaler (2009) predicted that *Homo economicus* would evolve into *Homo sapiens*. In other words, Economics will become more related to human behaviour. As researchers in Social Science, we need to understand that we are dealing with *Homo sapiens*.

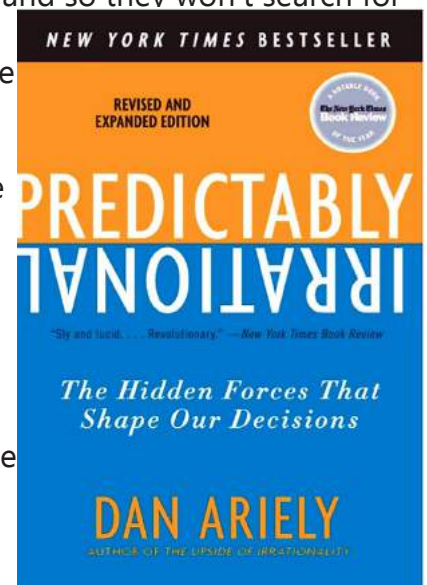
Choice architecture is a behavioral change approach employed by behavioral economists. It refers to intentionally changing a decision-making environment (such as a presentation, timing, or context) to influence a decision (Williamson 2018). Richard Thaler has proposed a specific type of choice architecture known as 'nudging'. Nudging is the act of subtly modifying the environments within which voluntary decisions are made without actually restricting any options. He called it 'Libertarian Paternalism'.

Dan Ariely in his book *Predictably Irrational* delves into the irrational nature of many decisions, and how to apply these behavioural trends in the marketing strategy. According to Ariely, 'Most people think they have a good

handle on why they make certain decisions. People often think that they're making decisions, but in reality their decisions are very much determined by their environment.'

Extension scientists often are victims of 'confirmation bias'. They form opinions about farmers' problems and conveniently choose only those pieces of information that support their hypothesis. Such biases cloud their decision making, and so they won't search for real evidence.

Behavioral science insights can help extension workers to realise this fallacy. It will be all the more important to recognize that such insights will help in understanding the biases of farmers in the adoption process.



## Theories of select Behavioural economists

An attempt is made to present the salient contributions of select Behavioural economists, in Table 1.

**Table 1: Theories of select Behavioural economists.**

Behavioural economist	Concept / Theory	Key message	Application in Extension
Herbert Simon	Bounded rationality	Rationality is limited by the tractability of the decision problem, cognitive limitations and availability of time.	Decisions on crop and livestock insurance; Decisions on input use by farmers, including dairy farmers.
Daniel Kahneman	Prospect theory; System 1 & 2 thinking	Deals with how people decide between alternatives that involve risk and uncertainty.	Climate and market resilient practices; Devising marketing strategies for FPOs.
Richard Thaler	Nudge	Positive reinforcement and indirect suggestions as ways to influence the behavior and decision making of groups or individuals.	Abandoning use of pesticides; Regulated use of irrigation water; Scientific milking practices; Value chain management.
Dan Ariely	Irrational behaviour	Impact of empathy and emotions on decision making by the consumers.	Strengthening FPOs for creating trust in farmers.
Uri Gneezy	Effect of incentives on behaviour	Reveals the hidden motives and undiscovered economics of everyday life situations.	Impact of subsidy on adoption behaviour; Credit behaviour using KCC vs. institutional credit

**Bounded rationality**

‘Bounded rationality’ is the idea that when individuals make decisions, their rationality is limited by the tractability of the decision problem, their cognitive limitations and the time available. In this view, decision maker’s act as satisfiers, rationality describes humans making decisions within the constraints of incomplete and imperfect information, limited time, and restricted computational ability. Rationality is thus ‘bounded’ by its limitations even though people try to decide rationally.

Bounded rationality postulates that in case of decision making in the wild (‘wild’ stands for situations where the events and outcomes are not so certain), people make use of heuristics or rule of thumb. The decisions may not be rational, but given the circumstances, it might be the right one. Behavioral sciences can map the decision making process. Once the decision tree is mapped, it can provide point of intervention to change behavior. Fast and Frugal Trees (FFT) are simple algorithms that facilitate efficient and accurate decisions based on limited information. An illustrative case could be that of an emergency doctor facing a patient with high fever and sore throat. Here, the doctor has to take a quick decision whether

to send the patient to COVID-19 care unit or to a regular hospital bed. Extension workers may also face such situations while suggesting suitable technologies to farmers affected by natural disasters.

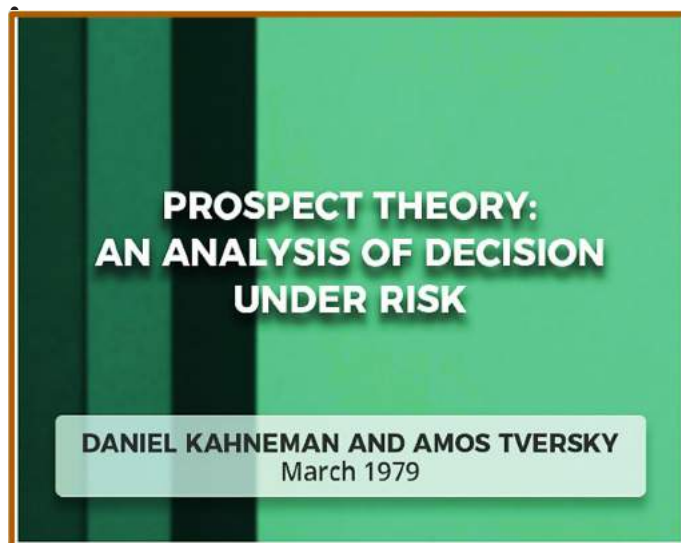
Kreckova and Brozova (2017) had conducted a study on agricultural insurance and bounded rationality. The study confirmed the existence of bounded rationality in agricultural insurance in the Czech Republic. Bounded rationality in this study seems to originate due to insufficient information on payments in the insurance industry, excessive complexity related to the selection of the best premium, as well as from the fear of impending loss. The study concluded that it seems to be primarily more acceptable to clients to pay regularly, but smaller amounts, than to eventually pay a one-time but very high amount of money.

**Prospect Theory**

In 1979, Kahneman and Tversky published Prospect Theory: An Analysis of Decision under Risk that used cognitive psychology to explain various divergences of economic decision making from neo-classical theory. Prospect theory has two stages: an editing stage and an evaluation stage. In the editing

stage, risky situations are simplified using various heuristics. In the evaluation phase, risky alternatives are evaluated using various psychological principles that include:

- **Reference dependence:** When evaluating outcomes, the decision maker considers a 'reference level' (for example, the previous year's yield). Outcomes are then compared to the reference point and classified as 'gains' if greater than the reference point or 'losses' if less than the reference point;
- **Loss aversion:** Losses are avoided more than equivalent gains sought for.

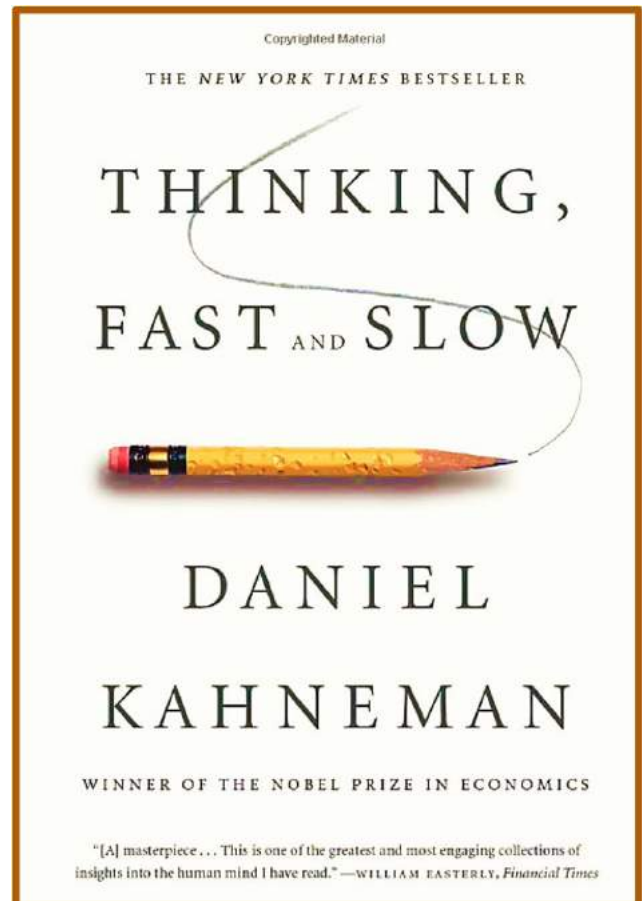


Prospect theory explains three biases people use when making decisions. They are:

1. **Certainty:** occurs when people tend to overrate options that are certain, and risk averse with regard to gains, e.g., use of a drought tolerant crop variety.
2. **Isolation effect:** refers to people's tendency to act on information that stands out and differs from the rest, e.g., success stories of other farmers.
3. **Loss aversion:** is when people prefer to avoid losses rather than acquire equivalent gains. e.g., crop insurance package.

The theory describes how people choose between different options (or prospects) and how they estimate (often in a biased or incorrect way) the perceived likelihood of each of these options happening. People make decisions using several common biases. Understanding these biases can help persuade

people to take action. If we take the example of investor behaviour, when an investor is presented with an equal choice, he/she will choose the one presented with the most perceived gains. This is because according to Prospect Theory, the perceived loss would have a greater negative emotional impact.



Kahneman has described the process of 'thinking fast and slow', which is also known as System 1 and System 2 theory. System 1 is fast, instinctive and consumes less energy. System 2 is slower, which requires thinking and energy. While System 1 refers to automatic decision making, System 2 refers to reflective thinking. An example of System 1 is normal driving, whereas driving in hilly terrain under snowy condition is System 2. The theory of System 1 and 2 is incredibly useful as a way to understand the complexities of human decision making. In the field of extension education, Prospect Theory can be used to explain several biases farmers rely on when making decisions related to risk and uncertainty. These could be adoption of risk aversion practices related to climate change, insurance package for farmers, poultry disease surveillance, etc. Understanding these biases can help in persuading farmers to take action.

## Nudge

Richard Thaler who coined 'Nudge' refers to any aspect of choice architecture that alters the behaviour of people in a predictable way without prohibiting any options or significantly changing their economic incentives. Nudge discusses how public and private organizations can help people make better choices in their daily lives. It is said that Thaler has changed the Economics discipline itself in that '[h]e doesn't write papers that are full of math, but writes papers that are full of common sense'.



The image is a screenshot of a blog post from AESA (Agricultural Extension in South Asia). The header includes the AESA logo, the text 'Blog 105: October 2019', and 'Agricultural Extension in South Asia'. The main title of the blog is 'RETHINKING POLICY FROM A BEHAVIOURAL ANGLE: A CASE OF NUDGE'. Below the title are three small portrait photos of the authors: Muthuprasad T, S Niranjana S, and Aditya KS. To the right of the photos is a quote: 'Behavioural Economics can be very useful not only in understanding our own behaviour, but also in formulating the right policies and evaluating policy outcomes. In this blog, Muthuprasad T, S Niranjana S and Aditya KS urge academia to consider inclusion of Behavioural Economics topics in social science curricula.' Below the quote is a section titled 'CONTEXT' which discusses the origins of Behavioral Economics, mentioning Adam Smith, Daniel Kahneman, Amos Tversky, and Richard H. Thaler's book 'Nudge'.

Nudge can be considered as an approach to decision making and cognitive biases such as anchoring, framing, etc., as its tools. Nudges can integrate normative messages. For example, when communicating with people who have not adopted the desired target behavior, messages might be used to inform clientele about the number of people in a certain socio-demographic group or geographic area who have adopted the behaviour. This approach is most likely to be effective when the target audience is under-performing in relation to the reference group, but wants to be like the reference group. This is referred to as 'framing effect'. (For further details, kindly refer AESA Blog 105 – 'Rethinking policy from a behavioural angle: A case of Nudge' by Muthuprasad T, Niranjana S and Aditya KS).

## Irrational behaviour

Ariely observes that human behaviour departs from standard economic theory in systematic and predictable ways, which he explores at length in his studies. He is more connected with neuro economics. While Behavioural economics is mostly experimental and based on field

observation, in neuro economics, researchers try to observe what happens in people's brains. Ariely observed that people often behave in ways that are completely at odds with how they would behave if they were rational utility maximizers. The most common example has to do with the effect of emotion on our behaviour. A good illustration could be of someone who goes to a restaurant saying that he is on a diet, but when the waiter comes with a new dish he changes his opinion and tastes the dish, now this is a case of irrational behaviour. There are many such irrational behaviours experienced in daily life.

Ariely believes that economics would make a lot more sense if it was based on how people actually behave, instead of how they should behave. Using this hypothesis as a guide, Ariely thinks there are unlimited social, economic and political problems that can be solved or at least addressed more effectively in a chaotic world. Some of the methods suggested are: (a) the influence of 'free'; (b) price primacy; (c) herding; and (d) placebo effect. Getting something free makes us feel excited, and the strong emotional impact of a 'free price' is called the 'zero price' effect. After administering a placebo (resembling a real drug, but with an inactive substance like sugar), if the patient feels cured, it is not due to the properties of placebo, but belief in the placebo. This is referred to as placebo effect.

Ariely (2010) noted that the only effective way to get people to respond to suffering is through an emotional appeal, rather than through an objective reading of the great need. The upside is that when our emotions are awakened, we can be tremendously caring. By realizing that our emotions are fickle and how our compassion biases work, we can make more reasonable decisions and help people who need our care. This is particularly applicable in the case of farmers under stress during the the COVID-19 pandemic.

Ariely (2016) argues that people have an innate ability to trust one another, but struggle to trust large corporations. Ariely shares tips for overcoming this barrier and creating organizations that people can trust. There are many aspects and building blocks for trust,

but there are five key mechanisms suggested by Ariely that allow human beings to trust one another: long-term relationships, transparency, intentionality, revenge, and aligned incentives. Ariely's views are very relevant in the case of establishing farmer trust in FPOs.



### Incentives and behavior

Uri Gneezy's early work on 'when and why incentives can backfire' has become the cornerstone in a compelling line of research that explores when traditional economic theories fail to explain real human behavior with regard to incentives. Gneezy's research focuses on helping organizations use Behavioural economics to optimize incentive schemes.



Uri Gneezy et al. (2011) explain how extrinsic incentives may come into conflict with other motivations. If incentives are not substantial enough, this change in perception can lead to undesired effects on behaviour. Incentives might have the desired effects in the short term, but they still weaken intrinsic motivation.

The growing body of evidence suggests that the effects of incentives depend on how they are designed, the form in which they are given, how

they interact with intrinsic motivation and social motivation, and what happens after they are withdrawn.

Monetary incentives have two kinds of effects: the standard direct price effect, which makes the incentivized behaviour more attractive, and an indirect psychological effect. In some cases, the psychological effect works in an opposite direction to the price effect and can crowd out the incentivized behaviour.

### OTHER SALIENT WORKS IN AGRICULTURE

There are other Behavioural economists also, whose studies are relevant to the discipline of Extension education. For instance, Duflo et al. (2011) in their empirical study revealed that small, time-limited discounts in the cost of fertilizers at the time of harvest induce substantial increase in fertilizer use, compared to those induced by much larger price reductions later in the season. They concluded that a small, time bound discount programme on fertilizer could be an effective, easy to scale up policy that can encourage fertilizer use without distorting decision making and inducing excessive use of fertilizers.

Nava Ashraf et al. (2016) had applied insights from psychology and economics to understand decision making with the aim of improving the design of development programmes. Their research has focused on technology adoption and intra-household decision making, with applications in health, agriculture and microfinance.

Mani et al. (2013) hypothesize that poverty directly impedes cognitive function. The researchers examined the cognitive function of farmers across the planting cycle. It was found that the same farmer shows diminished cognitive performance before harvest, when poor, as compared with after harvest, when rich. Although farmers showed more stress before harvest, that does not account for diminished cognitive performance. Instead, it appears that poverty itself reduces cognitive capacity. These results help explain a spectrum of behaviors among the poor.





Nadia Streletskaya et al. (2020) provide a selective overview of the linkages and complementary topics in behavioral economics and agricultural adoption literatures. The authors highlight the salient differences between agricultural adoption research and Behavioural Economics research, which provides many insights to extension workers.

## APPLICATION IN EXTENSION EDUCATION

### Behavioural Economics:

- is useful not only in understanding the behaviour of individuals, but also in formulating the right policies and evaluating policy outcomes;
- is useful in studies related to risk and uncertainty faced by farmers, supply chain management, farmer insurance, agricultural financing, input and output marketing, etc.;
- helps extension researchers to identify and study the biases of farmers and other stakeholders in decision making;
- helps extension professionals modify the choice environment to support positive decision making by farmers through tools such as social proof, loss aversion, framing,

decoy effect, anchoring, endowment effect, etc.;

- helps social scientists in understanding farmers' choices – be it their decision to adopt technologies or their response to policies or choice of source of information; and
- is useful in integrating normative messages into the decision-making environment. Inform people of the norm, that is, the decisions others make in the same situation. The use of social comparisons can help people go by what others do.

## WAY FORWARD

Economics is very important to the daily lives of farmers in the sense that it summarizes many aspects of farmer behaviour, such as income, cost of production, marketing services, credit and insurance, etc. The importance of understanding Behavioural Economics for extension personnel is immeasurable as it allows for a better understanding of the farmer's mind.

Behavioural Economics, also referred to as the science of decision making, is an emerging discipline which uses experiments that observe human behaviour to uncover how we think.

It is suggested that Behavioural Economics should form part of the academic syllabus for extension students. Extension researchers could gain much from identifying and studying the biases of farmers and other stakeholders in decision making using various theories and concepts developed by Behavioural economists. Capacity development programmes may be organized for field extension personnel so as to make them aware and use these concepts in organizing extension services more effectively.

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# 05

## RESEARCH ONION: A SYSTEMATIC APPROACH TO DESIGNING RESEARCH METHODOLOGY

Developing a good research design is important while undertaking quality social science research, and in this blog **Mahesh B Tengli** illustrates the different stages in designing a research methodology using the Research Onion framework.

When I joined for my PhD, as many of you, I too was curious about research. Along with the curiosity came seriousness, but only after one of my mentors said: "Your thesis is your brainchild and indeed a reflection of you". I am here now to share a few of the specifics that I learnt during my PhD journey. I will be discussing how to design and present a robust research methodology. Why do I find this concept very crucial? It is because these answers to research questions are valid and reliable – if they are answered through a systematic method(s). Often we find dissertations with a poorly explained research methodology chapter, which is required to be crystal clear in every step, so I was in search of something that can explain things clearly. During my desk research, I came across various ways and means to design research methodology; one of the most crucial revelations for me was a research vegetable called 'Research onion'. Let us first see what this research onion is all about.

### WHAT IS 'RESEARCH ONION'?

Saunders et al. (2012) proposed the research onion framework (Figure 1), which explains pictorially the various aspects of the research to be examined and planned in order to come up with a sound research design. In other words, the research onion guides the researcher through all the steps that need to be taken when developing a research methodology.

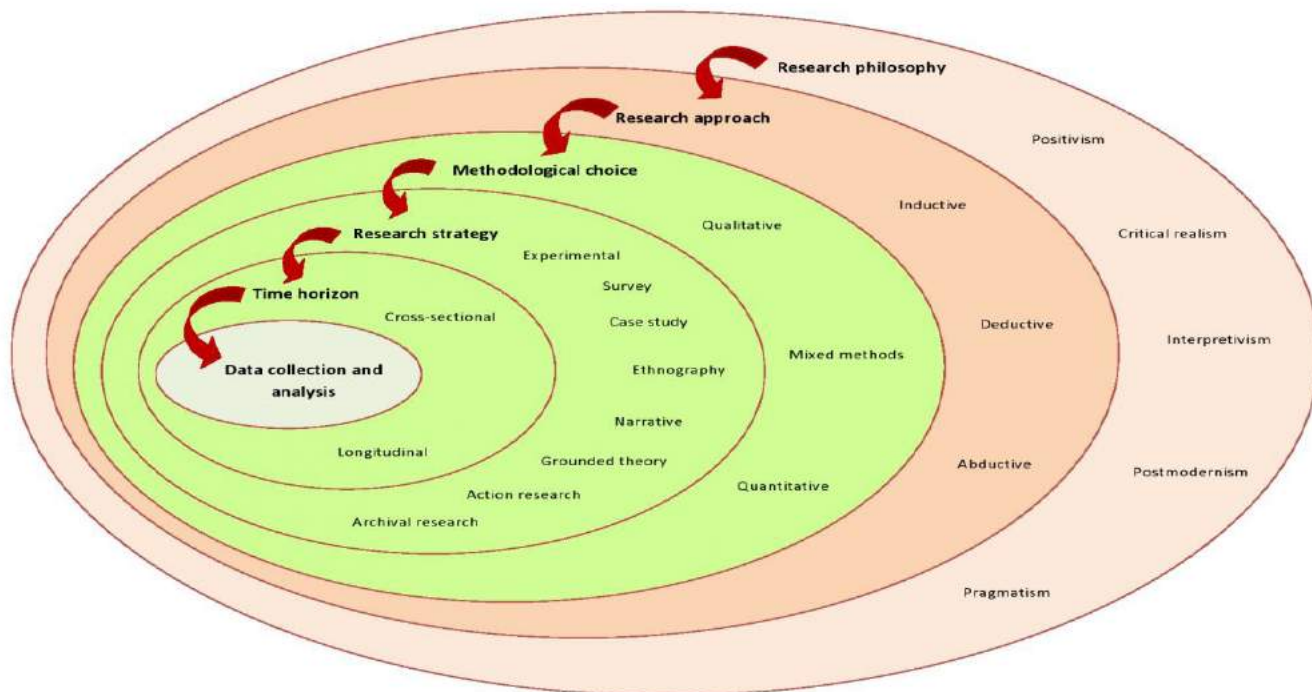
Saunders et al. (2019), divided the research onion into three levels of decisions: 1. First two outer rings, i.e., Research philosophy and Research approach; 2. Research design which constitutes (a) methodological choices, (b) research strategy and (c) time horizon; and (3) tactics, i.e., the inner core of the research onion, which includes data collection and analysis aspects.

Before we strip the research onion let us do an activity. Take an onion and try to peel it from the inside without using a

knife. You tried but could not peel it, the systematic way is to peel it from the outside to inside, and this is what we have to do with the research onion as well.

To develop a sound research methodology scholarly research starts with the research question(s), the objectives followed by the series of decisions on choice of research philosophy, approach to research, then the

research design, i.e., methodological choices, research strategy, the time horizon, and the last inner core – data collection and data analysis. All the layers of research onion are interrelated and interdependent. In other words, the choice of philosophy influences the approach, which in turn influences the selection of methodological choice, strategy, time horizon, data collection and analysis.



**Figure 1: Research onion**  
**Source: Developed from Saunders et al. (2012)**

## PEELING OUT THE RESEARCH ONION

### 1. RESEARCH PHILOSOPHY

Knowingly or unknowingly a researcher will be making numerous assumptions while embarking on research (Burrell and Morgan 2016).

These assumptions are of three types:

- **Ontological assumptions** - Assumptions regarding the reality faced in the research or what makes something a reality, and how a researcher can understand existence.
- **Epistemological assumptions**- Assumptions associated with human knowledge or what forms valid knowledge, whether it can be known, and how a researcher can get it and transfer it.

- **Axiological assumptions** -These are assumptions about the level of influence of the researcher’s values on the research process or what is essential and valuable in the research.

Further, these assumptions help a researcher to design the research questions, choose appropriate methods, and influence the interpretation of findings (Crotty 1998). These assumptions altogether form the research philosophy of the study. According to Saunders et al. (2012), the term research philosophy refers to ‘a system of beliefs and assumptions about the development of knowledge’.

The ontological assumption is the assumption made by a researcher regarding the nature of reality. Here reality means the study area or a subject domain, such as agricultural extension. The extension fraternity has various assumptions regarding the subject of

extension, we assume it to be a study of human (farmers) behaviour, and others say it is the transfer of technology, and so on and so forth. These ontological assumptions may also be with regard to a specific research area in the subject domain. For instance, we study farmers' adoption of agro-technology, in most adoption studies the researchers presumed that a lower level of adoption (a reality) of technology is the reason for lower crop production. Therefore, the focus was on studying the level of adoption by farmers and how to increase it. On the other hand, some researchers assume technology adoption as a mental process and see that there is low level of adoption everywhere, and so they try to understand why there is a low level of adoption and what are the factors determining the adoption. From this, it is clear that your assumption about the nature of reality (ontology) decides how you view the subject domain (Agricultural Extension) or the research area, which in turn influences what you want to research (what research questions to ask or what research objectives to study).

The epistemological assumption is an assumption made by a researcher regarding knowledge. What forms valid and reliable knowledge? How do we acquire and communicate it? We know that the subject matter of agricultural extension is derived from different disciplines. Therefore, the nature of knowledge will be diverse; it may constitute numerical data (e.g., number of women FPOs) to textual data (results of in-depth interview or focused group discussion), or even visual data (social map, resource map, sociogram). In extension research, facts, opinions, narratives and stories constitute valid knowledge, provided it follows a systematic process of enquiry. You will come across various research studies in extension where the researcher has used different epistemology in their research, research purely based on case studies, and some dealing only with factual stuff.

The axiological assumption is an assumption made by a researcher regarding the influence of values and beliefs on the research. The researcher tries to be free from values and beliefs intruding into the research or positively considers and acknowledges values and beliefs influencing the research process and the conclu-

sions. Sometimes we need to decide on whether the values and beliefs of the research respondents should be considered or not. Researchers argue, as reported by Saunders et al. (2019), that it is very tough to keep ourselves free from the influence of values and beliefs. For instance, as a researcher you might have come across your advisor saying "parametric test is stronger than non-parametric", "qualitative data gives in-depth understanding about a phenomenon than quantitative data". What are these assumptions? They are the aspects of research your advisor values more.

At this juncture, you might have questioned yourself – why should I be making assumptions and know the different research philosophies when I can directly collect data, analyse and report the results? There are several aspects for which these assumptions are essential they are listed below.

1. Assumptions are your research tour guide; they tell you how to conduct the research, what should be your role – whether you should maintain objectivity or can subjectivity be expressed. They tell you what methods you can follow.
2. The researcher has to defend his/her work at various levels. As a student researcher, we get suggestions from the advisory committee or institutional review board to strictly go for quantitative methods with probability sampling, and try to avoid qualitative methods. This is due to the difference in the assumptions or more specifically, the research philosophy they follow. The most challenging is to convince the journal reviewers and editors, there are chances of your paper getting rejected because your philosophy is different from what they follow. Therefore, to show that your overall approach to research is justifiable, you should state your assumptions (research philosophy) very clearly.
3. Another issue we come across is sweeping apologies in our dissertation, for instance, a researcher apologises for not interviewing a large number of respondents in qualitative research; and the other one is failing to get an in-depth understanding due to the quantitative nature of research. No! You need not apologise, all that you need to do is follow the standard methods and procedure that suits

your research philosophy. Therefore it is very important to understand the various research philosophies. According to Saunders et al. (2019), there are five research philosophies: (1)

positivism; (2) critical realism; (3) interpretivism; (4) postmodernism; and (5) pragmatism. The detailed explanation of these five research philosophies is presented in Tables 1 to 5.

Table 1: Positivism philosophy- explains what we see			
Ontological assumption (nature of reality )	Epistemological assumption (what constitutes acceptable knowledge)	Axiological assumption (role of values)	What methods do you follow to undertake such a study?
<ul style="list-style-type: none"> <li>Any aspect under study Eg. The social agency is seen as any other physical object and interactions as a natural phenomenon</li> <li>There is only one true reality about the aspect being studied</li> <li>The reality is ordered</li> </ul> <p><b>For example:</b> if we were to study farmers' community in a given village from a positivist perspective, we would assume "farmers community" as a physical entity like natural science.</p>	<p>It tells you that if you adopt positivist philosophy, the knowledge you contribute out of your research project will be as listed below ;</p> <ul style="list-style-type: none"> <li>Facts that are observable and measurable</li> <li>Law-like generalizations</li> <li>Numbers</li> <li>Causal explanation and predictions- Eg. factors influencing the dependent variable</li> </ul>	<ul style="list-style-type: none"> <li>No scope for influence of researcher's value in the research</li> <li>Strictly follow objectivity</li> <li>As a researcher you will be studying the aspect as it occurs, you keep yourself quite neutral and detached from what is researched and the results</li> </ul>	<ul style="list-style-type: none"> <li>If you follow the deductive research approach since you will be testing theories, i.e. developing a research hypothesis based on some existing theory</li> <li><b>Note:</b> Earlier positivist even adopted the inductive approach (theory building)</li> <li>Demands a structured approach for easy replication of the study for further validation by another researcher, value-free data collection mainly quantitative data with a higher level of measurement (Interval and above) and quantitative analysis</li> <li>Require a large sample size</li> </ul>

**Source:** Developed from Saunders et al. (2019)

**Note:** Application of positivist philosophy in social science research is a matter of scholarly debate. However, a researcher can apply some of the assumptions and methods with caution and rationality.

**Suggested reading:** Thomas Houghton, Does positivism really 'work' in the social sciences? Link: <https://www.e-ir.info/2011/09/26/does-positivism-really-%E2%80%98work%E2%80%99-in-the-social-sciences/>

Table 2: Critical realism philosophy- explains what we see and experience			
Ontological assumption (nature of reality )	Epistemological assumption (what constitutes acceptable knowledge)	Axiological assumption (role of values)	What methods do you follow to undertake such a study?
<ul style="list-style-type: none"> <li>Reality is structured and layered, i.e. the empirical (events that we can observe and experience-, the tip of the iceberg), the actual (events and non-events created by the real, may or may not be seen-iceberg inside the water) and the real (casual structures, mechanism and properties- the process taking place inside the iceberg and all things responsible for the things happening at empirical and actual level).</li> <li>The reality is external and independent but not directly observable, the manifestations of reality can be seen and experienced</li> <li>Casual mechanism</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge is the product of its time, i.e. historically situated</li> <li>Social facts are social constructions approved and accepted by the people</li> <li>Historical causal explanations</li> <li>Experiential verbal explanations</li> </ul>	<ul style="list-style-type: none"> <li>The values of the researcher and that of the social unit under study is present in the research, i.e. value-laden research</li> <li>Researcher acknowledge all forms of biases arising out of different views and experiences</li> <li>The researcher tries to reduce bias and errors as much as possible</li> <li>Objectivity is valued with some scope for subjectivity</li> </ul>	<ul style="list-style-type: none"> <li>Research approach you follow is abduction (Retroductive)</li> <li>Range of research strategy and methods are used</li> <li>Both qualitative and quantitative research methods are applied</li> <li>Whatever method suits your research question is adopted</li> </ul>

**Source:** Developed from Saunders et al. (2019)

**Suggested reading:** Fletcher Amber J. Applying critical realism in qualitative research: Methodology meets method. <https://doi.org/10.1080/13645579.2016.1144401>

Table 3: Interpretivism philosophy- explains the meanings about the reality created by humans

Ontological assumption (nature of reality )	Epistemological assumption (what constitutes acceptable knowledge)	Axiological assumption (role of values)	What methods do you follow to undertake such a study?
<ul style="list-style-type: none"> <li>• The reality is complex; it has multiple meanings,</li> <li>• Culture and language construct the reality</li> <li>• There is no one true reality</li> <li>• Reality is having diverse interpretations, experiences and practices</li> <li>• For instance, a reality “attitude towards GM crops” is not the same for all the farmers; it varies on the temporal, spatial, situation and personal aspects.</li> </ul>	<ul style="list-style-type: none"> <li>• Simple theories and concepts</li> <li>• What a respondent farmers narrate, his /her stories (success or failure), perception and interpretations constitute knowledge</li> <li>• New understanding or a worldview either expressed by a respondent farmer or interpreted by the researcher constitute knowledge</li> </ul>	<ul style="list-style-type: none"> <li>• Values of the respondents and the researcher is an important aspect required in the research – value-bound research</li> <li>• A researcher is a part of what is researched</li> <li>• Subjectivity is the essence of research</li> <li>• Researcher reflexive, which means as a researcher we examine ourselves that, how our assumptions, perceptions and conceptual understanding affect various decisions in the research process</li> </ul>	<ul style="list-style-type: none"> <li>• The inductive research approach is followed (Theory building)</li> <li>• Research strategies like case studies, ethnography, grounded theory are adopted</li> <li>• Small sample size</li> <li>• In-depth interviews, focused group discussions</li> <li>• Qualitative methods of analysis – qualitative content analysis, thematic analysis</li> <li>• Range of data (number, text, visuals, artefacts etc.) can be interpreted</li> </ul>

**Source:** Developed from Saunders et al. (2019)

**Suggested reading:** Chen Y Y, Shek D T L and Bu F F. 2011. Applications of interpretive and constructionist research methods in adolescent research: Philosophy, principles and examples. International Journal of Adolescent Medicine and Health 23(2). doi:10.1515/ijamh.2011.022 <https://pubmed.ncbi.nlm.nih.gov/21870675/>

Table 4: Postmodernism philosophy- it seeks to challenge the existing school of thoughts and highlight the marginalized views

Ontological assumption (nature of reality )	Epistemological assumption (what constitutes acceptable knowledge)	Axiological assumption (role of values)	What methods do you follow to undertake such a study?
<ul style="list-style-type: none"> <li>• Reality is nominal, which means the order and structure of social phenomenon (a reality) we study is not independent of us; instead, it is formed by us as a researcher and other social actors.</li> <li>• The reality is created by us using the language, power relations, perceptions</li> <li>• Multiple reality but some are dominated and silenced by different reality, and both are equally important</li> <li>• Reality is not a solid entity it's a flux of processes, transient</li> </ul>	<ul style="list-style-type: none"> <li>• Dominant ideologies, school of thoughts decide what truth and knowledge is</li> <li>• Here the knowledge constitutes the unpopular, suppressed and silenced meaning and interpretations of the other realities</li> <li>• Knowledge also constitute exposing power relations and challenge of the dominant view</li> </ul>	<ul style="list-style-type: none"> <li>• The research is value-constituted: the values of the researcher and the respondents forms the heart of the research</li> <li>• The researcher and the investigation is deeply involved in power relations (Challenging the power relationship)</li> <li>• The researcher is radically reflexive</li> </ul>	<ul style="list-style-type: none"> <li>• Do not subscribe to and apply structured methods, welcome flexible methods</li> <li>• Deconstructive- cut open and reach the core to expose the suppressed reality of a dominant thought, theory. Ideology</li> <li>• Extensive reading of text and realities</li> <li>• In-depth investigations of anomalies</li> <li>• Range of data is collected and subjected to mainly qualitative analysis (Eg. Discourse analysis)</li> </ul>

**Source:** Developed from Saunders et al. (2019)

**Suggested reading:** Rosenau P V. Postmodernism: Methodology. <https://doi.org/10.1016/B0-08-043076-7/00692-6>

**Link:** <https://www.sciencedirect.com/science/article/pii/B0080430767006926>

Table 5: Pragmatism philosophy- it seeks to improve practice by the application of concepts

Ontological assumption (nature of reality)	Epistemological assumption (what constitutes acceptable knowledge)	Axiological assumption (role of values)	What methods do you follow to undertake such a study?
<ul style="list-style-type: none"> <li>The reality is complex, external and practice emerging out of an idea</li> <li>The reality also constitute a flow of processes, experiences and practices</li> <li>There are multiple reality</li> </ul>	<ul style="list-style-type: none"> <li>Here the research contribute one or more of the following aspects as a knowledge;</li> <li>Practical knowhow</li> <li>The knowledge that turns into practice in a given context</li> <li>Knowledge is something that enables actions, solve a problem, improve practice and process</li> </ul>	<ul style="list-style-type: none"> <li>Here the values of the researcher and the respondents drive the research- value-driven research</li> <li>The research process get started with the problem that is most valued by the researcher or the affected social unit</li> <li>Researcher is reflexive</li> </ul>	<ul style="list-style-type: none"> <li>Multiple research approach and methods appropriate to answer the research question(s) and find practical solutions to research problem are used</li> <li>Range of methods; qualitative, quantitative, mixed, multiple and action research</li> </ul>

Source: Developed from Saunders et al. (2019)

**Suggested reading:** Crist J D, Parsons M L, Warner-Robbins C, Mullins M V and Espinosa Y M. 2009. Pragmatic action research with 2 vulnerable populations. Family & Community Health 32(4):320–329. doi:10.1097/fch.0b013e3181b9

## 2. THE RESEARCH APPROACH OR APPROACH TO THEORY DEVELOPMENT

The second ring in the research onion contains the research approach. If we critically think on what a researcher does in research, we can classify them into three aspects – theory testing, theory building, and theory modification. The point I am trying to make here is that the research we undertake involves the use of theory which we may or may not name in our research design. You will find the essence of theory in the conclusions of research findings.

The selection of a particular philosophy that was discussed in the first section will determine the approach you choose for the development of the theory or for the reasoning behind your findings. Further, the approach you select will influence the choice of research design and methods (Babbie 2010).

According to Saunders et al. (2012), there are three research approaches viz., induction, deduction, and abduction. A brief overview of the research approaches is presented in Table 6.

Table 6. Comparison of research approaches			
	Induction approach	Deduction approach	Abduction approach
<b>Logic</b>	Here, a researcher use premises developed from observations to draw untested conclusions	Here, when premises based on an existing theory are true then the conclusions are also true	Here, a known premises (Generally some surprising or incomplete conclusions) are used to generate testable conclusions
<b>Generalization process</b>	From specific to general	From general to specific	Interaction between the specific and the general
<b>Generalizability</b>	The findings cannot be	The findings can be generalised to the research settings or the context the theory is applied	The findings can be generalised to the research settings or the context the theory is applied
<b>Use of data</b>	Researcher collects data to identify patterns, themes and come up with a conceptual framework as conclusion	Data is collected to test hypothesis related to an existing theory	Researcher collects data to identify patterns, themes and come up with a conceptual framework and to test hypothesis (from the conceptual framework) with subsequent data collection
<b>Theory</b>	Theory is built (note: theory cannot be verified by inductive research approach)	Theory is falsified or verified	Theory is generated or modified; mixing existing theories to build new theory or modify existing theory
<b>When to apply?</b>	When your research question is to answer; Why something happens? Lack of theory to explain the phenomena	When your research question is to describe; What is happening?	When your research question is to describe and test some surprising or incomplete conclusions.

Source : Adopted from Saunders et al. (2019)



In this section I have graphically explained all the three research approaches using flowchart with hypothetical examples.

### 2.1. Inductive approach to research

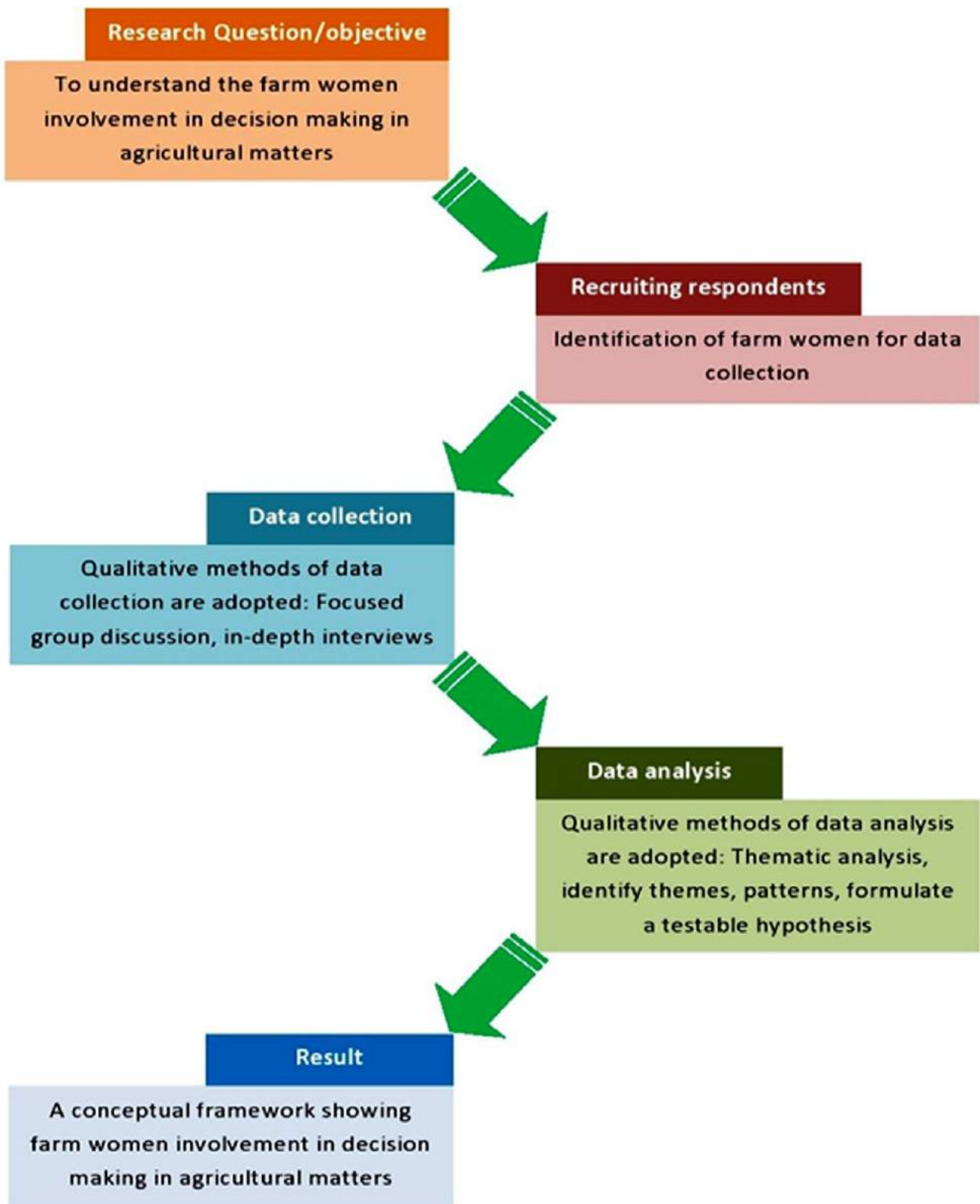
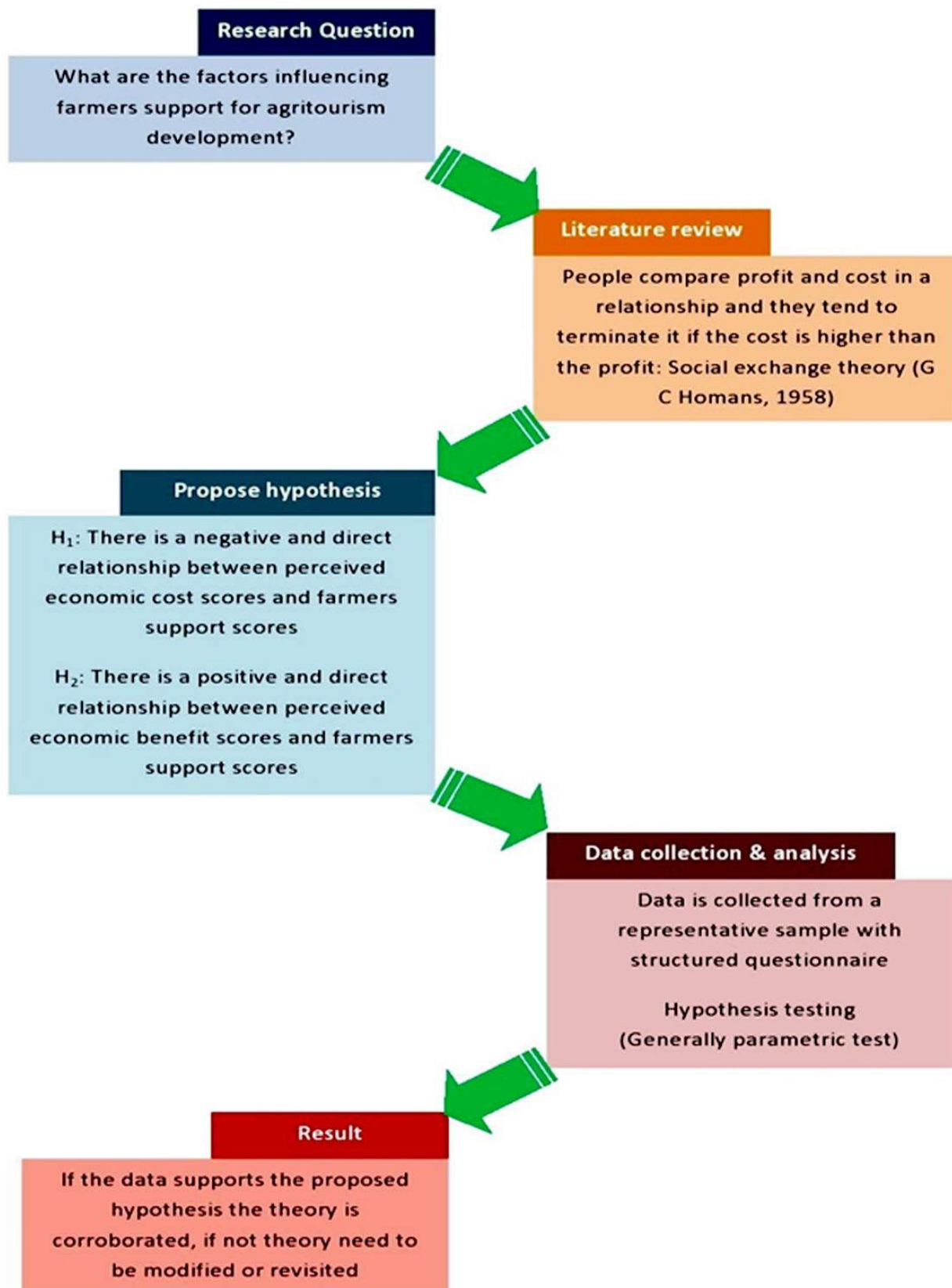


Figure 2: Schematic representation of inductive approach to research  
Source: Developed from Saunders et al. (2019) and author's understanding

**Suggested reading:** Ferguson K M, Kim M A and McCoy S. 2011. Enhancing empowerment and leadership among homeless youth in agency and community settings: A grounded theory approach. *Child and Adolescent Social Work Journal* 28(1):1-22. <https://doi.org/10.1007/s10560-010-0217-6>

## 2.2. Deductive approach to research



**Figure 3: Schematic representation of deductive approach to research**  
Source: Developed from Saunders et al. (2019) and author's understanding

**Suggested reading:** Chia-Pin Yu, Shu Tian Cole and Chancellor Charles. 2018. Resident support for tourism development in rural midwestern (USA) communities: Perceived tourism impacts and community quality of life perspective. Sustainability, MDPI, Open Access Journal 10(3):1-17.

### 2.3. Abductive approach to research

You may find some surprising or incomplete observations or conclusions regarding any social aspect; you wanted to study it both empirically as well as know the subjective opinions of people for better understanding. In this situation, you follow the abduction approach in which your research will combine the elements of both the inductive and deductive approaches. To put it in simple words, in abduction 'You build a theory and then go for its empirical testing'.

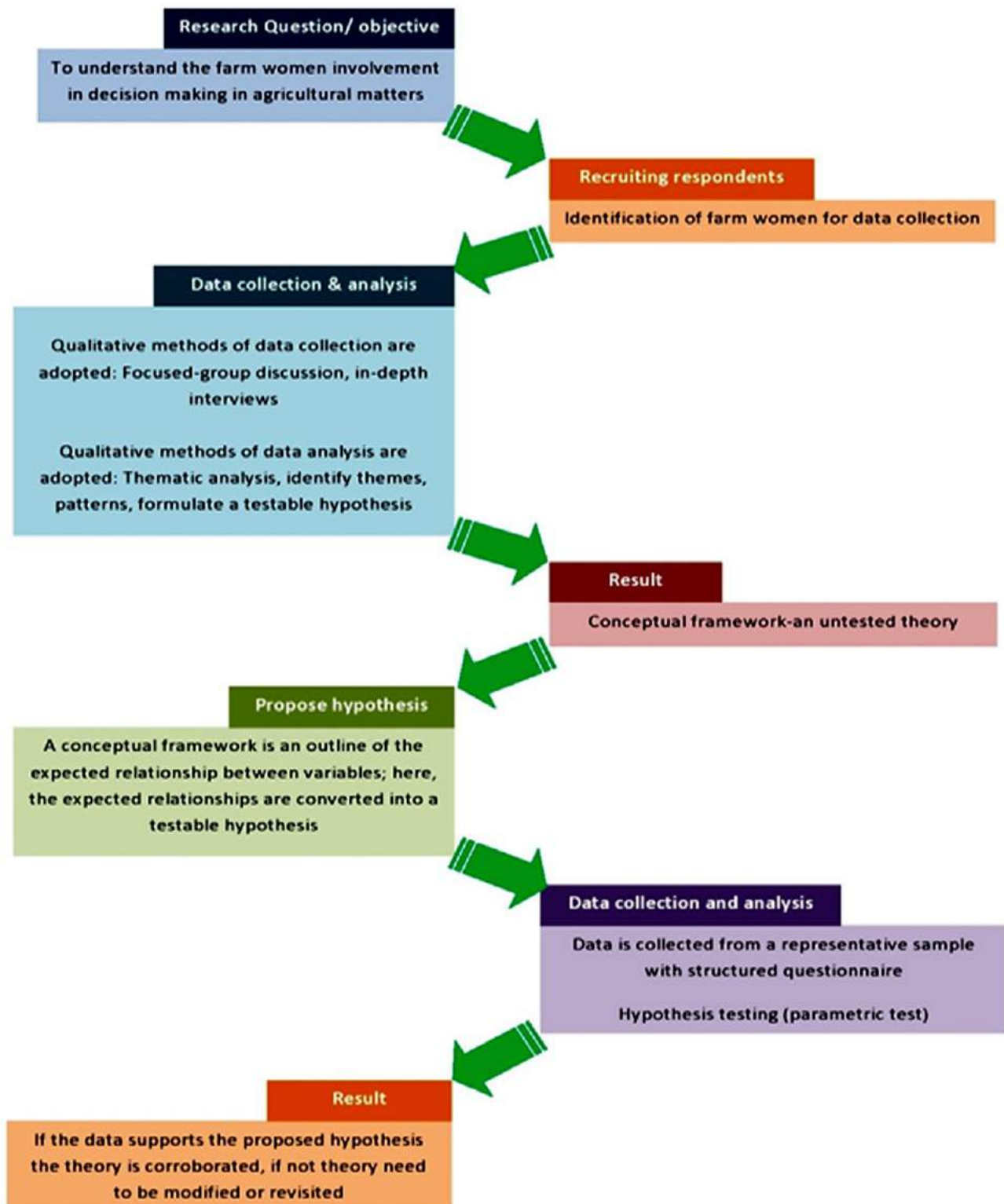


Figure 3: Schematic representation of deductive approach to research  
Source: Developed from Saunders et al. (2019) and author's understanding

**Suggested reading:** Bristow A, Robinso S K and Ratle O. 2017. Being an early-career CMS academic in the context of insecurity and 'Excellence': The dialectics of resistance and compliance. *Organization Studies* 38(9):1185–1207.

## Research design

It is the overall plan of a research project which involves three distinct but interrelated aspects. They are: methodological choice, research strategy and time horizon.

Let us understand them separately. Sanders et al. (2019) classified research designs into three types: (1) quantitative research design; (2) qualitative research design; and (3) mixed methods research design. I have attempted to develop a schematic explanation for qualitative and quantitative research design (Figures 4 and 5, respectively) for better understanding.

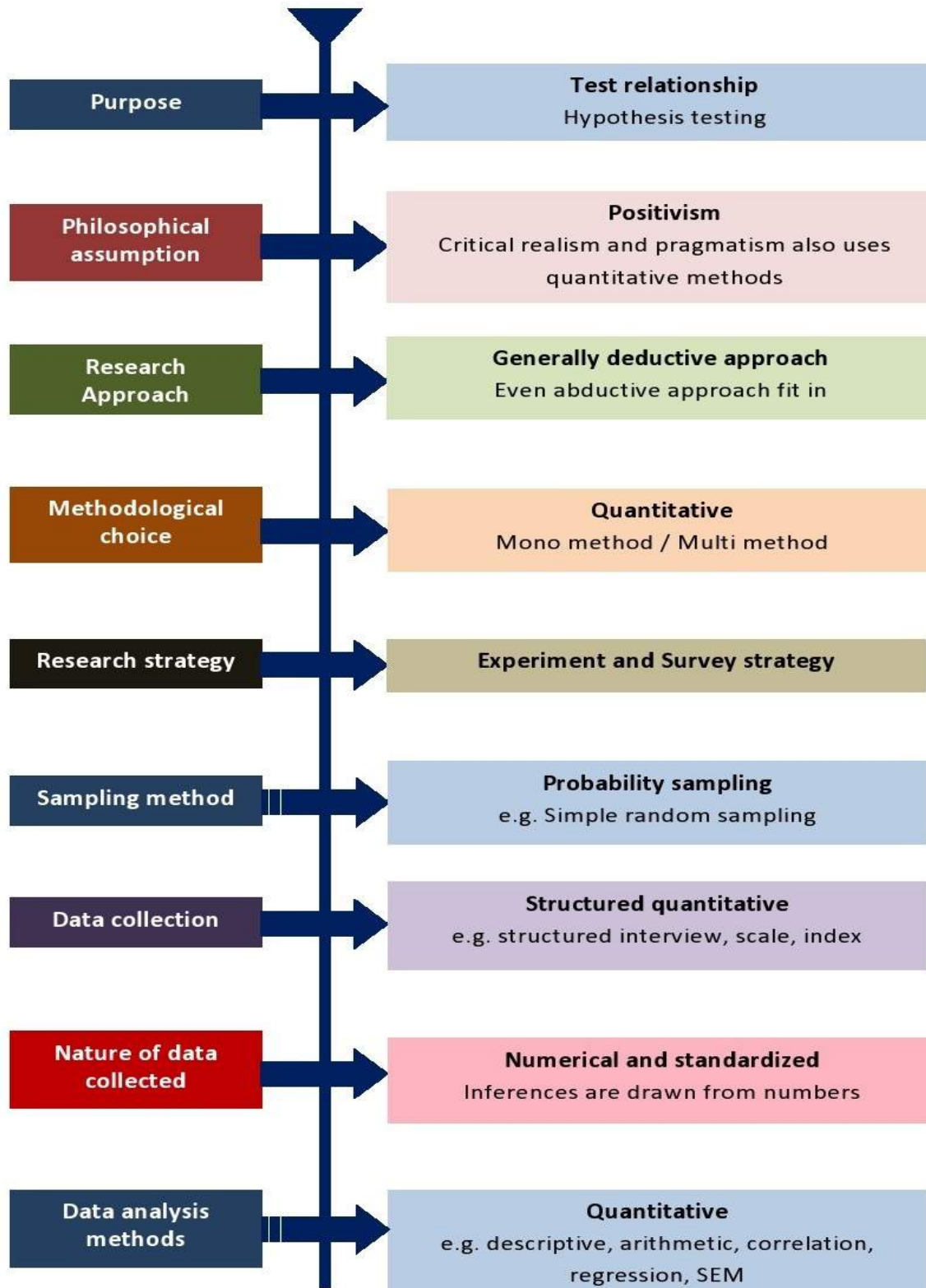
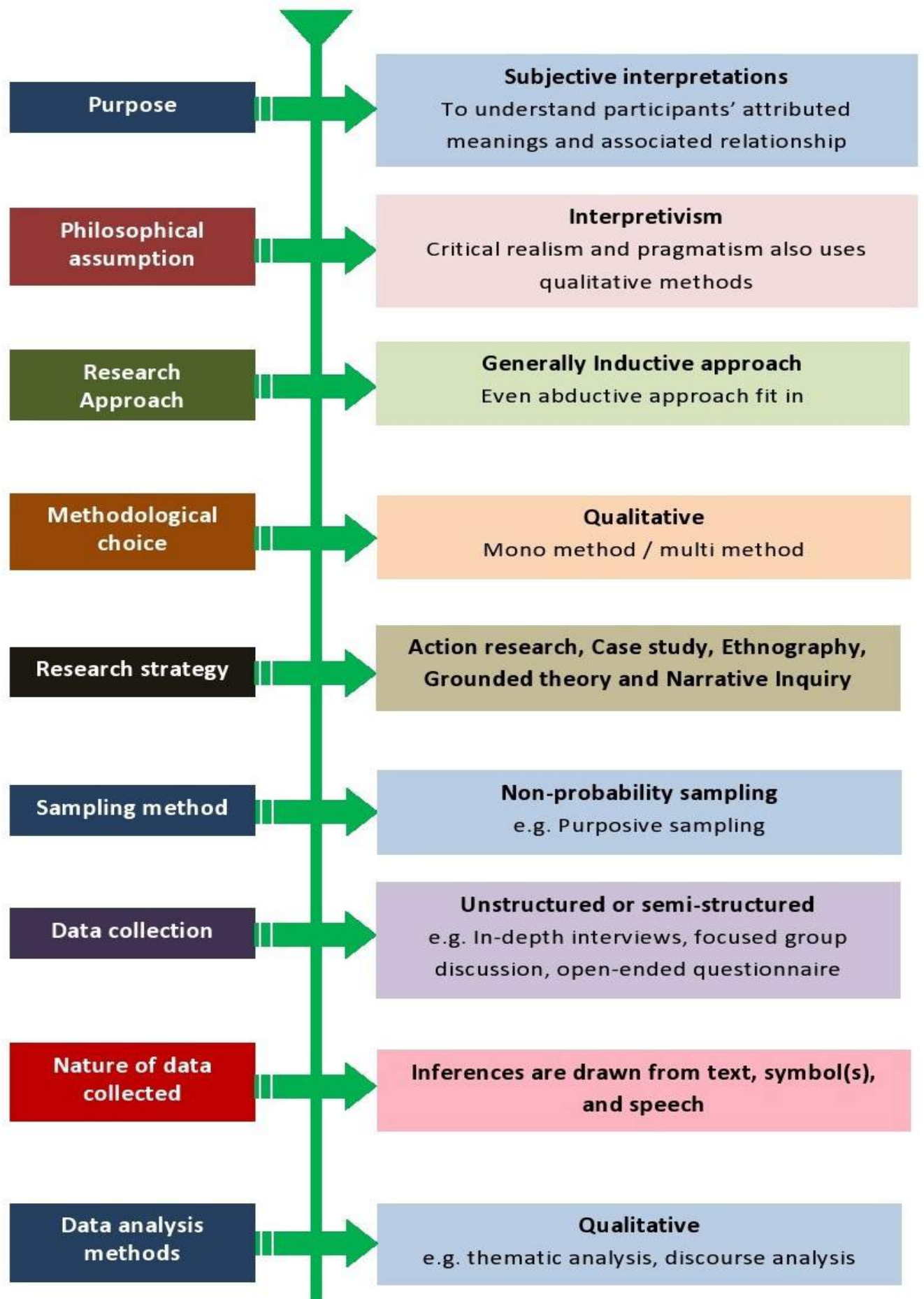


Figure 4: Schematic representation of quantitative research design

Source: Developed from Saunders et al. (2019) and author's understanding (Made with Poster My Wall)



**Figure 5: Schematic Representation of Quantitative Research Design**  
Source: Developed from Saunders et al. (2019) and author's understanding

### 3. METHODOLOGICAL CHOICE

Methodological Choice involves the selection and use of a quantitative, qualitative, or mixed methods research design. In the mono method, a single data collection technique is utilized, followed by corresponding qualitative or quantitative analysis procedures. In the multiple method design, more than one data collection techniques and analysis procedures are employed (Collis and Hussey 2013). Alternatively, a mixed-method approach utilizes both qualitative and quantitative data collection techniques and analysis procedures (Creswell 2013).

According to Saunders et al. (2019), mixed method research can be classified into three ways which are as follows:

1. **Concurrent mixed methods research:** Here a researcher collects both qualitative and quantitative data and analyses them in a single phase study.
2. **Sequential mixed methods research:** Here a researcher collects and analyses data in two phases, which can further be divided into two forms:
3. **Sequential exploratory research design:** where a researcher collects and analyses qualitative data in the first phase, followed by quantitative data collection and analysis in the second phase;
4. **Sequential explanatory research design:** Here a researcher collects and analyses quantitative data in the first phase followed by qualitative data collection and analysis in the second phase.
5. **Sequential multi-phase:** In this a researcher collects and analyses data in more than two phases, in sequence. For example, qualitative followed by quantitative and then qualitative.

### 4. THE RESEARCH STRATEGY

The research strategy describes how the researcher aims to carry out the work (Saunders et al. 2007). There are several

research strategies, viz., Experimental design, Survey design, Archival research, Case study, Ethnography, Action research, Grounded theory and Narrative inquiry (Saunders et al. 2012). Here we can include other research strategies appropriate to our study.

- a. **Experimental design:** Here, a researcher tries to study a cause-effect relationship between two or more variables. He/she decides to systematically manipulate the independent variable to study the corresponding changes in the dependent variable.
- b. **Survey design:** Here, a researcher tries to seek answers for 'what', 'who', 'where', 'how much' and 'how many' types of research questions. Data is collected and analyzed from a sample of individuals.
- c. **Case study:** is an empirical inquiry of an individual social unit. Here the researcher tries to seek answers for 'how' and 'why' questions.
- d. **Action research:** A systematic inquiry to address real-life practical problems. Here a researcher tries to find practical solutions for problems through participation and collaboration with members of a social unit.
- e. **Grounded theory:** This is a systematic inductive method for conducting qualitative research to develop a theory.
- f. **Ethnography:** is a research strategy adopted to explore cultures and societies. Here a researcher collects data through direct interaction and involvement so as to gain firsthand information from research subjects.
- g. **Archival research:** A systematic inquiry wherein primary sources held in archives are studied for evidence collection or deep understanding. Here a researcher does not use secondary sources relevant to the research topic.

### 5. TIME HORIZON

Research can be grouped into two types based on time, i.e., longitudinal or successive

independent samples; and cross-sectional (Bryman and Bell 2015). The longitudinal study refers to the study of a phenomenon or a population over a period of time (Caruana et al. 2015). A cross-sectional study is a 'snap-shot' study, it means a phenomenon or a cross-section of the population is studied for one time (Setia 2016). Please read the suggested reading given below to understand one of the longest researches in the history of social science research.

**Suggested reading:** Hastorf A H 1997. Lewis Terman's longitudinal study of the intellectually gifted: Early research, recent investigations and the future. *Gifted and Talented International* 12(1):3– 7. doi:10.1080/15332276.1997.11672858

## 6. DATA COLLECTION AND ANALYSIS

The inner circle of research onion is made up of 'tactics' which refers to aspects about the finer details of data collection and analysis. In this section, the following aspects are described.

**a. Data collection tools and procedures:** Data collection tools such as scale, questionnaire, mail survey, etc., and procedures such as scale construction, interviews, focused group discussion, etc.

**b. Study Area** – A brief description about the study area and why you have selected this locale, supported by reliable data.

**c. Research population and sampling procedures:** Describe the following aspects in this section:

- i. Inclusion/exclusion criteria;
- ii. Sample size;

- iii. Sampling method;
- iv. Sampling plan - Flow chart with a table indicating sample details;
- v. Sourcing samples: Here the researcher has to describe the source of the study samples; it has the following three aspects:

- **Source population(N):** This is the group about which the researcher is going to draw inferences and to which the inclusion and exclusion criteria are applied (Example: women farmers of a district - say may be N=1000);
- **Study population (Np):** The group which fits the inclusion and exclusion criteria (Example: women farmer growing sunflower, with landholding more than 2 ha and five years of experience, say maybe Np=500);
- **Sample (n):** The group selected after following a suitable sampling method, and finally with whom you conduct your study (a representative sample of women sunflower growers sampled from the study population, say maybe n=120).

vi. Sample limitations

**d. Study Phases:** describe in how many phases your study will be done (during planning-synopsis) / was done (while reporting in the thesis) if it was done in multiple phases. Explain the list of the tasks using a Gantt chart (Figure 6).

**e. Variables and their measurement:** Describe how the concepts, constructs and the variables were identified; this aspect is linked with the theoretical orientation. Provide the operational definition; it means how the variable is measured, mention the level of measurement also. A schematic table would suffice (for example, see Table 7).

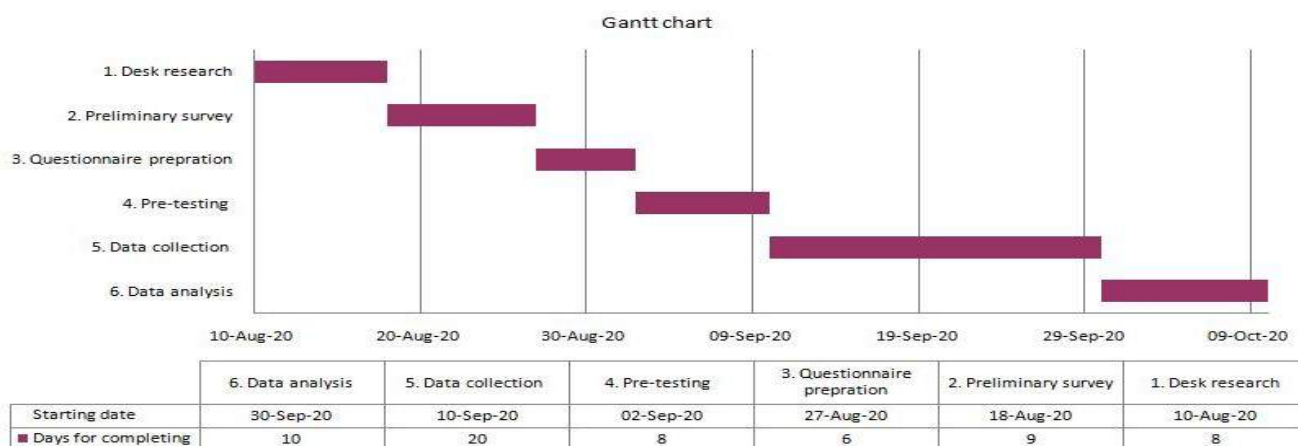


Figure 6: Gantt chart illustrating a phase of research

**Table 7. List of variables their method of measurement and operational definition**

No.	Variable	Method of measurement	Operational definition
1	Dairy farmers' support	Ordinal	Dairy farmer's score on 'Dairy farmers' support' schedule.
2	Perceived negative impacts	Ordinal	Dairy farmer's score on 'Perceived negative impacts' schedule.

**f. Statistical analysis:** Mention all the statistics tools applied and software(s) used to analyse the research data (in thesis).

**g. Ethical considerations:** All the ethical aspects considered in the study need to be clearly planned and mentioned. Mention about respondent consent, how sensitive information (in synopsis) was elicited, if any. Report the approval of Research ethics committees, if applicable.

## CONCLUSION

The difference between a researcher and a non-researcher is, whatever a researcher does she/he does it systematically, justifies logically, subjects it to verification, is always open to criticism, ready for self-correction and explicitly expresses what was done, how it was done, why it was done and what was found. A researcher starts with a research problem, raises questions, and transforms it into workable objectives. To find answers to the research questions, we need a sound research methodology. Research onion is one such framework that helps in designing a robust research methodology; simply put, it will help you to make a series of decisions that allows systematic research. We began with three assumptions, viz., ontological, epistemological and axiological, which constitute our research philosophy. Once we decide on the specific philosophy, an appropriate research approach can be adopted based on the research question and philosophy. The deductive approach is

adopted for theory testing, inductive approach for theory building, and abductive approach for theory modification.

Further, these two crucial decisions will guide the next important aspect that is research design, which is made up of three important decisions: 1. Methodological choice – whether to follow a qualitative method, quantitative method or a mixed method; 2. Research strategy; and 3. Time horizon – cross-sectional or longitudinal research. Furthermore, the last decision is about very minute intricacies of research that is data collection, analysis and ethical statement.

### Authors' observation

It is often observed in academic discussions that various aspects of research are presented and (or) perceived to be competitive (quantitative versus qualitative, parametric versus non-parametric, probability sampling versus non-probability sampling, small sample size versus large sample size, experimental design versus non-experimental, cross-sectional versus longitudinal, and so on) rather than complimentary. Every aspect of research has got its own importance and relevance. A research scholar values every logical approach to research, and it is possible only after looking at it through all dimensions via the lenses of different questions (why, what, when, where, who, what).

### Acknowledgement

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# 06

## LIFE CYCLE ASSESSMENT (LCA) AS A METHODOLOGICAL APPROACH

In this blog, **Pampi Paul, Mahesh B Tengli, N Uttam Singh, Anirban Mukherjee, A Roy and CH Gowda** discuss the use of Life Cycle Assessment in understanding the distribution of resource demands and environmental impacts along food product supply chains. This method is also used as a way of identifying environmental hotspots so as to develop management strategies that can improve the supply chain.

In recent times, energy consumption by different applications is growing rapidly, resulting in the generation of significant quantities of waste and emissions that is left in the environment. Meanwhile, the term 'sustainable development' has prompted initiatives with different methods for assessing impacts, including environmental, social or economic impact of any process, product, etc. With increasing attention paid to sustainability issues, in agriculture as well as food sector, has come a rising interest in metrics for measuring the environmental profiles of food production system. Therefore, it is essential that governmental authorities around the world take vital steps to apply the necessary practices and regulations that can help reduce energy consumption and thus the impact on the environment.

### LIFE CYCLE ASSESSMENT

Life Cycle Assessment (LCA) is a formalized methodology (ISO 14040-14044) that provides a quantitative approach to understanding the distribution of resource demands and environmental impacts along food product supply chains, as well as key mitigation levers. The purpose of this kind of LCA is to develop a baseline understanding of the magnitude, distribution of resource demands, and environmental impacts associated with production of a given commodity at a regional or national scale, along with key levers for mitigation actions. The life cycle approach is essential for effective environmental management because important interactions may occur 'upstream' or 'downstream' along supply chains.

In the context of sustainable agriculture, assessing the impact of farming practices has become important. Life Cycle Assessment (LCA) thus offers a comprehensive method for assessing the environmental impact of a product or an activity over its entire life cycle.



**Recording the farm inventory (feed, fodder, herd size etc) as part of LCA**

The purpose of conducting LCA studies varies from one application to another. Different applications use LCA for different purposes. In general, the main aim of using LCA is to reduce the environmental impact of products by guiding the decision making process towards more sustainable solutions.

### **LIFE CYCLE ASSESSMENT APPROACH TO QUANTIFY THE EMISSION FROM DAIRY FARMING**

On a global level, agriculture is estimated to be the fourth contributor of greenhouse gases (GHGs) after energy supply, industry, and

forestry (IPCC 2007). A report issued by FAO (Steinfeld et al. 2006) identified livestock as being responsible for 18 percent of the world's total GHG emissions. The most important GHGs generated by dairy industry are methane, nitrous oxide, carbon dioxide and some refrigerants, such as HFCs and CFCs (Vora 2010), and the major source of methane (CH<sub>4</sub>) emission is from enteric fermentation of animals (Hospido 2005). Nitrous oxide (N<sub>2</sub>O) emission occurs due to production and use of fertilizer and manure storage; and carbon dioxide (CO<sub>2</sub>) emission occurs due to the use of energy sources at farms as well as at the processing level (Thomassen et al. 2008).

#### **Box 1: Carbon Footprint**

'Carbon footprint' is the total amount of greenhouse gas emitted directly or indirectly caused by an activity or is accumulated over the life stages of a product; it is measured in terms of Carbon di-oxide equivalent (CO<sub>2</sub>-e). A carbon footprint focuses on processes and practices related to the emission of carbon di-oxide (CO<sub>2</sub>) and other greenhouse gases. In general, carbon footprint has been defined as the quantity of GHGs expressed in terms of Carbon di-oxide equivalent (CO<sub>2</sub>-e), emitted into the atmosphere by an individual, organization, process, product, or event from within a specified boundary.

Life Cycle Assessment is one of the methods available to quantify the emission behind a product at the farm gate level. LCA is a whole production chain-oriented approach to quantify all types of GHG emissions responsible for a product. The main strength of this approach is its ability to provide a holistic assessment of the entire production process, in terms of resources used and environmental impacts, as well as to consider multiple parameters (ISO 2006).

In general, studies often differ regarding their focus area (farm/regional/national/global level), The purpose of conducting LCA studies varies from one application to another. Different applications use LCA for different purposes. In general, the main aim of using LCA is to reduce the environmental impact of products by guiding the decision making process towards more sustainable solutions. their systems under consideration

(average dairy systems, conventional versus organic, grass-based versus confined), their scope (different system borders), differences in the functional unit (FU), and the way co-products are handled. Direct comparisons of different LCA studies are hard due to such differences in scope, methodological choice, and assumptions. This method also represents significant challenges, particularly when applied

to agriculture, for instance the data intensive nature of the method places limitations on the comprehensive assessment of complex, interconnected food chains. A second difficulty lies in the fact that methodological choices and assumptions – such as system boundary delineation, functional units, and allocation techniques – may be subjective and affect the results.

### Box 2: Life Cycle Assessment (LCA)

LCA was originally used to analyze industrial process chains, but has been adapted over the last 20 years to assess the environmental impacts of agriculture. It is an environmental impact assessment tool, a 'compilation and evaluation of the inputs, outputs and potential environmental impacts of a product system throughout its life cycle' (ISO 14044:2006, 3.2). The life cycle perspective allows for a comprehensive way of assessment, the possibility of taking the whole production chain into account. Generally, LCA has a product focus, which means that a certain product is at the heart of the analysis.

LCA as a tool 'can assist in the identification of opportunities for improving the environmental performance of products, in informing decision-makers, selection of environmental performance indicators and marketing' (ISO 14044:2006, Introduction). LCA is one tool among several available the results from which can be used 'as a part of a much more comprehensive decision process'.

'It does not address the economic or social aspects of a product but the life cycle approach and method may be applied to these other aspects.'

ISO 14044:2006 describes the LCA requirements and guidelines;  
ISO 14040:2006 describes the principles and framework for LCA.

### GENERAL PRINCIPLES OF LCA METHODOLOGY

The LCA method involves the systemic analysis of production systems, to account for all types of inputs and outputs associated with a specific product within a defined system boundary. The selection of system boundary largely depends on the goal of the study. The reference unit that denotes the useful output of the production system is known as the functional unit that has a defined quantity and quality. The functional unit can be based on a defined quantity, such as 1 kg of a product, an alternate may be based on an attribute of a product or process, such as 1 kg of Fat and Protein Corrected Milk (FPCM).

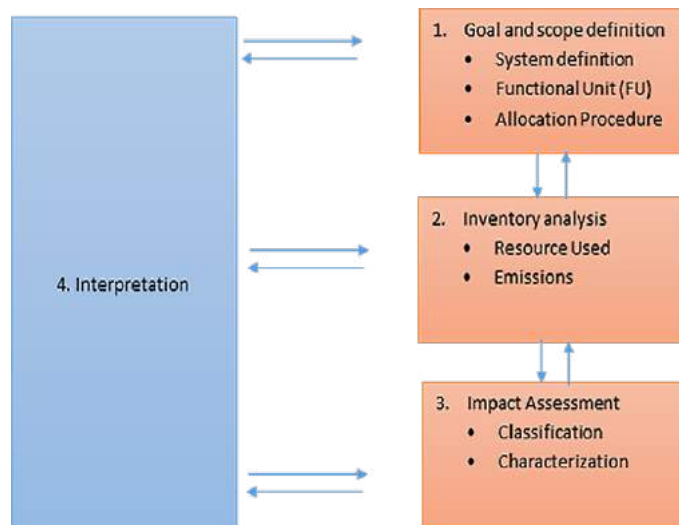


Figure 1: Life Cycle Assessment Framework

### Box 3: Estimation of a Functional Unit

Usually, in the case of dairy farming, the functional units used to report GHG emissions are kilogram of carbon dioxide equivalents (CO<sub>2</sub>-eq.) per kg of FPCM (fat and protein corrected milk) and carcass weight, at the farm gate.

All milk was converted to FPCM with 4.0 % fat and 3.3 % protein, using the formula:  

$$\text{FPCM (kg)} = \text{raw milk (kg)} * (0.337 + 0.116 * \text{Fat content (\%)} + 0.06 * \text{Protein content (\%)})$$

## LIFE CYCLE ASSESSMENT (LCA) FRAMEWORK

LCA is organized in four steps (as illustrated in Figure 1): goal and scope definition, inventory analysis, impact assessment, and interpretation. Here is a general description of the methodology.

### i. Definition of Goal and Scope

It defines the frame of the whole analysis. The system borders are drawn, which set the frame for what is included in the analysis and what is excluded. The functional unit (FU) is defined, which expresses resource use and environmental impacts. The impact categories as well as the method of handling multiple products are defined.

### ii. Inventory Analysis

It represents data inventory of all input data. For example in dairy farming, it is feed and fodder use for the animals, as these are mainly responsible for enteric fermentation. Data on consumption of fertilizers, electricity in the farm, manure management system, etc., are needed for the analysis as LCA is a data demanding tool. Furthermore, all resources that are used in the production process at the farm level as well as all emissions are quantified.

### iii. Impact Assessment

This is the step where the list that contains the corresponding materials and consumed energy quantities related to the studied product is interpreted and transformed into understandable impact indicators. Total resource used and emissions are calculated and expressed in pre-defined units. Mostly in the study of LCA of milk production, global warming potential (GWP) is the only impact category used for analysis. In order to aggregate these emissions they are converted to the same unit, CO<sub>2</sub>-equivalents (CO<sub>2</sub>e) per kg of milk, using the characterization factors in a 100 year perspective provided by the IPCC (Foster et al. 2007), where 1 kg CO<sub>2</sub> = 1 kg CO<sub>2</sub>e, 1 kg CH<sub>4</sub> = 25kg CO<sub>2</sub>e and 1 kg N<sub>2</sub>O = 298 kg CO<sub>2</sub>e.

### iv. Interpretation

In this last step the result of impact assessment for the different environmental indicators are

interpreted and hotspots of emissions are identified in the production or processing chain.

## SYSTEM BOUNDARY

The system boundary defines which processes will be included in, or excluded from, the study. Generally, it defines by cut-off criteria, which are parts and materials included in and excluded from the product system. This assessment encompasses a particular boundary and is often termed as system boundary. The cradle to retail system boundary is split into two sub- systems:

1. Cradle to farm gate includes all upstream processes involved in livestock production, up to the point where the animals or products leave the farm, i.e., production of farm inputs, and dairy farming.
2. Farm-gate to retail covers transport to dairy plants, dairy processing, packaging, and transport to the retail distributor

## ALLOCATION OF EMISSION

Allocation is the partitioning and relating of inputs and outputs of a process to the relevant products and by-products. In the case of dairy farming, generally dairy herds produce a mix of goods and services that cannot easily be disaggregated into individual processes.

For example, a dairy cow produces milk, manure, capital services, and eventually meat when it is slaughtered. In LCA, we need to use specific techniques to attribute relative shares of GHG emissions to each of these goods and services.

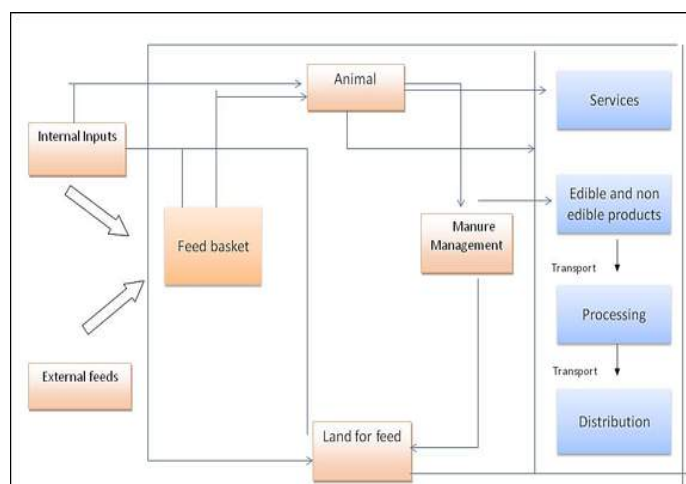


Figure 2: System boundary for Life Cycle Assessment

## ROLE OF LCA IN RELATION TO PRODUCTS

LCA plays an important role in public and public management of particular products. This may involve both an environmental comparison between existing products and the development of new products, which may also include comparison with prototypes. For instance, a major application involves 'green' procurement – that is, a 'green' purchasing policy, which can be implemented by both authorities and companies. Another application concerns eco-labelling (i.e., assigning a 'green label' to environmentally friendly product alternatives), enabling consumers to make comparisons between products. A further application in relation to products is the design of more environmentally friendly products, otherwise known as eco-design.

## LIMITATIONS OF LCA

Though the core characteristic of LCA is its 'holistic' nature, which is its major strength, and at the same time, it has limitations also. Most importantly, LCA cannot address localized impacts. It is possible to scale down some of the results and identify the regions in which certain emissions take place, after which differences in the sensitivity of these regions can be taken into account in the context of LCA.

LCA is typically a steady-state, rather than a dynamic, approach. However, future technological developments are increasingly being taken into account in more detailed LCA studies. In general, LCA regards all processes of production as linear, both in the economy

and in the environment. Again, some progress is being made in reducing this limitation, but at heart, LCA is a tool based on linear modelling. It focuses on the environmental aspects of products, but says nothing about their economic, social and other characteristics. A further limitation can lie in the availability of data, which is more challenging.

## IMPLICATIONS FOR EXTENSION

The main advantage of this approach lies in its ability to easily detect deferrals of environmental loads in the chain. In general, the main aim of using LCA is to reduce the environmental impact of products by guiding the decision making process towards more sustainable solutions. Within the life cycle of a certain product, there is a sequential order of life cycle stages, each one of these phases consumes a certain amount of energy, minerals, water, etc., that subsequently induces a harmful impact on the environment.

With the use of this method Extension researchers can identify the loopholes in the chain or stages from the emission perspective. As this tool is totally inventory-oriented as used in the chain, so the real farm level inventory data analysis can give us an idea about the identification and management of emission hotspots. This analysis helps us to identify the practices most responsible for higher carbon footprint values. This will help researchers to identify potential improvement opportunities of products or processes from the perspective of lower environmental impacts and reduced use of resources across all life cycle stages.

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# 07

## DEFYING ADOPTER CATEGORIES AMONG FARMERS: LESSONS FOR EXTENSION

Technology adoption in agriculture may not always follow the classical adopter categories wise progression as indicated in the Diffusion of Innovation theory proposed by Everett M Rogers. Based on a long-term action research study on bio management of Coconut Rhinoceros Beetle (CRB), in this blog, **Anithakumari P** illustrates the need for a more nuanced approach to look at technology dissemination and adoption.

Extension services, in general, follow an individual farmer centric approach in promoting new technologies in agriculture. Such an approach is less effective especially while working with small and marginal farmers. In the case of coconut, small and marginal farmers dominate the sector and they are engaged mostly in homestead farming. The ICAR Central Plantation Crops Research Institute (CPCRI), Regional Station, Kayamkulam (Kerala) pilot-tested several technologies among coconut-based homestead farmers, especially in root (wilt) disease affected areas. The disease is of a debilitating nature, adversely affecting the health and productivity of affected palms and there are no absolute control measures. Root (wilt) affected coconut palms are more vulnerable to pests and diseases, adding to the income and investment woes of homestead farmers.



**CRB infested coconut palms-“V” shaped cuts indicating infestation**

The CPCRI experiences indicated the inefficiency of individual farmer-based technology dissemination and adoption in managing the major pest, Coconut Rhinoceros Beetle (CRB). Non-availability of bio control agents and non-consideration of area wide distribution of breeding sites (which many times fall outside the coconut holdings) in technology dissemination were the main reasons for the lack of success. The imperative of reaching out to a large number of farmers (7 to 12 farmers per hectare) added to the problem. Varied adoption and non-adoption of technologies by individual farmers reduced the efficiency of CRB management in general.



Hence, adoption of an area-wide community extension approach – coordinated by groups – was promoted to bring down individual

garden-based variability in order to significantly reduce pest incidence throughout the area of intervention.

### Box 1: Coconut Rhinoceros Beetle (CRB)

*Oryctes rhinoceros* (L.), the coconut rhinoceros beetle, is a ubiquitous pest species occurring throughout many tropical regions of the world. Adults can cause extensive damage to economically important wild and plantation palms. The pest infests seedlings, pre-bearing and bearing coconut palms, causing crop loss or yield reduction. The pest is reported from Africa, Asia, Middle East, North America, Oceania, etc. Generally integrated pest management (IPM) approach is recommended, which consists of multiple control options to keep pest populations below economic threshold level. One of the major bio control agent of this pest is the green entomopathogenic fungus, *Metarhizium anisopliae* (Sundara Babu et al. 1983). In breeding sites, the fungus may be applied for larval control and is distributed by adults. This fungus acts as a biopesticide on immature stages of the beetle (Bedford 2014). Zelanzy (1979a) reported an average of 4 to 13% nut yield reduction due to frond damage by CRB. CRB infestation was reported to be 48.31 per cent in coconut seedlings and 22.7 per cent each in pre-bearing and bearing palms in Kerala State (Anithakumari et al. 2015).

The fungal bio agent (*Metarhizium anisoplaea*) is recommended for application in CRB breeding sites for destruction of larvae as adult beetles may spread it. The general breeding sites are FYM/cowdung pits in homesteads, coir pith heaps in coir making units, dead and decayed palm trunks in homesteads due to red palm weevil or diseases.

### AREA-WIDE COMMUNITY EXTENSION APPROACH (AWCA)

Field research conducted by the CPCRI among coconut farmers indicated that farmers prefer low cost, safer, easily adoptable control practices to manage the pest, since palms are grown mostly in house plots. Bio management is preferred by the farming community as they are environment-friendly, safe, cost-effective

and efficient as well. A report indicated that IPM components were partially adopted by 36 per cent of coconut farmers, whereas knowledge and adoption of bio management stood at only 2.1 per cent (Anithakumari et al. 2012). The dismal level of knowledge and adoption of bio management of coconut pest triggered refinement of the prevailing extension strategies in the farmers' system, and the process is depicted in Figure 1.

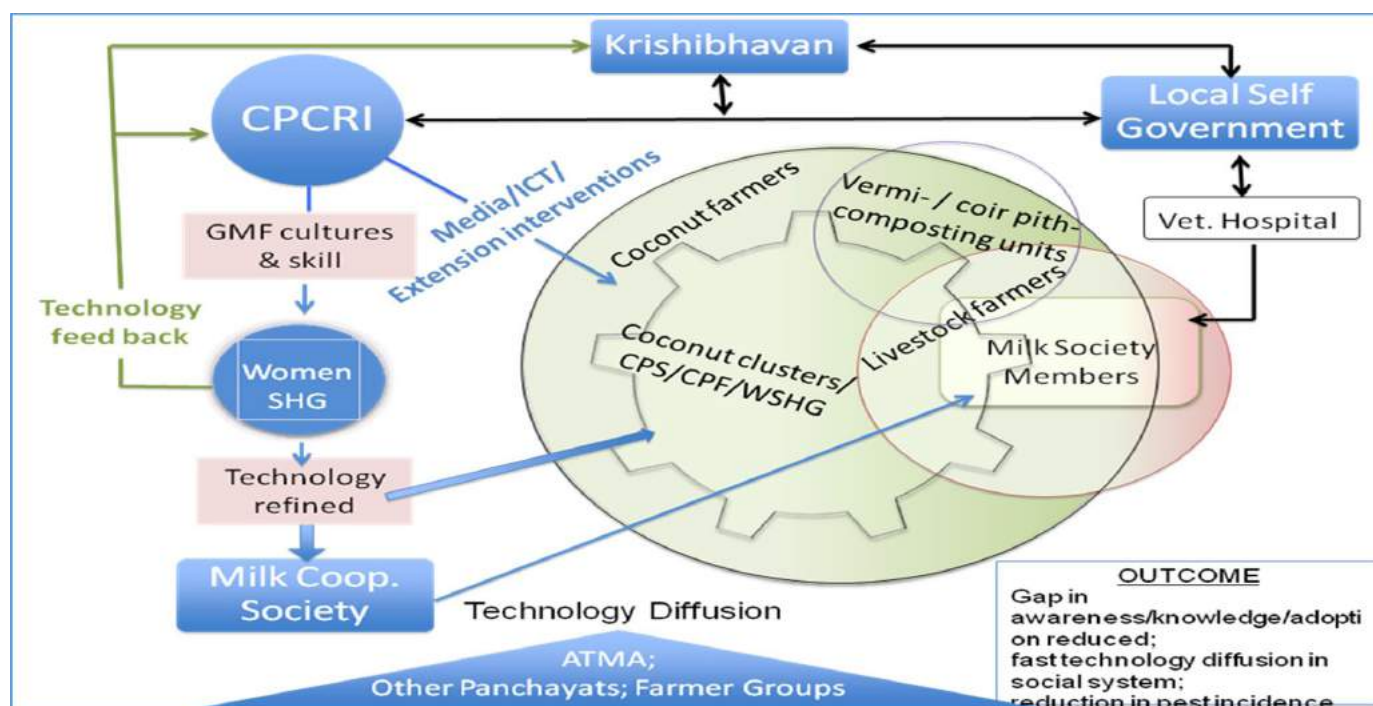


Figure 1: Area wide Community Extension Approach (AWCA) of Bio-management of Rhinoceros beetle

2007-2009 period: Pilot-level field research was initiated in two panchayats, Thekkekara and Devikulangara, of Alappuzha district during 2007, covering 1500 ha of coconut cultivation. ICAR-CPCRI, evolved effective bio management techniques against CRB as a component of the Integrated Pest Management (IPM) using *Metarhizium anisopliae*, green muscardine fungus (GMF). The major constraints identified were non-availability of critical inputs (bio agents) and non-awareness. In discussion and linkage with the extension agencies, farmers and experts of ICAR-CPCRI implemented extension interventions, such as on- and off-campus training programs, method demonstrations on application of bio agents, five result demonstrations in each panchayat, extension literature in local language and agri clinics/advisory services on a ward basis. Mass media campaigns were also organized as per a pre-arranged schedule. With regard to providing high quality bio agent (GMF) the entomologists suggested replicating the Farm Level Production (FLP) of green muscardine fungus (GMF) based on the simple method followed in Sri Lanka. A rural youth qualified in micro biology was selected and trained on laboratory and unit initiated production. Sadly, the attempt was a total failure with a high level of contamination in spite of expert support, and the low cost method was rejected as non-viable. Furthermore, reaching out to a community of more than 5000-7000 homesteads (marginal farmers) without appropriate social process was seen as a huge task to undertake given the existing TOT system.

The lukewarm response of the farming community called for a rethinking of the entire technology, knowledge and adoption status, segmentation of adopters, as well as extension-based answers and solutions necessary to overcome this state of affairs. We learned that social participation and group dynamic skills are vital for overcoming the problems of small and marginal sized coconut holdings and also to realize faster and purposeful reach out.

2010 to 2013 period: Based on the lessons gained, the process was further taken forward for another field-based action program in Edava panchayat – in an area of 520 ha of coconut cultivation in 5465 homesteads with 110143 palms in a contiguous manner. This

panchayat was selected for our field research, as the Coconut Development Board's flagship programme on rejuvenation of coconut gardens (cut and removing old and low yielding palms, replanting seedlings and their management) was first implemented in this location. This program could trigger an incidence of CRB due to area wide cutting and problems of piling of organic debris stimulating breeding of the pest, according to experts. Hence as extension experts, we conducted participatory combing survey on the pest incidence, palm age wise severity of pest attack, breeding sites of the CRB in the area, knowledge and adoption levels, input availability and social institutions. Participatory Rural Appraisal (PRA) was the most helpful in eliciting information from different social strata.

Farm-level GMF production (FLP) units were initiated by women farmers' self help groups for decentralized production and supply of bio agents. The requirements were two 20 litre capacity pressure cookers for sterilization, cotton for plugging PPE covers, polished rice grains, four numbers of big sized candles, GMF culture (from CPCRI) and trained participants. Quality control of the product was ensured by the ICAR-CPCRI laboratory for each batch. The FLP technology was adapted and refined by the group, based on their needs and resources, resulting in a saving of 30 per cent of the preparation time (cooking of uniform-sized rice grains reduced to three minutes instead of 15 minutes as instructed, thereby reducing contamination and ensuring optimum fungal growth) and 40 per cent of cost (avoided use of cotton balls and PVC pipe pieces for plugging which was replaced with multiple folding of mouth portion and stapling tightly with equal results), which clearly indicated the role of women in technology facilitation and refinement, when associated. Repeated discussions and visits with KVK experts, pathologists and mutual learning of women group members were the inputs for continuous improvement. They produced 6000 to 8000 packets annually for supply to other areas also.

The area-wide community adoption strategy was thus evolved; it involved the CPCRI as technology provider and also as a major actor involved in capacity development of social units through convergence and linkage. One

practical as adoption unit for the AWCA, and also suitable for congenial support mechanisms of local institutions and social mobilization. The major partners and participants in this scheme included the Department of Farmers Welfare and Agriculture Development (Krishibhavan)/ Agricultural Technology Management Agency (ATMA) for networking and linkage with Local Self Government for up scaling, coconut farmers' groups (coconut producers clusters/ society), Department of Animal Husbandry/milk co-operative societies and mass media (print and All India Radio).

While planning for panchayat wise community adoption programs, initially all the potential breeding sites of CRB in the panchayat were mapped with GPS and treated with GMF as a ent of various stakeholders. one-week campaign with the active involvement of various stakeholders. The total cost was only INR 25,000 per panchayat for this programme. The participatory interventions also resulted in significant improvement in training participation (43%), social and extension participation (58%), extension contact (66%) and mass media exposure (51%) of the farmers when compared to the pre-intervention period.

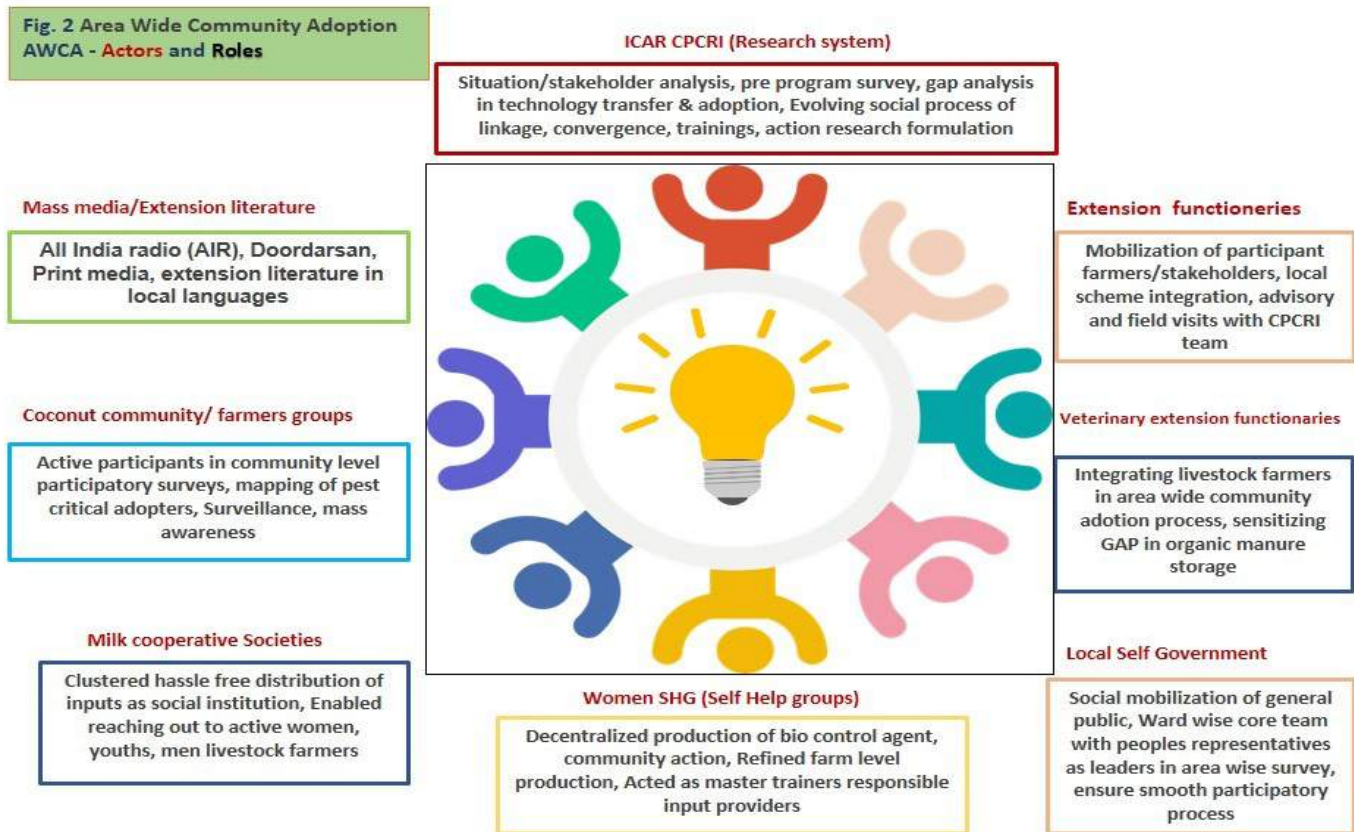
### HOW DOES THE ADOPTION PROCESS OF FUNGAL BIO AGENT FOR CRB

### MANAGEMENT DIFFER IN HOMESTEAD SOCIAL SYSTEMS?

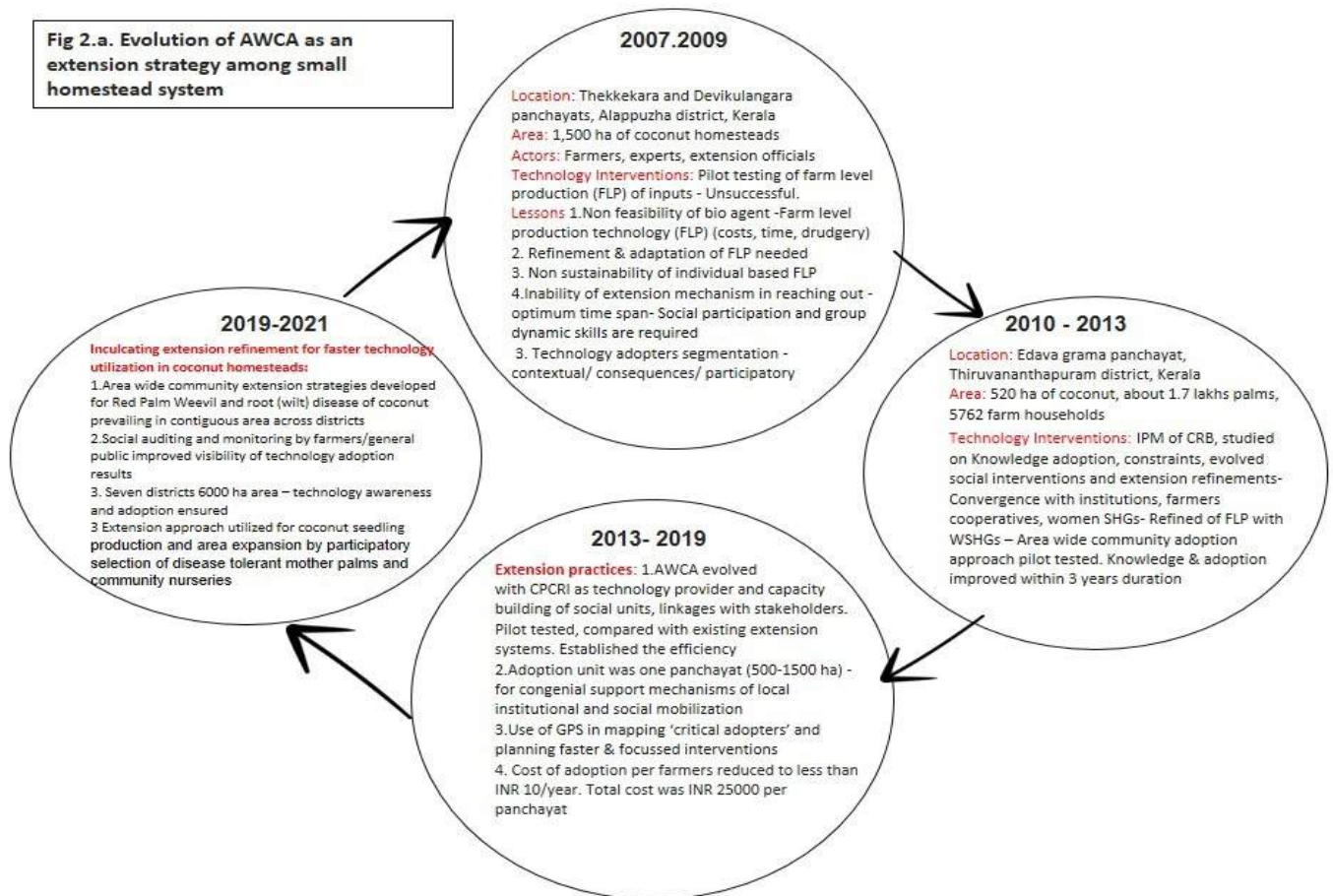
To fully appreciate the adoption process of fungal bio agent in this case, one needs to understand the nature of homestead social systems. Coconut homesteads are varied and are of average holding size of 0.22 ha with random integration of different farm components. They act as farm level ecological units for household needs, providing market surplus also. CRB management was introduced in these homesteads of less than 1 hectare, held by farmers with varying attitudes, motivation and resources.

Extension system needs dynamic strategies in dealing with technology dissemination in such systems. These strategies should combine area and community-based approaches with participation of varied stakeholders in technology selection and adaptation. The roles of actors in the AWCA process of CRB management evolved over time through participatory interventions. Even though the roles were played with responsibility and sincerity, we learned that the leadership from each actor contributed to the sustainability and up scaling of these strategies in other districts as well. The roles and major actors are given in Figures 2 and 2.a.

**Fig. 2 Area Wide Community Adoption AWCA - Actors and Roles**



**Fig 2.a. Evolution of AWCA as an extension strategy among small homestead system**



## LESSONS

Pilot testing of AWCA for CRB management revealed several important lessons, which are summarized below.

### Role of critical adopters

Critical adopters are farmers crucial for enhanced positive consequences of technology adoption in the allocated farming society, without whom as adopters, the technology impact cannot be achieved. As in the case here, they are inadvertently contributing to a general

problem affecting the entire community of palms. The critical adopters could fall under the general adopter categories as well, but technology adoption may not always directly benefit them, but could be beneficial to a larger section of farmers. The critical adopters in this case, namely the livestock farmers, coir units and compost producers having foci of pest multiplication, may not necessarily be coconut farmers per se, thus defying the general adopter categories. GIS, for area wide decision making in extension interventions with precision, is a tool of efficiency.

### Box 2: Mapping of Critical Adopters

The scattered breeding sites of rhinoceros beetle in the panchayat – livestock farmers (643 numbers), vermicompost units (7 numbers), coir processing sites with coir pith heaps (3 numbers) – were mapped, indicative of the locations in each ward. It was found that 82 per cent of these potential/critical adopters were distributed in six wards, where more concerted efforts were implemented. The other wards needed simple and low scale extension interventions only saving time, cost and manpower. They were reached through coordinated efforts of people's representatives, extension units of the Department of Agriculture and Animal Husbandry, milk cooperative societies in which 85 per cent of livestock farmers are members, and women Self-help Groups (SHGs). Through this approach more than 90 per cent of the potential critical adopters were reached within two months and post-intervention data indicated 75.8 per cent reduction of fresh pest infestation. The farmers revealed that grubs were infected by fungus after a week of treatment and infected grubs/adult beetles (using pheromone traps) could be collected from all wards, indicative of a reduction in the pest population.

Identification and mapping of critical adopters enabled the extension system to bring visibility to the hidden connections of technology adoption and public consequences among homestead systems in marginal land holdings. This also led to development of appropriate extension strategies, more precise reach out and more efficient use of inputs. In area wide approach of CRB, extension methods, tools, interventions, extent of linkages and convergences with relevant stakeholders could be decided based on mapping of critical adopters and severity levels of the pest incidence. The cost of extension reduced in terms of labour charges through linkages and convergences. Time taken for spread of technology across the system was only eight years (2007-2013) of AWCA. This is important given that this technology was developed five to six decades earlier – indicating much delay in technology dissemination and utilization. The existing wide gaps in continuous and improved technology supply in the coconut innovation sector calls for further analysis.

**Field challenges and compatible extension**

Analysis of the field situation indicated that the critical adopters may not be distributed

evenly in all the wards of a panchayat (Wards are the lowest administration unit of local self-government in Kerala State with a people’s representative). Hence mapping of wards in a panchayat enables identification of the stakeholders to be linked or converged for technology dissemination and adoption. This warranted individual extension approaches in wards with sparsely scattered critical adopters, and participatory group interventions in other locations.

**Why technology adaptation and refinement matters**

Small and marginal farmers form complex systems of linkages, networking, resource base, knowledge acquisition pattern, perceptions, attitudes and associations within and among them. Hence extension mechanisms need customized refinement as per technology characteristics, physiology of the crop and farming systems. In homestead systems we can observe the apparent uniformity among farmers with regard to technology needs or knowledge/adoption potential. An area wide community approach in extension could play an effective role in situations that overlook the segmentation of adopter categories.



**Close surveillance on CRB Investigation at the field level**

**Responsible technology dissemination**

The points of community learning vis-à-vis reducing complexity of technology use, ease of demonstration and trial, observability of results,

and compatibility with Indigenous Technical Knowledge (ITK) occurred due to planned social actions. The ITK of incorporating *Clerodendron infortunatum* (a local weed plant) was found

to make the fungal treatment of CRB breeding sites more effective as well as acceptable at large. The FLP of fungal culture by women SHGs was a standout intervention exhibiting ownership of the technology by the actors. Regarding detection in natural situations, scientists had no clue initially and the critical adopters also responded that after *Metarhizium* treatment they could not recover dead larvae from breeding (treatment) sites. Eventually farmers observed the presence of ant lines in the treated cow dung/compost/coir pith sites, leading to the affected grubs. This confirmed the effect of *Metarhizium* on CRB larvae, making them lethargic initially, then fading of larval colour, and finally death within a week. AWCA built technology awareness, dissemination, triangulation and evaluation within the farming community with minimum external bias. This has resulted in more ownership and better confidence in the potential of the technology. Trust and proximity among actors, commitment, sharing and cooperation are outcomes observed in AWCA and determines the success of community extension.

### **Quality feedback of tacit knowledge for refining research outputs and outcomes**

Perennial presence of host plants (coconuts) provides a congenial ecosystem for thriving of the ubiquitous pest (CRB). The AWCA led to refinement of CPCRI's recommendation that CRB breeding sites be treated once in 2-3 years since it was observed that fungal spores are active for that duration in laboratory conditions. In actual field situations the farmers used FYM/cow dung during April-May for planting tubers and other inter crops in coconut groves. The usual recommendation was to retain a portion of the *Metarhizium* treated organics in the pits/tanks so that it will multiply eventually in the added up organic manures. But farmers noted that this was not happening and larvae were observed in such sites, questioning the effectiveness of the technology. This feedback was verified and found to be genuine in field sites. The research showed that high temperature and low humidity during March-April months hinders *Metarhizium* multiplication, unlike in the laboratory. Hence the recommendation changed to yearly treatment of CRB breeding sites instead of once in three years.

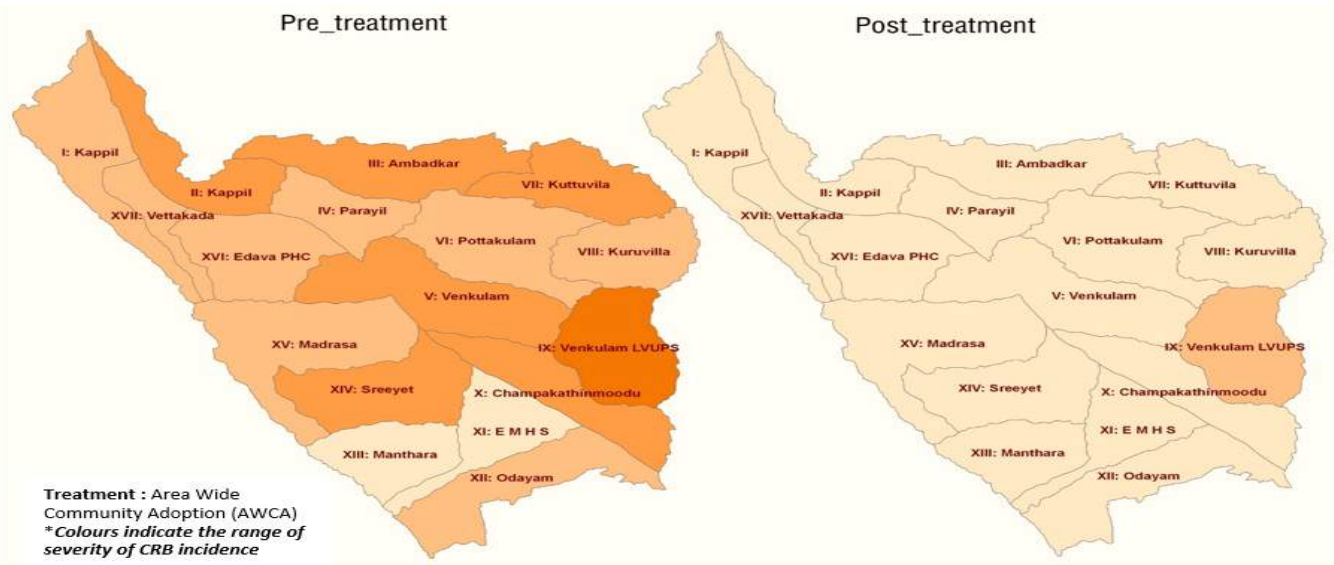
### **Socially coordinated farm-to-farm IPM on area basis reduced cost of extension**

The onus rests on 'critical adopters' as contributors to the problem, which means, for coconut farmers as the responsible technology adopters, even though most of them are not direct beneficiaries of the technology. Furthermore, it strengthened utility of technology adoption in reducing variability on the efficacy of the technologies across the system of intervention as compared to the household or individual level technology adoption among coconut communities. When compared to individual level adoption, farmers were of the opinion that there was 70-80% reduction in cost in area wide technology adoption. The FLP of bio control agent itself reduced input cost by 30 per cent and mobility for access too. Reaching out to critical adopters rather than individual coconut households reduced time, efforts and expenditure for extension functionaries. The reduction of pest infestation was in adult bearing palms, thereby reducing major cost of climbing charges (60 per cent of plant protection operations) for palm crown treatment as recommended. The use of chemical insecticides and engaging climbers individually, deterred small farmers from adopting regular plant protection for coconuts in homesteads. Thus AWCA induced economies of scale.

## **IMPACT**

### **Shift of adoption unit to contiguous geographical area**

The overall percentage of infestation in the pre-project period was  $72.9 \pm 9.3$  and it significantly decreased to  $58.1 \pm 9.1$  in the post-project period, in the intervention panchayat. The area-wide impact of the community adoption approach was very clear as compared to the control panchayat of Kollam district, where general extension advisory services were in operation instead of AWCA. The pest incidence did not decline, but rather, it was the same during 2010 and 2013 (74.5 and 74.6%, respectively). The impact of AWCA was more or less geographically contiguous (Fig 3). AWCA, with critical adopters recommended for technology dissemination and adoption mode by ICAR-CPCRI, was implemented in seven districts in an area of 6000 hectares of coconut, until 2020.



**Area wide result of technology adoption through AWCA– Edava Panchayat, Thiruvananthapuram District, Kerala State**

## IMPLICATIONS FOR EXTENSION RESEARCH

These experiences reveal the need for re-looking at the adoption process and technology recommendations.

Firstly, there is a need for continuous monitoring of technology performance at the field level under different extension settings (e.g., individual approach vs. area-wide approach). With the introduction of every bit of new knowledge at the field level there will be dynamic changes, and to fully understand the technical and social adaptations that happen, agro-biological scientists and social scientists need to undertake more detailed exploration on the performance of technology, second generation challenges that might emerge, as well as look for new opportunities in enhancing adoption.

Secondly, at the individual level farmers choose to be either an innovator or a laggard based on their decisions with regard to adopting technologies. But several studies challenged the adopter categories in terms of factors affecting the decisions at micro and macro levels. However, Rogers's theory still continues to hold good in explaining and strategically planning acceptance of knowledge, technologies and ideas. Given the Theory of Reasoned Action (TRA) individuals generally do not act independently of influences from their own social or cultural arena. A person's intention in support of a particular behaviour

is the major predictor which precedes the actual performance. The behavioural intention occurs as a result of the conviction that the performance will lead to a specific outcome (Blue 1995). They will be continually reporting their behaviour back to important reference groups. In extension research the extent and access of research and extension institutions as the reference groups among farming community needs analysis in the wake of online extension resources, which are readily available in need-based formats.

Thirdly, the consequences of adoption can be private, public, or both, as the case may be. Readiness to adopt technology by forcing an innovation may have to be modernised for jointly evolving and playing critical roles in the use of such innovation. The social impact/public consequences of technology dissemination and adoption – as evident from AWCA – call for impact analysis on a system basis as well. The decisions for adopting technologies follow different pathways in individual and community approaches. The dimensions of access, equity, institutional structures, and common investment by community organizations require further study and analysis.

The consequences of technology use are to be largely viewed and assessed within the paradigmatic dimensions of ecology, energy efficiency, psychological benefits, climate resilience, carbon foot print, and socially responsible consumption behaviour. Extension research and approaches need to

be scientifically responsive in knowledge and innovation creation, rather than individual process models.

Public consequences refer to the impact of an innovation on those other than the actor, while private consequences refer to the impact on the actor itself, which was elicited by Barbara Wejnert, in her article, 'Integrating models of diffusion of innovations'. The contextual uniqueness of technologies or methods in agriculture may not be shared in theories and adopter categories, which are focused on individual behaviour and decisions. The interconnections among farmers and stakeholders in the social system, with very small holdings of physical contiguity, strong kinship with influence of leadership are to be considered in community level extension.

These results have implications on the way extension is organized and emphasises the need for stratification of farmers as community/

groups/clusters rather than only as adopter categories in the scenario of limited man power and resources. The resources could be more effectively invested in educating and empowering extension functionaries by refining the curriculum and field functioning for higher impact.

## CONCLUSION

Technology adoption in agriculture, resulting in public after-effects often defies the general adopter categories among farming communities – as seen in the case of CRB. The bottlenecks of extension projects and programs while covering the majority of small and marginal farmers sustainably requires participatory studies. It also calls for evolving approaches and strategies appropriate to technological, social, biological and geographical contextualization. Sustainable adoption requires subjective evaluation of technology characteristics with which to evolve technology dissemination pathways.



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# 08

## A CASE FOR MORE QUALITATIVE STUDIES IN AGRICULTURE

In this blog **Aditya KS and Bhuvana N** argue for mainstreaming qualitative research methods in agricultural research. The blog elaborates on the misplaced, but predominant, notion of superiority of quantitative methods, particularly in Social Science. The choice of method should be a function of the research question and not the other way around. The purpose of this blog is to convince the readers that there is always 'room at the table' for qualitative studies in agriculture, and as a discipline we gain by embracing a mixed methods approach.

I have always been fascinated by qualitative research methods, but I have rarely used one till now in the seven years of my research career. I always end up visualising myself presenting a research grounded in qualitative methods at a Social Science conference – I can literally imagine frowns from my colleagues listening to my presentation and some whispers, "Is it really economics?" or then again "Is it really science?" or "These are merely statements, how do you know they are true?" There is a fascination and a strong preference for quantitative methods among researchers working on social aspects of agriculture. Most courses on research methods have exclusive emphasis on quantitative aspects of research. Use of qualitative methods is limited, even when used, the rigour of such studies in general is very poor. In this blog, we question this prejudice about quantitative methods being in some way superior to qualitative methods. We argue in favour of having more qualitative studies in agriculture.

### WHY QUALITATIVE STUDIES ARE IMPORTANT?

Let us start with our over the top love for quantitative studies. We agree that these are straight forward methods, amenable to statistical testing and lends itself to generalization. However, we should also accept the downside of using only the quantitative lens of enquiry. For instance, consider the most common adoption studies. The typical question to start with is 'what determines the adoption of new technologies?'

In a typical study, authors have a prior hypothesis that socio economic variables such as gender, age, education, income, and some technological aspects (mostly perceived) affect technology adoption. Data is collected on these variables, a model which fits the data is used and interpreted based on statistical significance. Most of these studies end up with conclusions, such as younger

farmers are more likely to adopt technologies or educated farmers are more likely to do so. In fact, one of my senior colleagues from Statistics used to tell me that social scientists can justify anything; if the coefficient for age is negative, they will interpret it as younger farmers are

more entrepreneurial and risk taking, and if the coefficient is positive, interpretation is changed to older farmers, whose experience leads to adoption! This is analogous to the narration in Box 1.

### Box 1: Openness in Science

"A traveller to a new land came across a peacock. Having never seen this kind of bird before, he took it for a genetic freak. Taking pity on the poor bird, which he was sure could not survive for long in such a deviant form, he set about to correct nature's error. He trimmed the long colourful feathers, cut back the beak, and dyed the bird black. "There now," he said, with pride in a job well done, "you now look more like a standard guinea hen"." Patton (1990, p. 347)



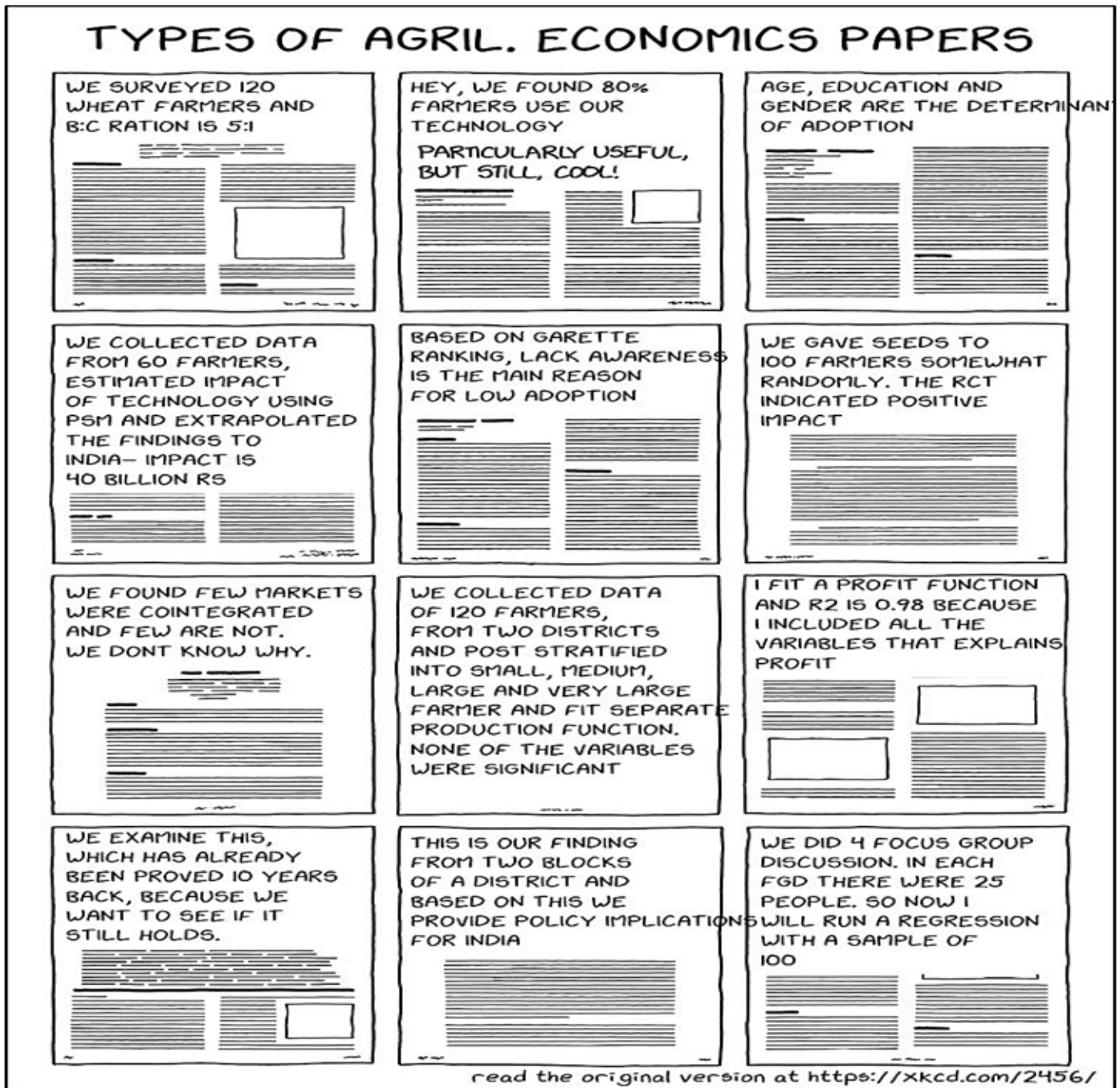
Nevertheless, what policy input can we give to such studies? Is it not already known that education is important? We already know the gender roles and challenges that women-headed farms face. What is it contributing to the progress of the theory or the subject matter? I am not criticizing every study here, of course there are very good papers on adoption using quantitative methods, but I am trying to underscore that not every quantitative paper with huge dataset and sound methods is useful or insightful. On a lighter note, Aditya has created a meme (Figure 1) on things that we find funny in our research papers.

Please allow us to present arguments in favour of qualitative studies. Many of you with a strong background in quantitative methods think that qualitative methods are easier as the sample size would typically be very small and one needs to worry about statistical significance (I used to be one of those, not now!). To do a qualitative study is easier, but it is extremely difficult to do it well. It is more complex, messier and time consuming than a typical quantitative study, but more on this later. Question at this point is:

what are the advantages of a qualitative study when done systematically?

Most qualitative methods are inductive (not all, though) and they aim to understand the world based on lived experiences. Many of the constructs which cannot be typically defined or measured as variables can be extracted in this case. Here, each situation is understood on its own, and interpretations are drawn to best explain the scenarios, rather than trying to fit the situation into a pre-existing theory. When we try to fit a given scenario into a pre-conceived model, there are chances of misrepresentation and we learn little about the problem. I think this passage from Patton is very relevant in this context.

So, qualitative studies are more interpretive, could explore human behaviour at a more fundamental level and understand farmers' behaviour from their own world view. These studies could be very useful on their own, or in combination with quantitative methods. Before detailing the typical characteristics of a qualitative study, I think it is helpful to discuss some basics of the philosophy of science.



**Figure 1: Types of Agricultural Economics research papers (a meme created by Aditya)**  
[https://twitter.com/Aditya\\_rao\\_ks/status/1395746308229505024?s=20&t=ZM2TAygm\\_INB9ld6A40\\_CqQ](https://twitter.com/Aditya_rao_ks/status/1395746308229505024?s=20&t=ZM2TAygm_INB9ld6A40_CqQ)

Broadly there are three main philosophies in science.

1. Deductive reasoning – Starting the enquiry with a theoretical background and applying it to understand field situations. It could be either ‘naïve falsification’ where the researchers try to either support a theory or end up with falsifying it based on observations from the field; or ‘critical reasoning’ where the hypothesis based on theory is the starting point, and the hypothesis is then statistically tested.

2. Inductive reasoning – This is theory-free reasoning based on observed data. The aim is to understand the story that observations are telling us and then drawing inferences based on these. The philosophy is to develop concepts based on the observed data.

3. Abductive reasoning – The philosophy is to critically observe the situation, draw inferences, go back to the field and gather more data to refine the concepts. So, this going back and

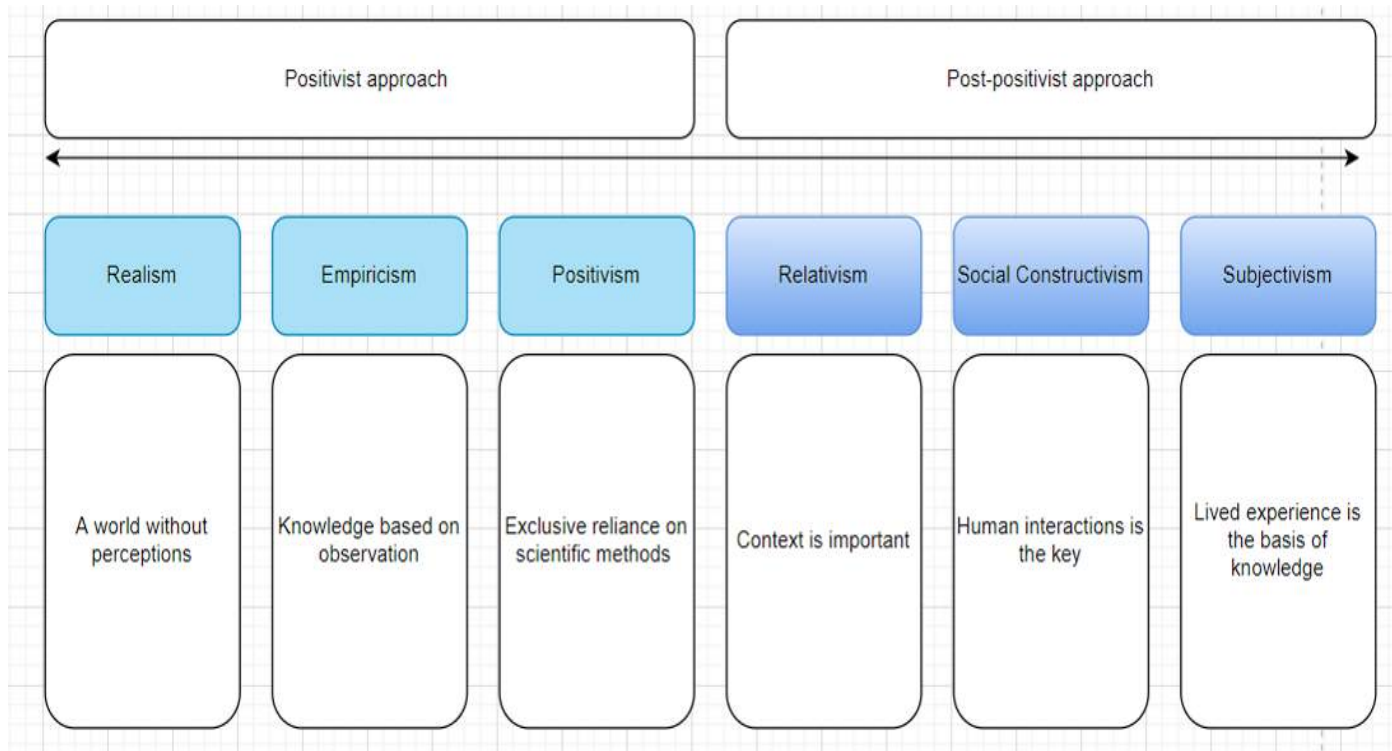
<sup>1</sup>This blog is written in a conversational tone, with ‘I’ and ‘We’ being used interchangeably.

forth between data collection and analysis differentiates it from the inductive methods.

## EPISTEMOLOGY

With this understanding, we can now talk about epistemology. Epistemology is a very difficult term to define. In the simplest explanation, it is a set of rules for creating new knowledge,

or rules used to understand the world we live in. Epistemologies pertaining to Social Science can be better represented in the form of a spectrum. We don't intend to explain all these different strands of epistemology in this blog, those who are interested can read more on these. Figure 2 depicts the spectrum of different epistemologies.



**Figure 2: Different epistemologies in science**

Qualitative methods fall under the epistemology of post-positivism, where the importance is on understanding the context of the situation, giving importance to understanding human interactions and lived experiences of participants. These methods rely on the researcher's description of perceived reality of the participants. In other words, the aim is not to describe what is real, but what the respondents think is real, based on their world view, because these perceptions are what shape their behaviour.

The purpose of detailing the research philosophies is just this: a researcher can better understand how to approach the problem if they think through on the epistemology they want to select. More importantly, there is no one universal methodological paradigm suited to all situations. One needs to choose the paradigm based on the situation and what they want to achieve. As Patton (1990) puts it

'research and evaluation should be built on the foundation of a "paradigm of choices" rather than become the handmaiden of any single inevitably narrow disciplinary or methodological paradigm.'

## END NOTE

Let us not be closed-minded on the choice of methods and let our choice of method be nothing like a 'bear choosing to like honey'. Let us be open to and promote more qualitative studies in agriculture as they can generate insights which are beyond the reach and scope of quantitative studies.

## Box 2. Bear's decision to like honey

One day, in a sudden impulse of generosity, a bear decided to enlighten the other animals in the forest about the marvellous properties of honey. The bear assembled all the other animals together for his momentous announcement "I have studied the matter at great length," began the bear, "and I have decided. that honey is the best of all foods. Therefore, I have chosen to like honey. I am going to describe to you the perfect qualities of honey, which, due to your past prejudices and lack of experience, you have ignored. Then you will be able to make the same rational decision that I have made.

"Honey comes conveniently packaged in beautifully shaped prisms of the most delicate texture. It's ready to eat, slides down the throat ever so easily, is a highly nutritious source of energy, digests smoothly, and leaves a lingering taste of sweetness on the palate that provides pleasure for hours. Honey is readily available and requires no special labour to produce since bees do all the work. Its pleasing aroma, light weight, resistance to spoilage, and uniformly high quality makes it a food beyond compare. It comes ready to consume — no peeling, no killing, no tearing open — and there's no waste. What's more, it has so many uses; it can be eaten alone or added to enhance any other food."

"I could go on and on, but suffice to say that I have studied the situation quite objectively and at great length. A fair and rational analysis leads to only one conclusion. Honey is the supreme food and any reasonable animal will undoubtedly make the same conscious decision I have made. I have chosen to like honey."

Patton (1990)

**Note:** We are not experts in the field of qualitative research, as we started working on it only recently and have developed a fascination for it. If there are any errors in the explanation, we totally own them. We also acknowledge that this blog is inspired by the teachings of Prof. Dr Vera Bitsch of TUM, Munich, Germany. Many of the points and literature comes from the classes of the Professor and the discussions afterwards. We are forever grateful to Prof Bitsch for the inspiration.

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# 09

## COMPUTER-ASSISTED QUALITATIVE DATA ANALYSIS WITH ATLAS.ti

In this blog, **Aditya KS and Bhuvana N** elaborate on the pros and cons of using software in qualitative data analysis. The blog also discusses the basic functionalities of the ATLAS.ti software.

Different data types can be used for qualitative research — interview transcripts, observations, audio/video/pictures — and the researcher's role is to draw inferences by following systematic methods. The usual approach is to use codes, which extract meaning from the data and then categorize codes into themes and then derive results based on coding of the systematic data. One can do coding manually, either on the printed page or on a word processor, or do coding with the help of Computer Assisted Qualitative Data Analysis Software (CAQDAS). The three most commonly used CAQDAS are ATLAS.ti, MAXQDA and Nvivo. In this blog we will elaborate on the use of CAQDAS, using ATLAS.ti as an example.

The purpose of using software in qualitative research is diametrically opposite to that in the case of quantitative research. In quantitative, the main use of the software is to calculate different statistics which describe the data, and then to run any statistical model needed to answer the research question. The role of the researcher here is to only specify the model, and the variables. In qualitative studies, however, the researcher him/herself is a research tool; analysis is a process of describing the perspectives of participants using the data. So, the researcher has to draw meanings and inferences from the subtle statements or observations, which cannot be done by a software. So, the software is merely an organization tool, to document the process of drawing inferences from the data.

With this as the background, let me put forward the arguments for, and against the use of CAQDAS. Bryant and Charmaz has pointed out that Glaser ('The Discovery of Grounded Theory', 1967, co-authored with Strauss) opposed the use of computer software in qualitative research.

His argument was that computer software will take away the creativity



Source: <https://trint.com/>

of the researcher. Becker argues that qualitative research requires a lot of inductive thinking—creating codes, generating meanings from statements, categorizing the codes and identifying patterns—and computer software can oversimplify this process, resulting in superficial and descriptive studies, devoid of theory development.

There is a counter argument in favour of CAQDAS as well. In qualitative research, most methods follow an emergent design (data collection and analysis go hand in hand, the codes and categories could change over time); so it is important to keep track of the entire process. Software makes it easy to organize codes, categorize them, as well as create and visualize relationships. Personally, having used both approaches - manual and CAQDAS- I feel using the software is extremely useful and saves time. Another distinctive feature of qualitative research makes it even more important as many qualitative studies follow emergent design, the entire research process is flexible as opposed to a structured research design where everything is planned in detail before the start of the survey and a new emerging idea could change the entire coding scheme, forcing the researcher to go back and start coding all over again. Software can be helpful not only to change coding schematics easily, but also to help with documenting the changes made, which is one of the important evaluation criteria.

Personally, I prefer to sit on the fence, not leaning on either extreme. CAQDAS can be a very helpful tool, but it is important to know its limits. Then only can we make the best use of it. Remember, researcher is the tool, software is just to assist the researcher, and to keep an audit track.

## INTRODUCTION TO ATLAS.ti

At this point, let us take a quick look at ATLAS.ti, one of the most widely used CAQDAS. ATLAS.ti is not an open source tool, it is a paid one and the subscription plan is available on its website. For learning purposes one can download a trial version, valid for five days.

### Steps to Start with ATLAS.ti

ATLAS.ti Installation: Browse the website <https://my.atlasti.com/> and sign up for the software by providing your email and password. If you are already signed up then login to tour the ATLAS.ti account. Once you sign up, you will receive an email confirmation on your registered email id, where you need to complete the registration by providing your first name and last name. You will be directed to a screen – as shown in Figure 1– where it will ask you to activate the license if you have purchased it. If you don't have a key, then you need to get a license by purchasing from the given red cart. Before purchase, one can explore the software by getting the trial version which is given next to the red purchase cart.



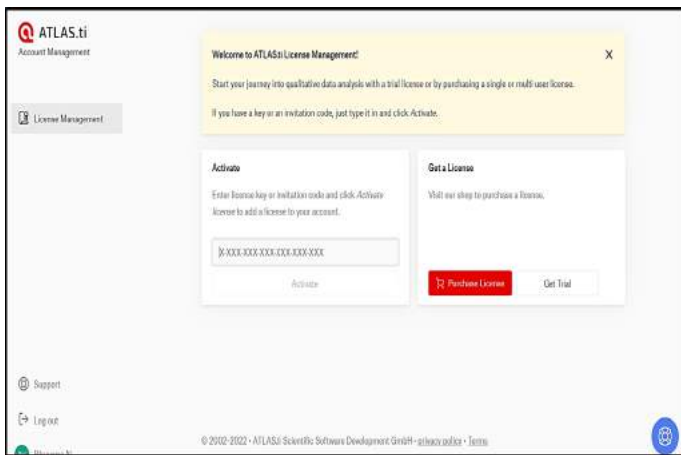


Figure 1: ATLAS.ti license management screen

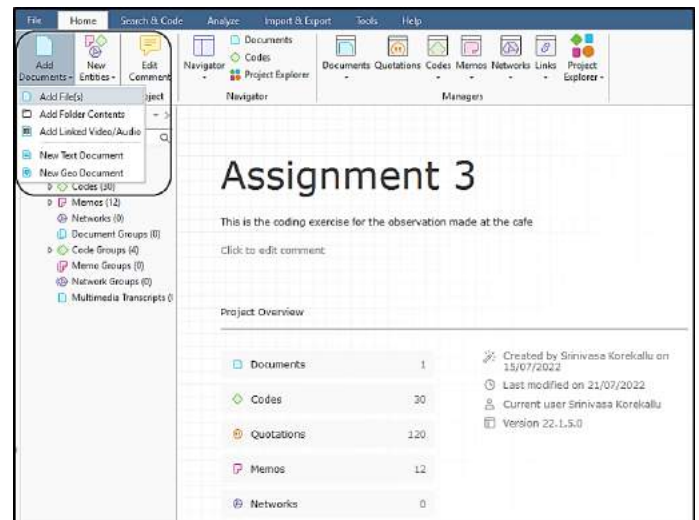


Figure 3: Adding files to a project

**Creating a new project:** Once the software is installed, the first step is to create a project. A project is a set of data, codes, and memos related to a particular research project. Click on the file symbol and add project (Figure 2), give it a name, and don't forget to add comments. In comments, usually the description of the project is provided in detail. If the project files are shared with someone else, they should be able to follow it easily.

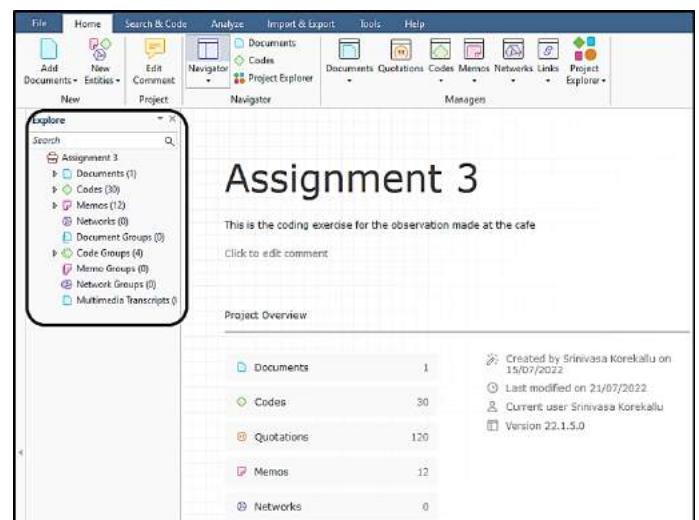


Figure 4: The different elements of the project

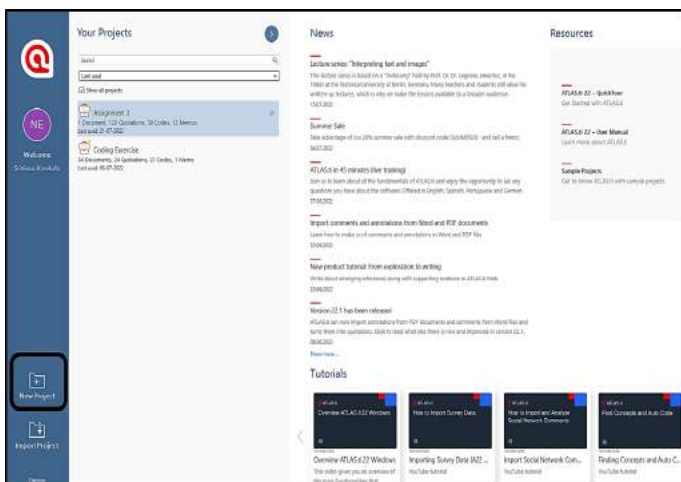


Figure 2: Creating a new project in Atlas.ti

**Adding documents:** Within a project, there are different categories – documents, codes, memo, networks, etc. To add a document to the project, click on either 'add file' (can be used to add a single file and allows different formats) or add folder (which can be used to add multiple files at once) (Figures 3 and 4).

**Coding:** It is a way of labelling the data so that the themes can be identified. The process of coding entails reading the document, identifying the relevant segments, if needed marking the quotation and adding the relevant code. There are different ways of coding — open coding, axial coding, theoretical coding, etc. But discussion on those methods is beyond the scope of this blog. To add code for a piece of text, select the portion of the text and click on add code (Figure 5). One can create a new code reflecting the text or add a code which is used previously (Figure 6).

In vivo coding is also possible, which uses the exact word in the text as a code. See the attached screenshot, for an example.

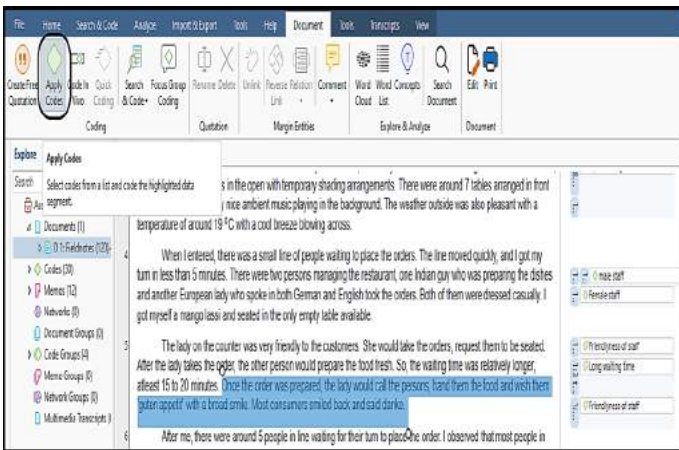


Figure 5: Applying code to quotation

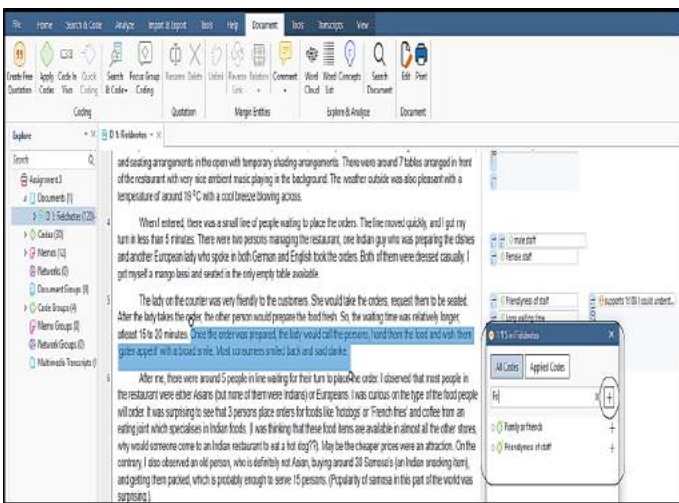


Figure 6: Applying code, either by typing a new code or using a pre-existing code

**Grouping codes:** One important aspect of coding that must be kept in mind is that the codes should be unique. It is ok to add more than one code to a fragment of text, but the codes should be independent and clearly defined. Soon after creating a new code, right click on the code, click on edit comment and define the code (Figure 7). Definition doesn't mean an established definition of the term; it should be a description of what the researcher means when using that specific code (Figure 8).

This can be done through 'edit comment' option for each code. Once the coding is completed, the codes relevant to a particular theme can be grouped. To do this, click on the code manager, select the relevant codes by holding shift button and right click to create categories (Figure 9). As before, use the edit comment option to add a description of the category.

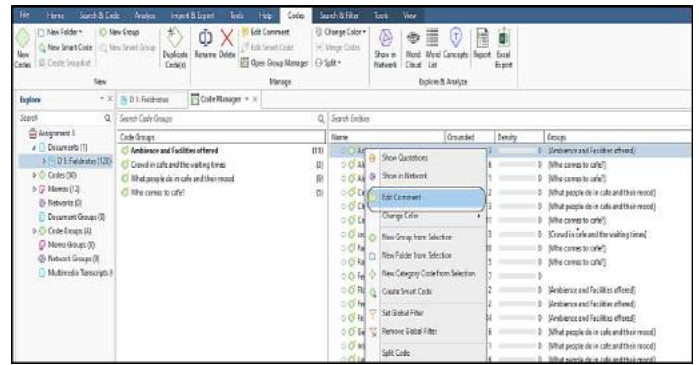


Figure 7: Adding comment to the created code

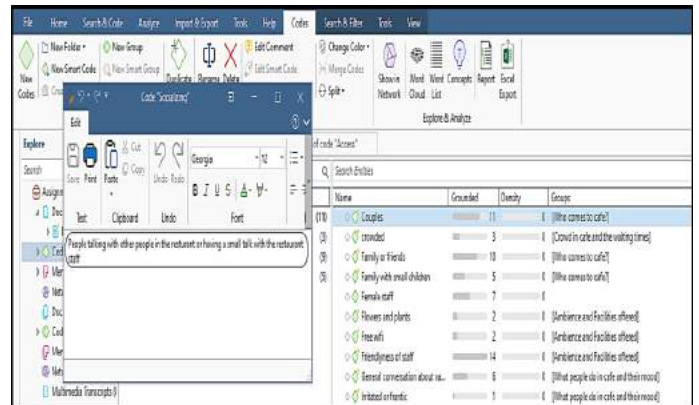


Figure 8: Adding description to the code using 'edit comment' option

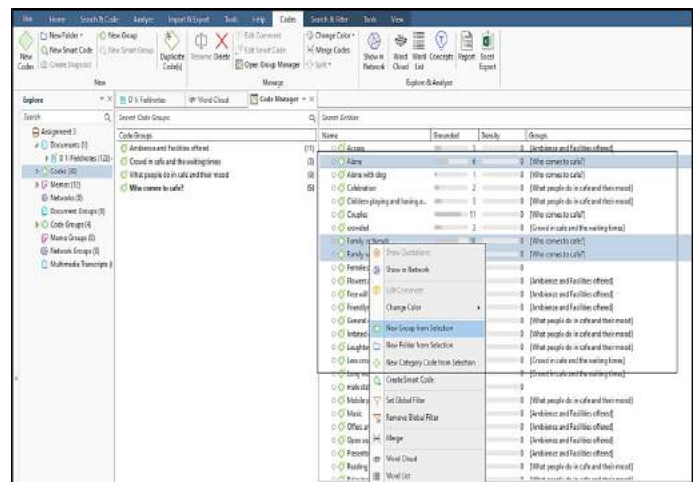
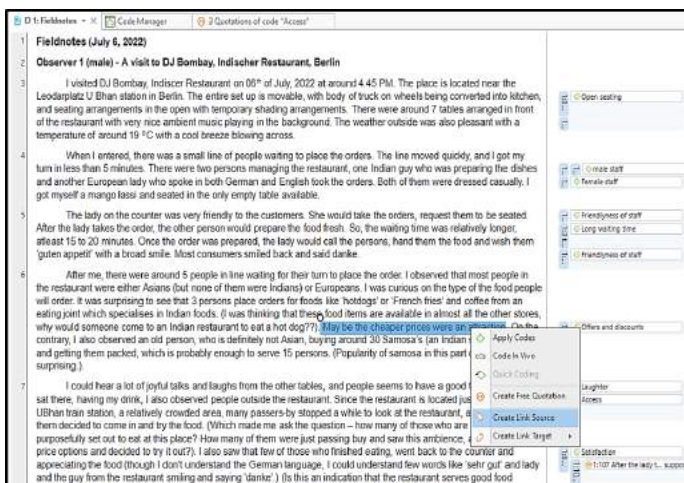
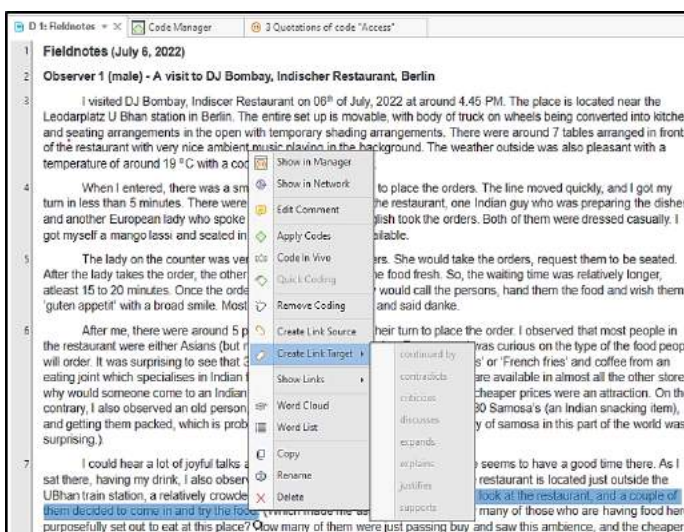


Figure 9: Grouping the codes into categories

**Relationships:** In the text, sometimes one fragment of the text has a connection with another fragment-support/oppose/justify/contradict, etc.-and this can be indicated through the 'relationships' option. Right click on the first fragment of the text, select as source (Figure 10). Click on the second related fragment and then add target, with appropriate relationship type (Figure 11). At the end, these relationships can be visualized in the form of a network.



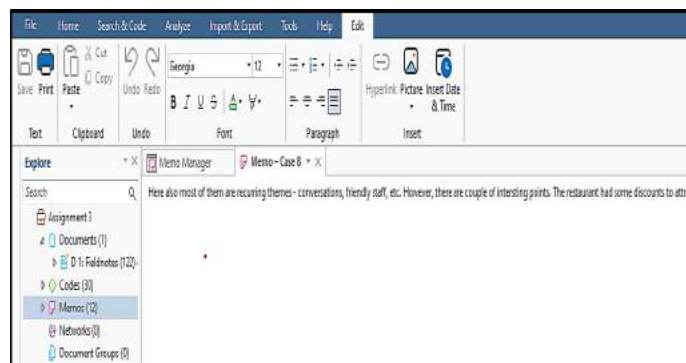
**Figure 10: Adding relationship between quotes - creating source**



**Figure 11: Adding relationship between quotes - adding target**

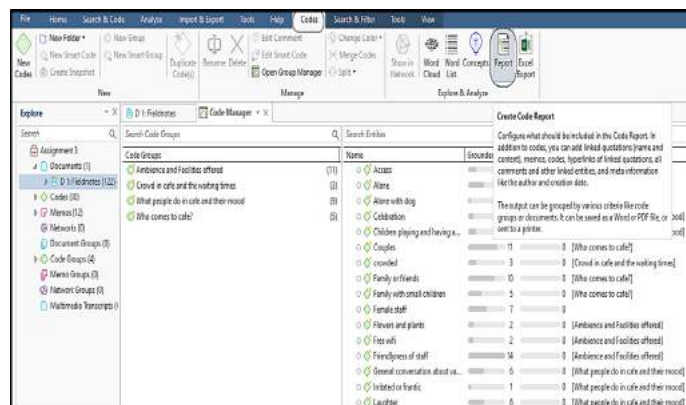
**Memos:** Memos are any piece of additional information related to the research project; it could be an observation made in the field or the emotion of the speaker as evident in the body language while carrying out the interview or researchers' thoughts on the emerging framework or underlying theory. Memos are the skeletons of qualitative research and the researcher should remember that 'writing is a form of thinking'. Atlas.ti provides an option for adding memos to the project, and as before, don't forget to add a description (Figure 12).

**Exporting the results:** In a typical piece of qualitative research, counting words or codes don't carry much meaning. The result is nothing but a deeper and conceptual explanation of the underlying phenomenon. Codes and emerging categories, along with bits of quotes help researchers to build the narrative. Coding schematics is an important part of research.



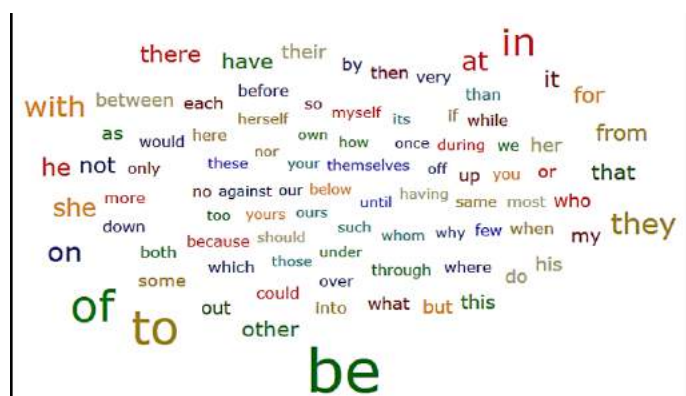
**Figure 12: Writing memos to help in analysis**

However, software can only provide a list of categories, codes with quotes in either Excel or Word. There are no hard and fast rules to bring them into a presentable form; so it is left to the creativity of the researcher. To export the results in Word or Excel, click on the codes and then export results to Word (Figure 13). Select the details that you need in the report and click 'export'.

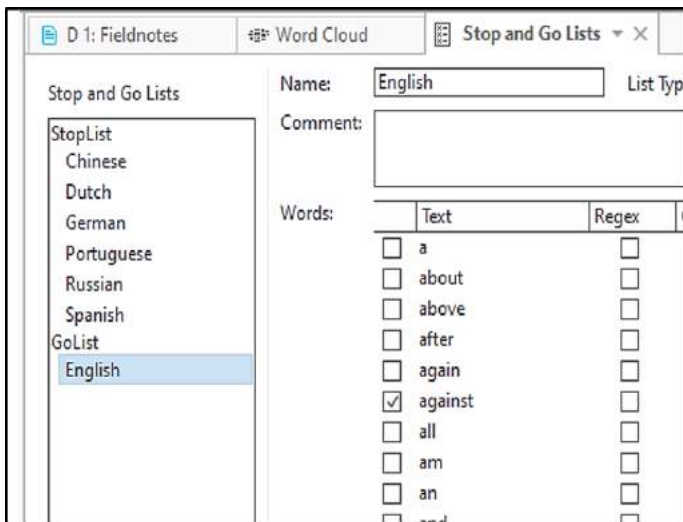


**Figure 13: Exporting the reports of analysis**

**Word cloud:** Word clouds are a popular way of visualizing the common words used in a documents. Atlas.ti can be used to generate a word cloud of the entire document or just a selected fragment (Figure 14). It also has the functionality of a stop list, which acts as a filter to remove irrelevant words (Figure 15).

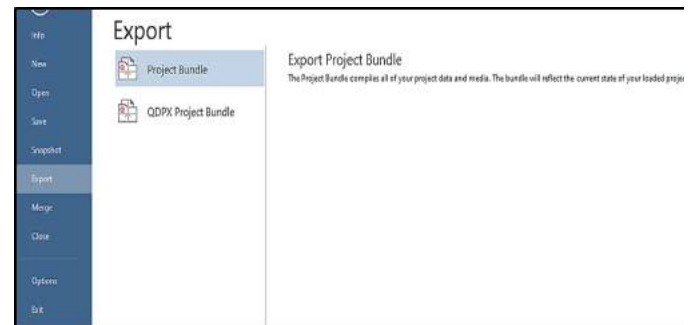


**Figure 14: Creating a word cloud for visualization**



**Figure 15: Creating a stop list to filter words in a word cloud**

or robustness criteria, to allow the inter-coder mode to help estimate the inter-coder agreement. These tools can be used depending on the research method and demands of the research question. Furthermore, search and code functionality of Atlas allows for automatic coding based on Artificial Intelligence, where the software will suggest different codes to be used. However, personally, I wouldn't use this, as Glaser predicted, this could lead to dry and shallow descriptions without any latitude for the researcher's creativity.



**Figure 16: Exporting the project documents as a bundle**

**Exporting project bundle:** The Atlas.ti software saves all the projects in the program files, which isn't readable from a different system. If one wants to use them in another system, the option is to export the project bundle, which can be done by clicking on the file menu, and then exporting as a project bundle (Figure 16). It is also a good practice to save project bundles at frequent intervals so as to avoid any accidents, and minimise the chances of losing all the progress made.

**Further learnings:** There are many advanced options in Atlas.ti, such as code co-occurrence network, creating secondary codes, network diagrams, etc. There is also inter-coder mode, which helps two or more persons to code the same document. But very few researchers use inter-coder agreement as an evaluation

## END NOTE

This blog is only an introduction to the most basic functions of the ATLAS.ti software. There are many video tutorials which you can access directly from the Atlas software, as well as many YouTube tutorials. The advanced functionality of the software can be learnt through these sources.

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# 10

## CAN FUZZY COGNITIVE MAPPING BE A NEW DIMENSION IN METHODOLOGY FOR RESEARCH IN AGRICULTURAL EXTENSION???!!!

In this blog post **Amitava, Shravani, Sanchita Garai and Sanjit Maiti** try to elaborate on the concept of Fuzzy Cognitive Mapping and its uses and applications in Agricultural Extension Research.

There is often a tendency in Agricultural Extension Research to carry out quantitative analysis rather than qualitative research. One possible reason, out of many, for this could be lack of availability of easy to use methods for gathering data, based on which appropriate conclusions can be drawn and inferences made. While in quantitative research the major focus is on deriving outputs and proving their validity as well as reliability with the use of appropriate statistical tests and fitting the data together, in qualitative research major attention needs to be put on collection and gathering of data. Validity and reliability of the data is based on whether the data has been collected faithfully and represents the viewpoint of the respondents accurately. It needs to explore local understandings of wellbeing (White and Jha 2014).

There are several methods for conducting qualitative research, such as content analysis, case study research, ethnographic research, etc. However, in the last few years, the Fuzzy Cognitive Mapping approach, a most used method being System Mapping, is gaining much traction in the field of Social Science research and gradually evolving and emerging as one of the most sought after methods for capturing stakeholders' knowledge, belief, perception, etc., for carrying out evidence-based decision making. In this blog we briefly explain what Fuzzy Cognitive Mapping is and its uses and applications in Agricultural Extension Research.



## SYSTEM MAPPING

System mapping consists of two distinct words viz., 'system' and 'mapping'. The first question that needs to be answered on system mapping is: What is a system? Well, that's a tough job indeed. There have been various definitions of 'system' that has evolved over time. Williams and Hummelbrunner (2011), suggested a few distinctions for considering a system: (a) a system is made up of some elements; (b) elements making up the system are linked, either by process or relationships; (c) systems contain a boundary. Continuing further with this definition, by considering the concept of purpose and organization, it was defined as an 'interconnected set of elements, that is coherently organized in a way, that achieves something' (Meadows 2009).

'Map', also synonymously called 'model', is something that portrays or rather simplifies some aspects or perception of reality. Mapping of a system not only helps in identification of the concepts prevalent in the system, but at the same time also helps in getting comprehensive clarity on the interaction prevalent among them. Common concepts of system mapping include:

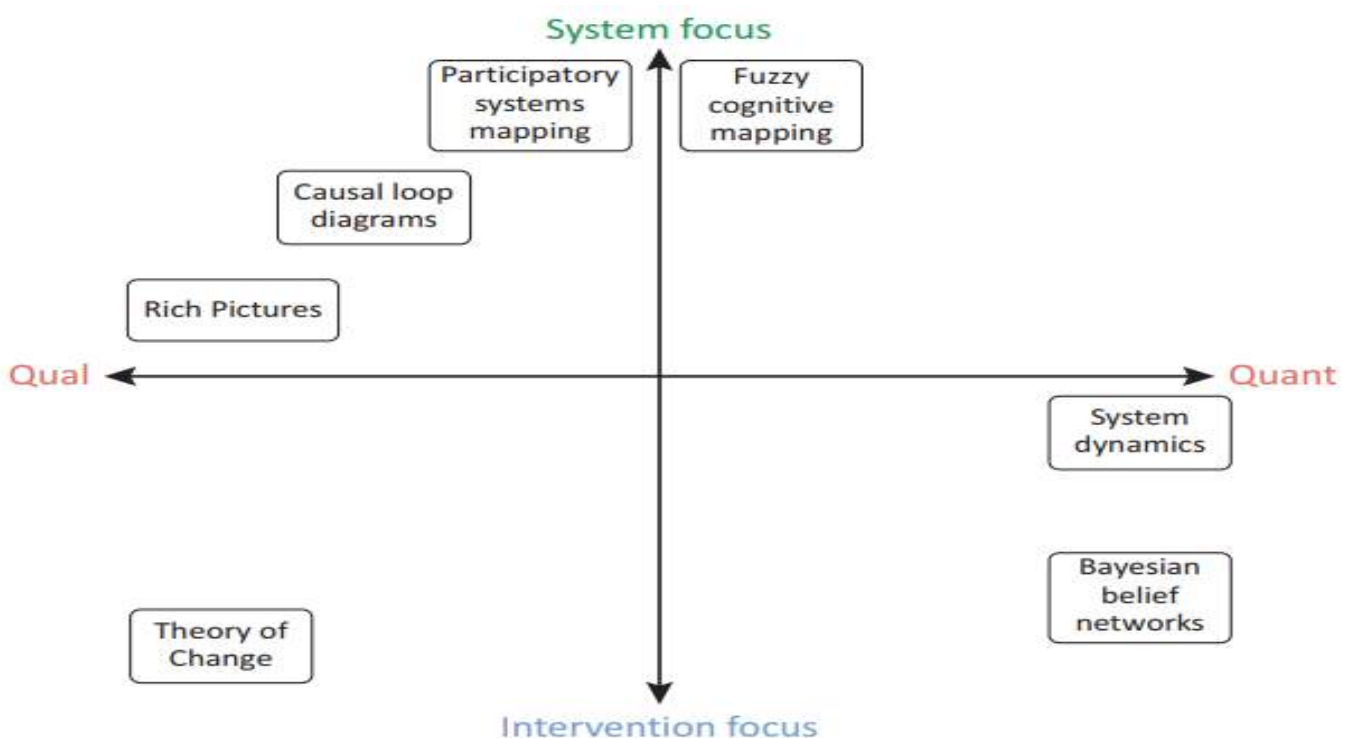
- **Network:** A network, in simple terms, means a system, where nodes are connected to edges.

This reveals the interconnectedness of elements in the system.

- **Nodes:** Elements in the network are denoted as nodes. They may vary in shape, size, colour, etc., based on their classification and imperativeness.

- **Edges:** The connections that link the nodes in a network are called 'edges'. They may be both directed or undirected (based on the type of connection between the elements).

There are various types of system mapping approaches, such as Bayesian Belief Network, causal loop diagrams, participatory systems mapping, rich pictures, system dynamics, etc. However, Fuzzy Cognitive Mapping approach is one of the most used and significant system mapping approaches. The usefulness of Fuzzy Cognitive Mapping was perfectly described by Barbrook-Johnson and Penn (2022), using three diagrams of conceptual spaces and positioning various mapping approaches based on overall focus and nature (Figure 1), based on their modes and ease of use (Figure 2) and based on the outputs and analysis they produce (Figure 3).



**Figure1: Positioning of various mapping approaches based on overall focus and nature**  
**Source: Barbrook-Johnson and Penn (2022)**

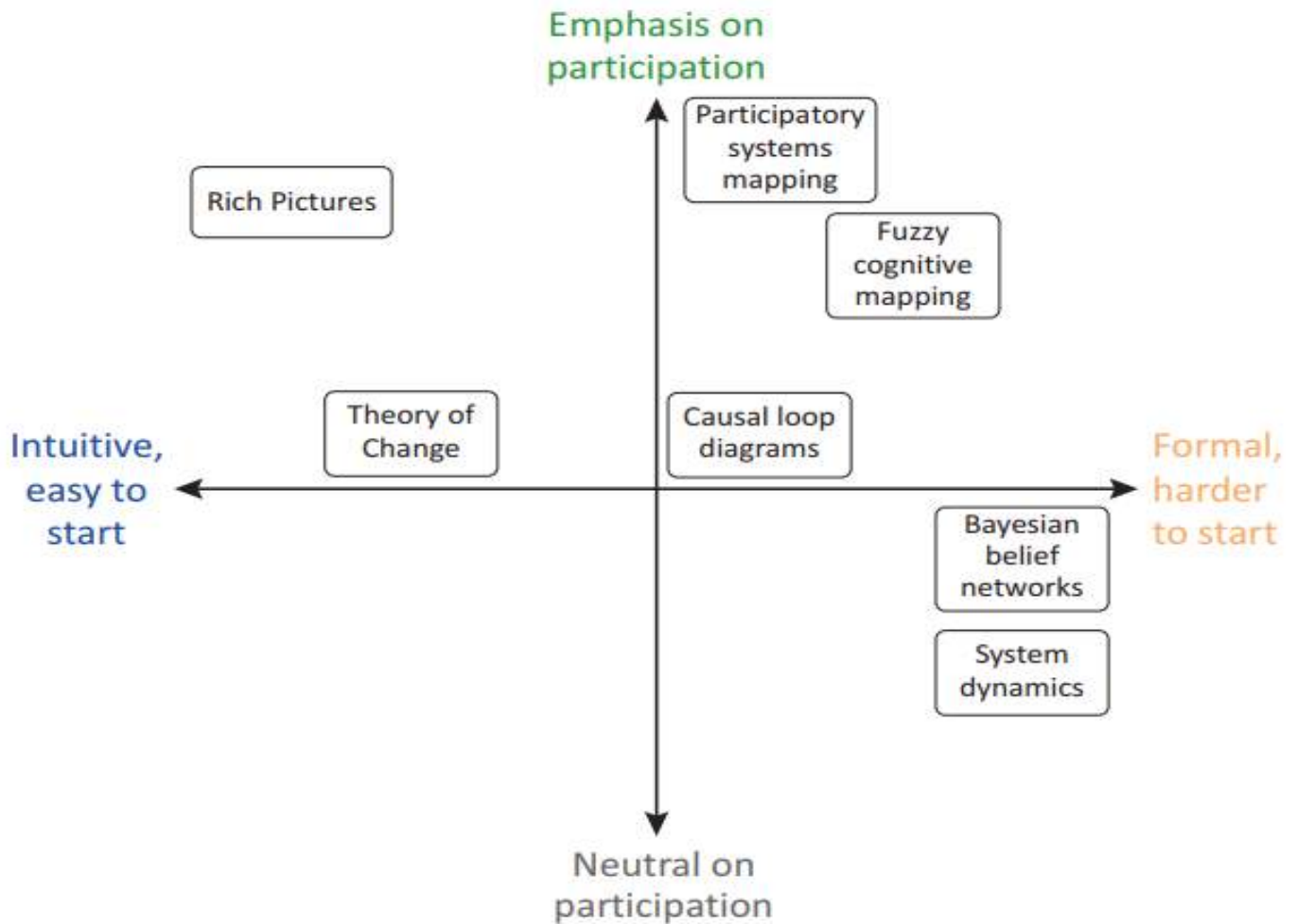


Figure 2: Positioning of various mapping approaches based on modes and ease of use. Source: Barbrook-Johnson and Penn (2022)

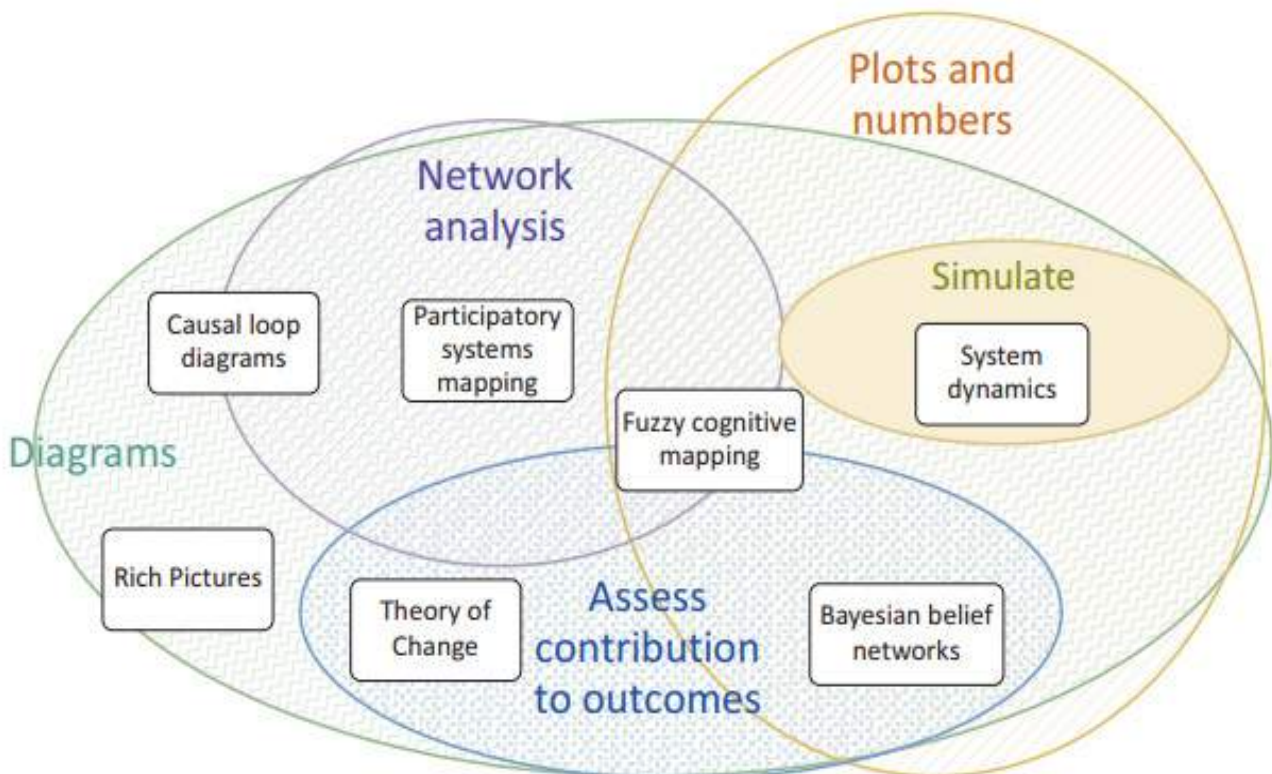


Figure 3: Positioning of various mapping approaches based on output and analysis. Source: Barbrook-Johnson and Penn (2022)

Based on overall focus and nature, FCM stands at a point where it can be categorically described as a mixed method approach that is very focussed on explaining and detailing the existing concepts as well as interactions among them in a system. It emphasizes that participatory approaches and collection of data and critical observations of the respondents play a significant role in the analysis unlike pure quantitative methods. However, it is imperative to say, unlike many other methods and approaches, it is a bit tough at the start and needs proper skills and expertise to conduct the analysis. Considering the type of outputs and results it produces, it is nevertheless important to say that it is a method that includes all types of possible outcomes deriving from system maps. It lies absolutely in the interaction point of all types of results, such as network analysis, diagrams, plots, and numbers, assessing contribution to outcomes, etc. All these features of FCM not only makes it a popular cognitive mapping approach, but also promotes it in today's agricultural extension research as one of the main methodologies to be used.

## THE WHAT, WHY, AND HOW OF FUZZY COGNITIVE MAPPING

Fuzzy Cognitive Mapping (or FCM) is an approach of building a model of a system consisting of several boxes and its connections. Boxes are normally known as 'concepts' and can represent anything that can be expressed as a variable. The concepts are connected with the help of edges. Edges express the type of relationship existing between two concepts of a system. As mentioned earlier, it may be both directed and undirected, i.e., if both the concepts are influencing each other then the edge shall be undirected, however, if one is influencing the other and vice-versa is not true, the edge shall then be a directed one. It is very useful for visualizing and understanding how concepts/factors/variables etc., affect each other, while maintaining self-loop and feedback mechanism within a complex system. Data collection and analysis in FCM is seen as a quasi-quantitative approach, since quantification of concepts and their relationships is expressed in relative terms (Gray et al. 2015). It allows the participants to debate cause-effect relationship among qualitative

concepts and, at the same time generate quantitative data based on respondent's experience, knowledge, perception of inter-relationships among the concepts (Singh and Nair 2014; van der Sluis et al. 2018). The maps can be done by both individuals and groups.

Strength of FCMs, as explained in detail by Singh and Chudasama (2020), over other mapping approaches includes:

- FCMs are not driven by lack of data, it is responsible to generate data (Kok 2009; Özesmi and Özesmi 2004).
- It is able to model complex and ambiguous mechanism systems and reveal hidden but important existing feedback mechanism in the system (Özesmi and Özesmi 2004; Singh and Chudasama 2017a).
- It empowers the researcher to represent, integrate and compare the data using FCM with the help of knowledge, perceptions and experiences of diverse stakeholder groups included in the research (Özesmi & Özesmi, 2004).
- Interactive scenario analysis of FCM enables simulations of various policies, and particularly in extension-based research helps in understanding the adoption and adaptation deficit in both current and future scenarios (Kok 2009; Özesmi and Özesmi 2004; Singh and Chudasama, 2017a).

An FCM includes a number of concepts ( $C=C_1, C_2, C_3, C_4, \dots, C_n$ ) and they are connected with the help of various edges. The links between the concepts are assigned weights ( $w$ ) with values ranging between -1 to +1. The weight describes the cause-effect relationship between the concepts in the following manner:

- If  $w = +1$ , there is a positive relationship existing between the concepts
- If  $w = -1$ , there is a negative relationship existing between the concepts
- If  $w = 0$ , there is no relationship existing between the concepts.

As mentioned earlier, the direction of the edge between the concepts carries significant



meaning and is of great concern during analysis of FCMs. If,

- C1 C2, C1 is the cause and C2 is the effect.
- C2 C1, C2 is the cause and C1 is the effect.
- C1 C2, both C1 and C2 is the cause and effect of each other.

## SCOPE OF APPLICATIONS OF FUZZY COGNITIVE MAPPING IN EXTENSION RESEARCH

Fuzzy Cognitive Mapping, a popular and prominent way of carrying out mental modelling of the respondents, has scope with high potential in the field of agricultural extension research. Goswami & Roy (2021) explained in detail the scope of using mental modelling in the field of agricultural extension research. They are as given below.

1. It is very useful in understanding as well as regulating the effects of human action in a defined system.
2. It has a great role to play whenever the system is lacking critical scientific data, and there is utmost need for the professional to develop a model of the system.
3. This methodology has high utility whenever there is a complex problem which needs clear solutions; however, obtaining distinct solution involves diverse stakeholder groups.
4. It helps the researcher in understanding how people belonging to a particular system, individually or collectively, conceive a concept or a construct and how they ultimately link it to their decision-making process.

## APPLICATIONS OF FUZZY COGNITIVE MAPPING IN AGRICULTURAL EXTENSION

Fuzzy Cognitive Mapping is a pathbreaking methodology and is gradually gaining popularity in the field of agricultural extension research, particularly in the domain of Indian agriculture. Singh et al. (2019) used FCM to elicit knowledge and to integrate perceptions of different stakeholders regarding climate change, its impact, and the efficiency of available

adaptation measures in the Sundarbans region of India. Singh and Chudasama (2021) studied several pathways of different adaptation measures adopted by the smallholder farming community apropos climate change in arid and semi-arid regions across twelve districts of India. FCM was also used to measure the perceived impacts of cyclones on fisheries (both inland and coastal fisheries), and the adaptation measures adopted by them (Singh and Chudasama 2017b). Measuring perception of residents in the coastal socio-ecological system, and comparing it with respect to various stakeholder groups, in a post-disaster situation was done with the use of FCM (Furman et al. 2021). It was also used to measure the dual impacts of COVID-19 and cyclone Amphan on the coastal community in West Bengal, India (Goswami et al. 2021).

Averbuch et al. (2022) conducted research on understanding how farmers from two different social contexts (Northeast US and Denmark) made their transition towards sustainability. FCM was implemented for building a model on their practices and perceived outcomes based on their gradual move towards sustainability. Not only crop farming, FCM is a useful methodology also in the context of livestock extension. Research was conducted to measure how intensified livestock production can be a promising pathway for the smallholder farming community (Alomia-Hinojosa et al. 2022). Differential perception of households to integrate livestock as a component in their farm was also measured with the help of Fuzzy Cognitive Mapping (Murphy et al. 2021).

FCM was used in developing a participatory model, involving diverse stakeholder groups, to identify the interlinkages between the water-energy-food nexus of various integrated policies, which further helped in gaining knowledge on the nexus and contributing towards growing awareness and building consensus among involved stakeholders (Martinez et al. 2018). This methodology also held a position in demonstrating policy option analysis for an existing Social-Ecological-System (SES) with assistance from diverse stakeholder groups (Mehryar et al. 2017).

## STEPS FOR CONDUCTING FUZZY COGNITIVE MAPPING

The steps for conducting FCM (Goswami et al. 2021; Singh and Chudasama 2017a, 2020, 2021) are as follows:

### Knowledge elicitation

The first step for conducting FCM includes identification of the concepts already existing in the system. This has to be done through a participatory approach where certain stimulation (personal interview, focus group discussion, etc.) helps respondents to identify the concepts which they perceive to be imperative with respect to the study being done. Identification of concepts can be carried out in two steps:

**a. Open concept design approach:** This stage focusses on generating concepts from experts, progressive farmers, etc. Identification of concepts in this phase remains unrestricted. Role of the researcher in this phase remains limited to determining the boundary for the study, while the respondents are free to identify any type of existing boundary in the system that is related to the topic. This phase is particularly useful in case there is insufficient knowledge for modelling of the system (Singh and Chudasama 2020). Questions generally asked in this approach may be cited with an example from Singh & Chudasama (2021):

I. "What have been the impacts of temperature and rainfall variability and extreme climatic events on your lives and livelihoods?"

II. "What adaptation interventions are being carried out in your village to reduce these impacts?"

**b. Pre-concept design approach:** In this phase, concepts are identified and determined either by experts or researchers with the help of extensive review of literature. Concepts generated in the open design approach can also be used in this phase, if any study combines both the approaches. Unlike the former approach, the researcher puts a restriction to the determination of concepts by the respondents. Although it puts an end to the diversity of the knowledge in the study, it still is very efficient in the context of the time required for building a model of the system.

Soon after the concepts are determined in the open concept design approach or in the pre-concept design approach, the participants are asked to indicate the relationship between the concepts, following a continuum, i.e., 1-2: Very low; 3-4: Low; 5-6: Moderate; 7-8: High; 9-10: Very high. Participants can be either asked to draw maps, after providing them with the basic knowledge of mapping, or maps can be drawn by the researcher with the help of software based on the causal links the participants have indicated. Values of the causal link are hereafter normalized between -1 and +1.

### Coding of individual FCMs into adjacency matrices

Individual FCMs are then coded into matrices in a spreadsheet, with all the concepts used in the analysis listed in both column and row, forming a square adjacency matrix (Singh and Chudasama 2017b; Singh and Nair 2014). Values of the link between the concepts should be normalized between -1 and +1; with -1 indicating a strong negative relationship and +1 indicating a strong positive relationship.

### Quantitative aggregation of individual FCMs

Matrices of individual FCMs are then quantitatively aggregated to form the matrix for mapping, and the map formed based on this matrix is known as Social Cognitive Map. This enables a superior representation of the system with more reliable results.

### Qualitative aggregation of Social Cognitive Maps

Maps with large number of concepts and sub-concepts become a hindrance in gaining insights from the map. So it is essential to aggregate them qualitatively into a fewer number of concepts and the approach helps in simplification of the Social Cognitive Map. Concepts are aggregated into categories under a broad concept; however, care must be taken so that the type of relationship between any pair of concepts does not get distorted after aggregation.

### Network analysis

Network analysis of the final product is carried out with the help of various software; and notable parameters considered for analyzing the network includes degree centrality (includes

both indegree centrality and outdegree centrality), betweenness centrality, closeness centrality, etc. Nodes in the network are also categorized into driver, receiver and transmitter based on their linkages with other nodes.

### Scenario analysis

Scenario analysis asks 'What if' type of questions, regarding the behaviour of the system, to be specific, behaviour of the concepts and sub-concepts included in the system, under various contexts. Concepts with highest centrality values are selected, and their initial values are activated (value of '1': activated; value of '0': deactivated), and then the values of all other concepts in the system are observed, leading to the formation of a scenario. This analysis is carried out several times in order to gain insights into the types of possible scenarios that can be observed. This also helps in having comprehensive clarity on the need of the system as well as any shortage in terms of adoption and adaptation prevalent in the system.

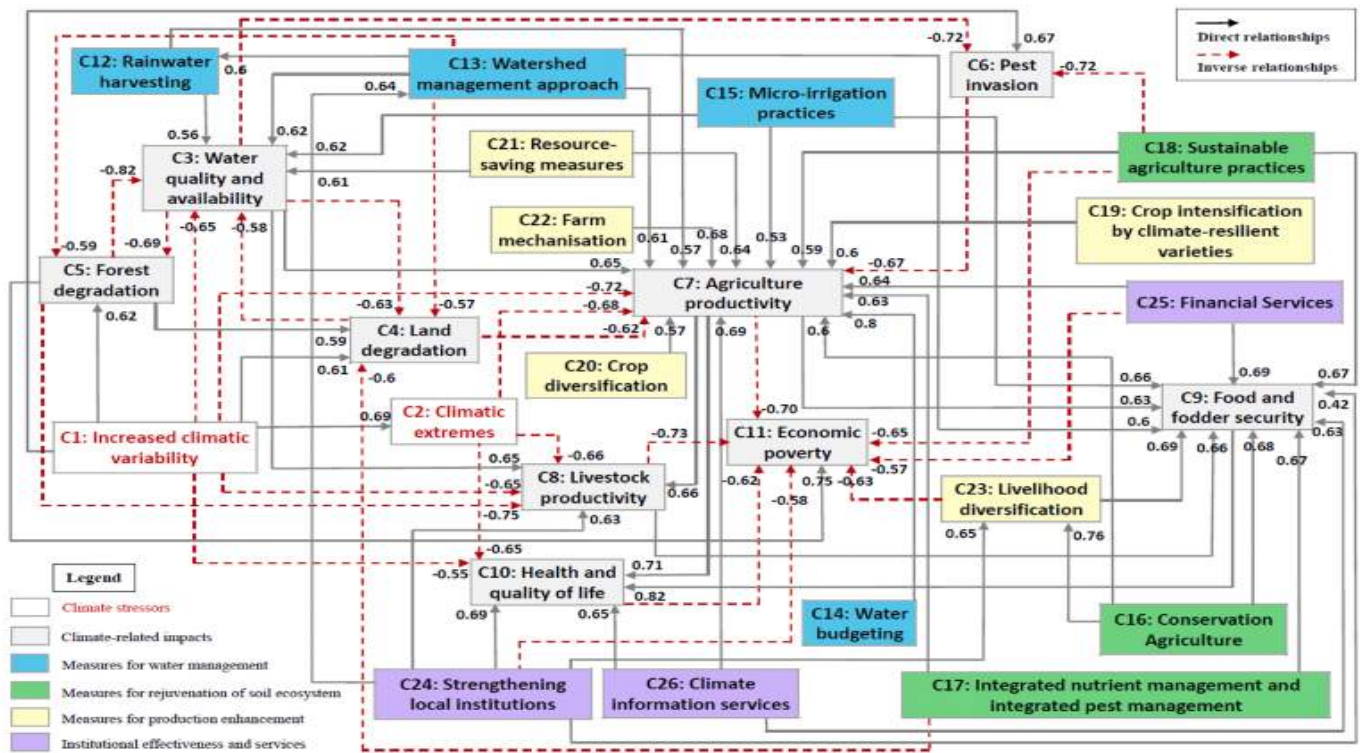
### EXAMPLE OF THE FUZZY COGNITIVE MAPPING APPROACH

A snippet of a Fuzzy Cognitive Map as obtained by Singh and Chudasama (2021) is given in Figure 4. The study was done across 12 arid and semi-arid districts for evaluating the effectiveness of several adaptation pathways. Data was collected with the help of FCM developed by 427 community groups, each group containing four to five members each. Maps were developed based on the concepts of perceived impacts of climate-related disasters and adaptation measures implemented to cope with the impacts of climate change. Social Cognitive Map developed from the study is explained in Figure 4.

From the figure we can see that the map consists of several types of nodes, such as climate stressors, climate-related impact and adaptation measures (water management, rejuvenation of soil ecosystem, production enhancement, institutional effectiveness). These nodes were linked to each other with the help of edges, with weights assigned to them. Let's try to briefly interpret this SCM, bearing in mind some of the concepts mentioned in the map. Livestock productivity (C8) was getting affected

due to climatic extremes (C2) as well as bigger climatic variability (C1). Negative weights assigned on the edges between C1 and C2 to C8 explains the negative relationship existing between them. Further, degradation of forest (C5), an impact of climate change in the area was also hampering livestock productivity. This again was proving to be a major cause for economic poverty (C11) of the community belonging to arid and semi-arid regions. Economic poverty was also due to declining agricultural productivity (C7) in the region. Agricultural productivity was also getting affected due to climatic extremes, increased climate variability and land degradation (C4) and pest invasion (C6). For coping with this effect, respondents followed several adaptation measures. Improvement in quality of water and increasing its availability (C3) was supporting livestock productivity as well as agricultural productivity in the region. Rainwater harvesting (C12), watershed management approach (C13), micro-irrigation measures (C15), sustainable agricultural practices (C18), crop intensification by climate resilient varieties (C19) and other resource saving measures (C21) proved to be beneficial in improving agricultural productivity despite severe climate change impacts. Improvement in agricultural productivity was also positively impacting the livestock productivity of the region. Good agricultural and livestock productivity in the region had a particularly positive impact on the food and fodder security (C9) of the community in arid and semi-arid regions. Positive value assigned on the edges connecting these nodes showed a positive relationship existing between the concepts.

Effectiveness of various adaptation pathways was also measured in the study with the help of scenario analysis. Twelve different scenarios for different adaptation pathways were developed based on the categories of interventions and combinations. Results of each of these scenarios were compared to the baseline scenario for evaluating adaptation pathways. Scenarios were classified into various categories, such as least effective adaptation pathways, low effective adaptation pathways, moderately effective adaptation pathways, effective adaptation pathways and highly effective adaptation pathways (Singh and Chudasama 2021).



**Figure 4: Social Cognitive Map illustrating perception of respondents on climate change impacts and adaptation measures. Source: Singh and Chudasama (2021)**

## SOFTWARE USED IN CONDUCTING FUZZY COGNITIVE MAPPING ANALYSIS

There are a number of software available for carrying out FCM. Most popular software among them is:

- Mental modeler ([www.mentalmodeler.com](http://www.mentalmodeler.com))
  - FCMapper (<http://www.fcmmappers.net/joomla/>)
  - FCM Bridge (FCM Bridge ([midasuser.com](http://midasuser.com))).
- Analysis can also be done using R programming (Dikopoulou et al. 2018) and Python (Mkhitarian et al. 2021).

## CONCLUSION

The Fuzzy Cognitive Mapping approach is now being used extensively across the globe as one of the most prominent and useful methodologies in carrying out research in the Social Sciences. It investigates the system and considers all of it for research, unlike pure quantitative methods where major focus is on selected aspects. This gives the methodology an edge over others and enables the method to become a boon for research in agricultural extension involving stakeholder's belief, perception and knowledge for evidence-based decision making. We believe proper use and implementation of FCM can open up a new paradigm of agricultural extension research soon.

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# Livestock Extension

02



# 11

## DAIRY COOPERATIVES AT THE CROSSROADS?

Dairy cooperatives, once touted as the instrument of socioeconomic change, are on the verge of collapse. It is high time for dairy extension professionals to work expressly towards strengthening dairy cooperatives through increased cooperation and participation of members in dairy cooperative activities, and development of leadership for efficient management of cooperatives, argues **SVN Rao**.

The dairy cooperatives in India helped in improving the socioeconomic status of dairy farmers, and made possible the supply of processed milk and milk products to consumers at reasonable prices. The three-tier structure of dairy cooperatives, the so-called Anand Pattern, evolved through a lot of effort and investment by the National Dairy Development Board (NDDB) under the dynamic leadership of the late Dr Verghese Kurien. By 2016-17, there were about 177,000 dairy cooperative societies, with a cumulative membership of 16.3 million milk producers (NDDB Annual Report 2016-17). But, with the recent introduction and promotion of New Generation Cooperatives, dairies are functioning under different modes, viz., Dairy Cooperative Unions, Mutually Aided Cooperative Unions, Milk Producer Companies, and private companies with varying degrees of success. It appears that milk unions are moving in the direction of getting privatised and in the process the basic purpose of dairy cooperatives in protecting the interests of both producers and consumers may be lost. Case studies of some of the milk unions in southern India are pointing to this trend. Thanks to political rivalry, even in Gujarat, the birth place of the dairy cooperative movement in India, chinks started appearing in the armour of Gujarat Co-operative Milk Marketing Federation after 46 years of operation.<sup>1</sup>

### DAIRY COOPERATIVE MOVEMENT IN INDIA

The foundation of dairy cooperatives was firmly laid in the state of Gujarat, which is a dominant player in the marketing of various milk and milk products under the brand name 'AMUL'. With the success achieved by AMUL, the Anand Pattern of milk cooperatives were replicated in almost all the states, which ushered in the 'white revolution' in the country (Box 1).

<sup>1</sup><https://www.businesstoday.in/current/corporate/mehsana-dairy-to-break-away-from-amul-after-46-years-slicing-10-pc-of-gcmmf-revenue/story/339527.html>

## Box 1: Evolution of Dairy Cooperatives in India

Efforts to develop dairying through rural organizations was made as early as in 1917 when the first milk cooperative society was formed in Bengal, to supply milk to the people of Kolkata, followed by union provinces, Gujarat, and Madras states. The Government of Bombay had initiated a subsidized milk distribution system in 1943, which was later closed in 1947 after expending over INR 30 million on it. In 1945 the Government of India decided to take measures to safeguard the supply of hygienic milk to major cities. A novel beginning was made in Mumbai and for the first time in India, milk produced in rural areas of Kaira (Kheda) district was collected in bulk, pasteurized, and then transported by rail for distribution in Mumbai. The Kaira District Milk Producers' Cooperative thus started with an initial collection of 250 litres of milk is a name in itself in the history of the cooperative movement in India, and is now more popularly known as AMUL (Anand Milk Union Limited).

The milk cooperatives under Operation Flood follow what is more commonly known as the Anand Pattern, which is nothing but a three-tier system of cooperative organization. At the village level there are Primary Milk Producers' Cooperative Societies, which collect, test, and supply milk to the Milk Producers' Union at the district level and these unions process and market milk and milk products. The unions are also responsible for milk enhancement programmes through supply of technical inputs and services to milk producers in the villages. The unions are amalgamated into Milk Producers' Federation at the State level. At national level there is a National Cooperative Dairy Federation (National Cooperative Dairy Federation of India). The entire co-operative organization is managed by representatives, elected by milk producers from among the producers. The role of the government is to supervise, guide, encourage, and where necessary correct the cooperatives when they go wrong.

The basic philosophy of the Anand Pattern is "to combine India's greatest asset, the power of its people, with professional management in a vertically integrated cooperative structure that establishes a direct linkage between those who produce the milk and those who consume it, whether as milk or milk products, eliminating all the middlemen." (-'From a drop to a flood' - NDDDB 1997). However, elimination of middlemen from the system has remained a myth till today.

With globalisation and increased threat from private dairies, the Government of India – based on the recommendations of the committee headed by D. YK Alagh – brought in the Companies (Amendment) Act 2002. This formed the basis for the evolution of New Generation Cooperatives (NGCs) in India (see Box 2). The NDDDB which played a key role in forming and

nurturing dairy cooperatives is encouraging the formation of NGCs, which ultimately may result in converting the milk unions into milk producer companies. Although the objective is to set up producer companies in areas where cooperatives are not present, the strong unions in Andhra Pradesh have got them registered as producer companies.

## Box 2: Evolution of New Generation Cooperatives

Based on the recommendations of the Dr YK Alagh Committee, the Companies (Amendment) Act 2002 came into effect on 6 February 2003.

Rationale for encouraging milk producer companies

- a. Private sector, large MNCs and retail chains are rapidly expanding their operations;
- b. Part IX A of the Companies Act would also be used to promote Producer Companies;
- c. It provides the same legal and regulatory framework enjoyed by companies, but protects the basic principles of cooperation.

**Objective:** The objective is to set up Producer Companies in areas where cooperatives are not present or have low coverage and procurement. NDDDB envisages mobilization and institution building through promotion of a new Milk Producers Institution/New Generation Cooperatives, which would subsequently be registered as Producer Companies under the Companies Act.

The NDDDB under the head 'Dairy Services' started encouraging the formation of New Generation Cooperatives (NGCs). It has promoted four Milk Producer Companies (MPCs) based on a request from Tata Trust – two in Rajasthan (Alwar and Pali), one in UP (Pratapgarh), and one in Punjab (Mansa). It is continuing its support to five MPCs – Paayas (Rajasthan), Maahi (Gujarat), Shreeja ( AP), Baani (Punjab), and Saahaj (UP) (NDDDB AR 2016-17). Today many NGCs are functioning in Andhra Pradesh, Bihar, Gujarat, Haryana, Maharashtra, Punjab, Rajasthan and Uttar Pradesh. Most of the NGCs have evolved into MPCs - Maahi, Paayas, Saahaj, Baani and Sreeja are some of them.

**Source:** <https://www.nddb.coop/services/cooperative/newgen>

## MAJOR FLAWS IN DAIRY COOPERATIVES IN INDIA

Rao et al. (2009) gave a detailed account of how milk producers are being exploited by all the stakeholders in dairy development in India. Some of the important issues pertaining to dairy cooperatives as analysed by them are presented below:

**i. Government control and interference:** The state Governments either directly or indirectly control the price of milk (considered as an essential commodity) and the milk producers have absolutely no say in this. Bhasin (2004) opined that the role of government and the Registrar of Cooperative Societies has not been positive, and there is a tendency to control the cooperatives and interfere in their working. At some places a government/private sector nexus has developed to the detriment of the cooperatives.

In fact, while delivering the inaugural address at the 34th Dairy Industry Conference held at Bengaluru, Montek Singh Ahluwalia (2005), stated "There is a perception in the country that the cooperative form of organization has got weakened and it needs to be freed from the intrusive control of the government".

**ii. Monopoly of DCSs:** Although dairy farmers have an option to sell milk to different agencies, most of them in rural areas have no option but to supply to dairy cooperatives (Holt and Ramkumar 2003). Theoretically, milk cooperatives serve as an excellent intervention for milk producers to get remunerative prices for their milk. But in practice many societies/unions in some parts of the country are running under severe losses for a variety of reasons. Irrespective of the reason, the milk producer has to pay for these losses. It is sad that the producers have to pay the cost for malpractices in collection of sample milk, weighing and testing, delay in payments, supply of poor quality inputs like cattle feed, etc. This is the reason why dairy cooperatives are branded as 'Organised middlemen' or 'Cooperative middlemen'.

**iii. Farmers have no say:** Rajivlochan (2008) argued that no one asks farmers for their opinion/inputs while conceiving several

schemes for their development. The policy makers assume that they are well aware of the needs of the farmers without properly understanding the ground realities and the net result is that these schemes abort in the initial stages itself forcing the policy makers to evolve new schemes without learning any lessons from the previous experience. If the government is serious about achieving pro-poor economic growth it is necessary that these resource-poor milk producers are involved right from the start of any dairy development intervention – by allocating resources to identifying their problems, targeting these and planning appropriate interventions in partnership with them (Peacock et al. 2005).

Despite all these lacunae, most of the dairy cooperatives are able to provide a stable milk procurement price for the farmers compared to other livestock products, such as chicken, meat, eggs, etc., the prices of which fluctuate.

The International Cooperative Alliance (ICA) has laid down the following principles/guidelines for cooperatives in order to put their values into practice. These include:

- Voluntary and Open Membership;
- Democratic Member Control;
- Member Economic Participation;
- Autonomy and Independence;
- Education, Training and Information;
- Cooperation among Cooperatives; and
- Concern for Community.

ICA firmly believes that "If all these principles are observed and applied in the day-to-day operations of a co-operative enterprise, that co-operative enterprise will be stronger and more sustainable". But unfortunately, these principles are breached in one way or another as far as dairy cooperatives are concerned, thus threatening the sustainability of the cooperative system itself. Some examples are presented here along with the experiences gathered from the dairy cooperatives in southern India.

In southern India, there are five states, and each one (except Telangana) is having a Milk Federation. The Union Territory, Puducherry, has a Milk Union. Based on secondary data, cases of one successful milk federation, two successful milk producer companies, and two failed milk unions are analysed and presented below.

## KARNATAKA COOPERATIVE MILK PRODUCERS' FEDERATION LIMITED (KMF)

KMF is the second largest dairy co-operative (after AMUL) among the dairy cooperatives in the country. It sells its milk and milk products under the brand name 'Nandini'. KMF has 14 Milk Unions covering all the districts of Karnataka State, which procure milk from more than 14,000 Primary Dairy Cooperative Societies covering more than 22,000 villages in the state.

The AMUL Pattern dairy co-operatives started functioning in Karnataka from 1974-75 with financial assistance from the World Bank/IDA, Operation Flood II & III. The Anand Pattern's three-tier organisational structure – Dairy Cooperative Societies (DCSs) at the village level, District Milk Unions at the district level, and a Federation at the state level – is resolutely and harmoniously working hand-in-hand in creating a self-sustaining rural economy based

on cooperative dairying. All these three are governed by a democratically elected board from among the milk producers. Under the direction of elected boards, KMF, and various functional Units & Unions are performing the assigned tasks to ensure fulfilment of the organisation's objectives.

KMF is one of the few federations in the country that have converted dairying from a subsidiary occupation into an industry.

Coordination of activities among the Unions and developing markets for milk and milk products is the responsibility of KMF. Marketing milk in the respective jurisdictions is organized by the respective Milk Unions. Surplus/deficit of liquid milk among the member Milk Unions is monitored by the Federation. While the marketing of all the milk products is organized by KMF, both within and outside the State, all the milk and milk products are sold under a common brand name – NANDINI.

**Table 1: Achievements of KMF**

No.	Particulars	1976-77	2015-16	2016-17	2017-18
1.	No. of DCSs functioning	416	14,826	15,074	15,864
2.	No. of Women DCSs functioning	0	3,550	3,549	3,743
3.	No. of Milk Producer members	37,000	2.35 millions	2.35 millions	2.46 millions
4.	Annual av. milk procurement	50,000 kg	6.49m kg	6.55 m kg	7.08 m kg
5.	Daily payment to milk producer members	Rs.900,000	Rs.146.2 millions	Rs.160 millions	Rs.182 millions
6.	Total turnover	Rs.882 m	117790 m	131330 m	135560 m

The Federation is largely successful in realizing the objectives of dairying during the last four decades of dairy development in Karnataka State. The success of KMF is attributed to its efficient and timely input services delivered to farmers at their door-steps. It is providing quality veterinary health services and AI to any remote village, makes up shortfall in cattle feed at less than the market price, and offers very

good procurement prices. This has, therefore, attracted greater patronage from farmers for these cooperatives. The extent of patronization by farmers is so complete that the dominant share of marketable surplus milk of farmers in Karnataka is procured by KMF dairies, and there is hardly any organized private dairy milk procurement, which is widely prevalent in other parts of the country. In addition, KMF was able

to exploit the huge ghee market of Tirumala Tirupati Devasthanam (TTD) for preparing about 250,000 laddus (sweets) daily. It supplied ghee, around 10,000 kg/day to TTD for about two decades up to 2015. Again after a lapse of four years, this year KMF has regained this ghee contract.

This is a remarkable case where, by and large, the cooperative principles have been adhered to with minimum interference and good patronage from the Government of Karnataka for almost 45 years, and this growth and development is likely to be sustained in the years to come.



### **PONDICHERRY MILK PRODUCERS' COOPERATIVE UNION LIMITED (PMPCU LTD.)**

PMPCU Ltd. was the first cooperative society registered in the year 1955 in the Union Territory of Puducherry. In 1973 it was converted into the Milk Producers' Union and now it has 98 functional village level milk producers' cooperative societies. It has a small dairy with a capacity to handle about 120,000 litres per day.

PMPCU was one of the best till 2004 and was running successfully in Puducherry. Payments were made to member producers once in a fortnight, regularly, and they used to regard the Union as a bank to depend up on. At the end of a fortnight, the lump sum amount they received for the milk they poured into the societies was handy to meet expenses such as payment of school fees, purchase of provisions, clothes, purchase of cattle feed, etc. Almost the entire milk required – about 60,000 litres per day – was procured only through village level societies. The processed milk and milk products were sold to urban consumers at a reasonable price. The Union was the envy of the neighbouring states.

This situation changed in 2002 when the Board

of Management of the Union was dissolved by an order of the High Court, Chennai, on charges of large scale corruption. The elections to the Board of Directors were last held in 2002. Since then a government official from the Dept. of Cooperatives is acting as Administrator. Since 2004-05 as the Union is not able to procure the required quantity of milk to meet the demand for milk and milk products, the Union started procuring milk from other dairies, both cooperative and private. By 2011-12 the average daily procurement from private dairies reached 73,400 litres per day whereas the procurement from its societies was 29,500 litres per day. Since 2006-07 the Union started incurring losses. The cumulative losses have gone up from INR 2.6 million in 2006-07 to INR 9.97 million in 2010-11.

These losses were attributed to government interference in managing the affairs of the Union. Succumbing to political pressure the Union appointed 275 casual workers in 2004-05. As on today the total employees in the Union is 788, very high compared to the 1,20,000 litres of milk handled per day. Although it is running at a loss, the employees have been given benefits – one litre of milk per day and 0.5 kg ghee per month to all. The Union never recovered after 2004. The milk producers have been losing interest in rearing cattle in Puducherry and

the number of cattle owners as well as the average herd size is showing a declining trend. This is a case where some of the principles of cooperatives were violated leading to poor performance of the Union. These principles are: i) Democratic member control; ii) Member economic participation; iii) Autonomy and independence; and iv) Concern for community.

The government (Registrar, Cooperatives) has not taken interest in conducting elections to the Milk Producers Cooperative Societies and the whole show is run by the secretaries of the societies and government officials. For all practical purposes it is a government-administered union with no participation or control of its members.

It is unlikely that PMPCSU Ltd. will come out of the red and its future depends greatly upon the extent of support it gets from the Government of Puducherry.

### **ANDHRA PRADESH DAIRY DEVELOPMENT COOPERATIVE FEDERATION LTD. (APDDCF)**

The APDDCF started functioning in 1981. Prior to this it was known as AP Dairy Development Corporation. This federation is operating 15 dairy plants in the state. Three milk unions (Krishna, Guntur, and Karimnagar) converted themselves into Mutually Aided Cooperative Unions Ltd, a hybrid between cooperatives and private companies. One Milk Union totally metamorphosed into a company (Vijaya Visakha Milk Producers' Company Limited). At present the Milk Unions are facing stiff competition from private dairies.

#### **The fall of Chittoor Cooperative Dairy**

Chittoor in Andhra Pradesh was considered to be the second largest milk producing district in India after Anand in Gujarat. The people of this district depend primarily on sericulture and dairy farming for their livelihoods. Over the years due to declining land size and acute drought conditions, farmers, especially the small, marginal and landless agricultural labour, were thriving on dairy farming. The Chittoor Cooperative Milk Producers' Union established a dairy in 1969 with a handling capacity of 6,000 litres per day. By 1989-90 it had attained a capacity of 250,000 litres per day. Its downfall started when it could not sell the huge quantity of milk powder processed from the surplus milk. It could neither pay the milk producers nor

recover from its losses, ultimately leading to its closure in 2002.

At this juncture the Government of Andhra Pradesh sought intervention from the National Dairy Development Board (NDDB). The NDDB with assistance from the state government established another private dairy -The Balaji Dairy in 2005. This situation was congenial for many private dairies to come up and they started exploiting the milk producers through low milk procurement prices and irregular payments for the milk supplied. Furthermore, they did not provide any technical input services to them.

The dairies in this district had increased their supply to such an extent that they were supplying milk in rail wagons to Mother Dairy, New Delhi. Taking advantage of the government's policy, Heritage Foods Limited was established in 1991. Its market presence is felt in 15 states/UTs of India. There were reports that Heritage Dairy virtually made the Chittoor Dairy defunct, which was once famous for its cheese products and a notable success under the cooperative sector. Efforts were neither made to revive the Chittoor Dairy nor payments made to its employees and member producers. Till date efforts have not been made to either revive the Chittoor Dairy or settle the payments of its ex-employees. This is another case where the principles of cooperatives were violated. The dairy was unable to face stiff competition from the private dairies, or get the timely support it deserved from the state government to revive.

#### **Krishna District Milk Producers' Mutually Aided Cooperative Union Ltd.**

Krishna district of Andhra Pradesh has a rich heritage, one of the important factors which contributed to the Union's success. Cattle rearing is an important occupation for the farmers in this district. In fact it has been a part of the people's culture since ages. Based on the recommendation of a UNICEF High Level Committee, four chilling centres in different parts of the district, and a milk products factory with one lakh litres handling capacity per day, were established in Vijayawada by the Department of Animal Husbandry, Govt. of Andhra Pradesh in 1960.

The milk product factory started milk procurement with a modest collection of 243 litres per day in 1965. The Krishna District Milk Producers' Co-operative Union Ltd. was established in 1965, and it was converted into the Krishna District Milk Producers' Mutually Aided Co-operative Union Ltd. in 1995 under the Andhra Pradesh Mutually Aided Cooperative Society Act 1995. (See Box 2 on rationale for New Generation Cooperatives.)

By the year 2017-18, the turnover of business has reached INR 6620 million with daily average milk procurement of 154,000 litres per day. The daily milk sales average per day has reached up to 271,000 litres. It has obtained ISO 9001:2015 and ISO 22000:2005, and FSSAI Certificates. The milk union is earning profits and distributing the price differential amount to its members regularly. It is paying about INR 632 million to farmers as cost of milk procured from them. In a way it has strengthened the rural economy by avoiding middlemen and making available safe milk and milk products to consumers. The societies in rural areas are providing funds for roads, schools, community, buildings, veterinary hospitals, libraries and so on.

The success of the Krishna Milk Union is attributed to its adherence to the principles of cooperatives which include autonomy and independence, democratic control and concern for community. This Union is now an autonomous body with least government control. The member producers derive pride in being members of the milk cooperative societies of the Union. The Union is able to pay remunerative prices to member producers regularly, and supply quality milk and milk products to consumers. In addition, credit has to be given to the farmers who consider rearing cattle as an important livelihood activity and it has become an integral part of their culture. Above all, the dynamic leadership provided by Shri Mandava Janakiramaiah who has been successful in commanding the respect of the member producers as the Chairman of the Union since 1995.

### **Sri Vijaya Visakha Milk Producers' Company Limited (Visakha Dairy)**

Visakha Dairy was established in 1973 under the Cooperative Societies Act and in 1977 it

commissioned a dairy plant at Visakhapatnam with 50,000 litres per day handling capacity.

With introduction of the MACS Act in 1995 by the AP State Government, Visakha Dairy was converted under the said Act in 1999 and registered as 'Sri Vijaya Visakha District Milk Producers Mutually Aided Cooperative Union Ltd'. To fulfil its growth aspirations while retaining the cooperative ideology as core principles of governance, Visakha Dairy converted into a producer company in 2006 under the name of 'Sri Vijaya Visakha Milk Producers Company Limited'. This became possible given the initiative taken by the Government of India to enable cooperatives to grow and operate on a competitive platform.



The Companies (Amendment) Act 2002 was introduced, enabling a cooperative form of enterprises known as producer companies that can be registered under Part IX A of the Companies Act 1956. The evolution of Vijaya Visakha Milk Producers' Company Ltd. is clearly linked to the political compulsions prevailing at that time (see Sulaiman et al. 2011).

Visakha Dairy is one of the fastest growing milk and milk products manufacturing company having two plants in Andhra Pradesh. Both the plants are equipped with state of the art technology and are ISO 22000:2005 certified. Presently both the plants have the capacity to handle up to nine lakh litres per day. It manufactures different varieties of milk and milk products and sells in Andhra Pradesh and neighbouring states of Telangana, Odisha and Chhattisgarh. The company has crossed turnover of INR 1000 crore. The company is fast moving in the direction of improving its growth as well as farmers' welfare.

A milk powder plant with a capacity of 13 metric tons per day was constructed in 1998 to convert surplus milk into skimmed milk powder in the flush season. Similarly, in 2001 an aseptic packing station was set up with a capacity of 30,000 litres per day for UHT milk production

and expanded to 3 lakh litres per day capacity in 2015. It is to its credit that Visakha Dairy enjoys a 10% market share in UHT milk on a pan-India basis.

The company was successful in creating a very good infrastructure for the benefit of its member producers. It has established a Training Centre and imparts training to farmers in all aspects of dairy farming, including clean milk production. It has also established 633 Veterinary Health Centres for providing healthcare to animals of its members at 50% subsidy. In addition seven Mobile Veterinary Service Vehicles are operating to provide healthcare to dairy cattle spread across more than 25 villages every day. It has established cattle feed plants with more than 400 MT per day of feed capacity and supplying cattle feed to farmers at subsidized rates. Furthermore, it has constructed more than 100 Bulk Milk Cooling Centres to procure and cool the milk covering every 10 km radius. Together the bulk coolers have a total capacity of 906,000 litres and are automated.

Visakha Dairy through its Milk Producers' Educational Health and Medical Welfare Trust is extending medical services to farmers and their families at subsidised rates at the 400-bed modern hospital constructed with 70 crores investment. Apart from all this it offers education to the farmers' children, preference to producers' children in employment, irrigation projects, culverts, kalyana mandapams, bridges, canals, etc. It provides employment to more than 2000 employees, including contract labour.

Visakha Dairy is one of the successful dairies in the country and this could be attributed to the complete autonomy it enjoys. It is growing consistently and paying remunerative procurement price to milk producers, and supplies quality milk and milk products to consumers. It has a benevolent concern for the community because of which it provides various welfare measures for the benefit of the milk producers. Another important reason for its success is that its Chairman, Shri Adari Tulasi Rao, has been providing the vital dynamic leadership to this company for more than three decades. He is seen as the 'Vizag Kurien' by the members of the milk producers of all three districts of Andhra Pradesh.

Based on the case study of Visakha Dairy,

Sulaiman et al. (2011), identified three decisive reasons for the successful evolution and growth of Visakha Dairy. These include: i) its extensive networks in political, bureaucratic, and civil society circles; ii) its wide-ranging support to producers – including educational and medical support; and iii) its commitment to consumers in terms of quality, pricing and availability. They concluded that these 'institutions' (patterns of behaviour) facilitated Visakha Dairy in accessing, sharing and applying tacit knowledge to compete, expand, and flourish.

The future of these two dairies (Krishna and Visakha) depends upon the extent to which the incumbent leaders (the chairmen) remain at the helm of affairs of the Unions, or equally competent leaders take over the reins of the Unions, subject to the prevailing socio-political environment. How long they will continue to enjoy the trust and confidence of its members is a million dollar question. Lately some reports say that everything is not going well with respect to financial management at Visakha Dairy.

## LESSONS

One of the major lessons that emerge from the analysis of these cases is that milk cooperatives will be successful in realising their objectives provided there is: i) no interference from the government; ii) dynamic leadership; iii) less competition from the private sector; and iv) clear adherence to the cooperative principles. With continued support from the government to provide autonomy to milk unions/dairies, it is likely that milk unions may follow the path of Visakha Dairy which is doing well in Andhra Pradesh. But the sustainability of such dairies in providing service to society is doubtful as, finally, it all depends upon the wisdom/ability of its leaders and their political affiliations.

Here, it is worth quoting the observations of ICA regarding the functioning of cooperatives. ICA noted that "Some governments that used co-operatives as government controlled engines of economic development made membership of co-operatives compulsory. This too breaches the 1st Principle. The right of (a) voluntary association to form co-operatives can also be frustrated by national legislative, tax and administrative systems which favour the investor



owned model of business enterprise and do not take account of the specific nature of co-operative enterprise, hence the importance of co-operatives working politically to influence the legal, financial and administrative regimes in which their business enterprises operate".<sup>2</sup>

Based on a comparative analysis of cooperatives in four European countries, Birchall (2009), argued that "It is that co-operatives are not just for the poor; some of the richest countries in the world depend heavily for their success on co-operative businesses. Neither are co-operatives for the rich; in these successful countries it is the small business-people, the farmers and the low to middle income consumers who benefit most from co-operative membership. Unlike other forms of business, co-ops both generate wealth and spread it around more equally. In the midst of a recession caused by a banking crisis fuelled by short-termism, self-seeking and greed, this must be a hopeful message. If we want to strengthen the Scottish economy, and help it to ride out the world recession, one way to begin would be by maximising the potential of the cooperative type of business". India is no exception to this.

These revelations indicate the need to reaffirm faith in cooperatives in the larger interests of the nation. Institutions, such as NDDDB, need to invest in protecting and nurturing these producer-friendly institutions as was done in the past. Equally important is to make the operations of dairy cooperatives transparent so as to reinforce the confidence of its member producers.

## IMPLICATIONS FOR DAIRY EXTENSION PROFESSIONALS

It is high time that dairy extension professionals start working for strengthening the dairy co-operatives through increased cooperation and participation of members in dairy cooperative activities, and in development of leadership for efficient management of cooperatives.

Extension must play a vital role in protecting the interests of milk producers, who happen to be their major clientele. A good majority of member producers do not realise that they own dairy cooperatives and do not involve in the activities of dairy cooperative societies. The extension professionals must work towards strengthening dairy cooperatives by educating and encouraging members in order to ensure their active 'cooperation and participation' in the activities of dairy cooperatives.

Extension professionals can also help in identifying, training, and developing cooperative leadership so as to enable the leaders to efficiently manage the activities of dairy cooperatives.

It is also necessary for them to conduct comprehensive research on differential performance of milk unions under different modes of management, viz., Dairy Cooperatives, Aided Cooperative Cooperatives, Producer Companies and Private Companies. The results will help in guiding the government in formulating appropriate policies to protect the interests of millions of our milk producers whose livelihoods depend upon dairy farming.

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<sup>2</sup><https://www.ica.coop/sites/default/files/publication-files/ica-guidance-notes-en-310629900.pdf>.

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# 12

## REVAMPING VETERINARY AND ANIMAL HUSBANDRY EXTENSION IN INDIA

Competence in basic subject matter knowledge and skills (acquired in BVSc & AH), and its application in 'relevant extension specialisation' (Veterinary and Animal Husbandry Extension/Dairy Extension) enables the extension professional to perform effectively, argue **SVN Rao and PVK Sasidhar**.

During their involvement as QRT/RAC members with the Indian Council of Agricultural Research (ICAR), the authors of this blog observed poor representation of 'qualified' Veterinary and Animal Husbandry Extension (VAE)/Dairy Extension scientists in ICAR - Animal Science Institutions/KVKs. This has seriously compromised livestock extension activities as well as assessment, refinement, and transfer of the livestock technologies that have been developed.

While evaluating Masters/Doctoral theses or reviewing extension research articles for publication in dairy/animal science journals, we noticed that most of the investigators – lacking in veterinary background – did not have clarity on the basic concepts of livestock production and management, and problems of livestock farmers.

As external examiners at some of the State Agricultural Universities (SAUs) and State Veterinary Universities (SVUs), we observed that non-extension faculty from other Veterinary departments are teaching Veterinary and Animal Husbandry Extension UG courses and are even guiding Masters and Doctoral students (e.g., the VAE departments in 38 out of 52 Veterinary Colleges and IVRI do not have the required number of faculty with prescribed qualifications to teach UG courses, leave alone for guiding PG students).

Our introspection led us to wonder whether we, with Veterinary and Animal Science background, can conduct extension studies in, say fisheries or agriculture or horticulture, without having basic conceptual clarity in these subjects. We then realised that we do not have the necessary technical competence in these subjects, and we honestly admit it is not right on our part to get involved in teaching, or in research and extension in these subjects. It is this realisation that made us write this blog. Our opinions expressed here are purely personal, based on our work experience in ICAR's

Agricultural Research Service and in veterinary colleges, apart from our association with ICAR/SAUs/SVUs in various committees.

- Technologies to be transmitted;
- Primary target group and key stakeholders;
- Staffing as per statutory requirements etc.

## VETERINARY AND ANIMAL HUSBANDRY EXTENSION EDUCATION (VAE)

Veterinary and Animal Husbandry Extension Education (VAE) is a diverse, valuable, and a relatively new operational concept in India. VAE's role in veterinary and animal science research and development is to be clearly understood by policy makers/research managers in ICAR Headquarters & Animal Science Research Institutes, Agricultural Scientists Recruitment Board (ASRB), SAUs and SVUs. The VAE follows the general trends set by agricultural extension with substantial changes in:

- Educational qualifications for teaching faculty and researchers prescribed by the Veterinary Council of India (VCI);
- Basic technical subject matter application in extension research;

VAE probably is the only discipline weighed down with several inconsistencies in its nomenclature, qualifications of the teaching faculty, syllabi and curriculum, and the target groups it addresses. This could be one of the reasons why this discipline is riddled with several misconceptions.

## WHY BASIC TECHNICAL SUBJECT MATTER COMPETENCIES ARE ESSENTIAL FOR EFFECTIVE EXTENSION

Extension as a whole is not a standalone discipline as it deals with a specific subject matter, which needs to be communicated to a specific target group – farmers. The subject matter to be transferred depends upon the category of farmers. Accordingly different streams of extension emerged vis-à-vis the subject matter with which it deals (Box 1).

**Box 1: Extension Specialisations and Essential Subject Matter Competencies**

Extension Specialisation	Required Basic Technical Subject Matter Training	Target Group	Area of Work
Agricultural Extension	BSc (Agriculture) BSc (Horticulture)	Agriculture and Horticulture Farmers	Crop Technologies - Cereals, pulses, oil seeds, cash crops, tubers, fruits and vegetables,
Veterinary and Animal Husbandry Extension Education /Dairy Extension	BVSc & AH	Livestock and Poultry Farmers	Livestock and Poultry Technologies - Farm, companion, working and lab animals and poultry
Fisheries Extension	BFSc	Fisheries and Aquaculture Farmers	Fisheries and Aquaculture
Home Science Extension	BSc (Home Science)	Communities	Community development, resource management, food and nutrition, and textiles, etc.

The competencies required by a Veterinary and Animal Husbandry Extension Education/Dairy Extension professional may be classified into two broad categories:

### (a) Process skills or functional competencies or soft skills

- **Example 1:** Programme planning, execution and evaluation.
- **Example 2:** Data collection through household surveys on problems of livestock development – purpose, procedure, data consolidation, analysis, interpretations and identification of problems for intervention and policy.

- **Example 3:** Networking with local organizations, facilitating group formation, resolving conflict and engaging stakeholders in livestock development, etc.
- (b) Technical subject matter application competencies or core skills**
- **Example 1:** Conducting a method demonstration on how to perform artificial insemination or pregnancy diagnosis in dairy animals.
  - **Example 2:** Conducting refresher training for field veterinarians on animal reproduction competencies (Box 2).
  - **Example 3:** Demonstrating 'The Five Freedoms' of animal welfare and their outcomes in a livestock or poultry farm (Box 3).

### Box 2: Refresher Training Curriculum for Field Veterinarians on Animal Reproduction Competencies

(a) Technical Subject Matter Application Competencies/Core Skills: Anatomy of bovine female reproductive organs; Slaughterhouse specimens collection; Physiology of female bovine reproductive system; Ovarian development and follicular dynamics; Rectal examination - purpose, procedure, care & precautions; Heat behaviour, heat aberrations, palpable changes and pregnancy diagnosis; Differential diagnosis; Endometritis and latest protocols in treatment of uterine pathology; Anoestrus and its management; Oestrus synchronization; Repeat breeding; and Cryo-preservation of semen, thawing procedures and handling of AI equipment.

(b) Process Skills or Functional Competencies/Soft Skills: Indian dairy industry – present scenario and SWOT analysis; Concepts of ideal dairy, farming practices/parameters; Data collection through household survey on reproductive problems of bovines - purpose and procedure; Data consolidation and analysis, interpretations and identification of reproductive problems for intervention; Presentations by participants (Group work); Field visit for hands-on training and practice; Veterinarians role in enhancing livestock productivity; Tips for enhancing conception at field level.

(Source: Ravi Kumar et al. 2016)



### Box 3: Requirements for Good Welfare under Five Freedoms and their Outcomes

Freedom	Summary of Requirements and Outcomes
1. Freedom from hunger, thirst and malnutrition	Requirements: Covers the basic needs - food and drinking water. Outcomes: Experiences (hunger, thirst) that animals will have and the physiological consequences that can occur (malnutrition), if this Freedom is not met.
2. Freedom from thermal and physical discomfort	Requirements: Covers the need for animals to be housed or maintained in an environment that is suitable for that species. Outcomes: Ways in which animals may suffer from inadequate housing (discomfort), if this Freedom is not met.
3. Freedom from pain, injury and disease	Requirements: Deals with the health needs of animals. Outcomes: Animals may experience pain as a result of injury and or diseases (ill health), if this Freedom is not met.
4. Freedom to express normal behaviour	Requirements: Recognises the importance of having specific behaviours which are important to animals. Outcomes: Experiences (lack of space, facilities and company of own species) that animals will have and the physiological consequences that can occur (if unable to have specific behaviours), if this Freedom is not met.
5. Freedom from fear and distress	Requirements: Recognises that animals can experience negative emotional states, particularly fear, and that they should be protected from experiencing these states. Outcomes: Experiences (fear and distress) that animals will have and the physiological consequences that can occur (mental suffering), if this Freedom is not met.

The essence of the discussion presented in Box 1 – along with specific examples given in Boxes 2 and 3 – is that Veterinary and Animal Husbandry Extension/Dairy Extension professionals must have competence both in basic subject matter knowledge and skills and its application, to perform effectively in the field (Rao 2019).

#### HISTORY OF VETERINARY AND ANIMAL HUSBANDRY EXTENSION EDUCATION AND DAIRY EXTENSION AT PG LEVEL

The Division of Dairy Extension at the National Dairy Research Institute (NDRI) came into existence in 1961. Postgraduate teaching and research began in 1972 and the degrees awarded were MSc and PhD in Dairy Extension. Later, NDRI started awarding its MSc degree as MSc Dairying (Dairy Extension), and after a few years it started awarding degrees as MVSc (Veterinary Extension) for all those with basic

BVSc & AH degree, and MSc for those with BSc (Ag) and BSc (Dairy Husbandry).

The Division of Extension Education was established at the Indian Veterinary Research Institute (IVRI) in 1970. From 1985 onwards IVRI has been offering a PG programme in Extension Education. IVRI has also changed its nomenclature while issuing degree certificates – first into MVSc (Veterinary Extension), and currently as MVSc (Veterinary Extension Education) and PhD (Veterinary Extension Education).

NDRI and IVRI were the only ICAR institutions offering PG programmes for BVSc & AH graduates in the animal science domain, although they were permitted to pursue PG extension. But at IVRI, there were a few faculty members with BVSc & AH degrees who had specialised in Extension, associated with the PG programme in Veterinary Extension.

The Madras Veterinary College (MVC), as a constituent college of Tamil Nadu Agricultural University (TNAU), established the Department of Extension in 1963. When Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) was established in 1989, MVC launched their PG programme in Veterinary Extension in 1990. Later, the PG programme in Veterinary Extension was introduced in many SAUs and SVUs.

## ESTABLISHMENT OF VETERINARY AND ANIMAL HUSBANDRY EXTENSION EDUCATION DEPARTMENTS AT THE UG LEVEL

The VCI has recognised the importance of VAE in the BVSc & AH degree programme and made it mandatory to establish it as one of the 17 departments as part of Minimum Standards of Veterinary Education Regulations 1993 (VCI 1993). After that, the departments of VAE were established in all the veterinary colleges so as to impart knowledge and inculcate the skills required by veterinarians – to educate livestock farmers on the various aspects of livestock management that would enable them to increase their production and income through superior livestock rearing.

## CURRENT SCENARIO

The prevailing scenario with respect to UG, PG and Doctoral programmes being followed in different institutions is described below.

**1. Under-Graduate Programme (BVSc & AH):** As of 2020, in the public sector, the BVSc & AH programme – as per VCI Minimum Standards of Veterinary Education (MSVE) – is being offered by 53 institutions in India. This includes IVRI and 52 constituent Veterinary Colleges under SAUs/SVUs/Central Agricultural University (CAU)/Central Universities (CUs). As per the MSVE-2016 regulations, the department of VAE must have three faculty members (1 Prof., 1 Assoc. Prof. and 1 Asst. Prof.) who have specialised in VAE in order to offer BVSc & AH degree programme for an annual intake of 80 students in a Veterinary College. As per the VCI regulations all the courses must be taught by competent faculty with specific qualifications in the respective subjects (Box 4).

### Box 4: Faculty Eligibility to Teach UG Courses in Veterinary Institutions

14. Teachers, Examiners, Paper Setters. – (1) The persons with only basic veterinary qualification, included in Schedules to the Act, registered with a State Veterinary Council and having a Post-graduate Degree in the concerned subject, shall be recruited as teaching faculty in the Veterinary Colleges and preference shall be given to the candidates who have qualified National Eligibility Test conducted by Agricultural Scientist Recruitment Board and in case National Eligibility Test qualified candidates are not available they shall qualify National Eligibility Test prior to their promotion and the College or University may employ Graduate Assistants with BVSc and AH or MVSc degree against the vacant post for a maximum period of two years and not more than one in each department.

**Source: VCI 2016**

Unfortunately, the VAE departments in 38 out of 52 Veterinary Colleges and IVRI do not have the required number of faculty with prescribed qualifications (Table 1). The VAE departments in some Veterinary Colleges are filled with Agriculture Extension faculty, whereas in some other Veterinary Colleges posts are filled with veterinarians who have specialised in subjects other than VAE, such as Veterinary Gynaecology & Obstetrics, Veterinary Surgery & Radiology, Veterinary Pathology, Livestock Production & Management, etc. **We are sure that Veterinary Universities/Colleges are not producing Veterinary Gynaecologists, Veterinary Surgeons and Veterinary Pathologists to teach VAE courses in their respective colleges.** There are a few Veterinary Colleges in the country which do not have even a single faculty qualified in VAE. In addition, there are many vacancies in the Department of VAE. The net result is that the quality of teaching takes a beating and the veterinary graduates coming out of the portals of such institutions will not be in a position to develop clarity on VAE concepts or the skills required to effectively deliver the Veterinary and Animal Husbandry Extension services to livestock farmers. There are several dichotomies which often interfere in the process of 'making veterinarians' and delivery of services by them (Rao et al. 2019).

**Table 1: Details of VAE Faculty available in Public Sector Veterinary Colleges in India**

No.	State	University	Veterinary College Location	No. of faculty with VAE qualifications	Shortage of Faculty in VAE*	State wise vacancies in VAE
1.	Andhra Pradesh	SVVU	Tirupati	1	2	3
2.			Gannavaram	3	0	
3.			Proddatur	2	1	
4.	Assam	AAU	Guwahati	5	0	1
5.			Lakhimpur	2	1	
6.	Bihar,	BASU	Patna	3	0	0
7.	Chhattisgarh	CGKU	Durg	1	2	5
8.			Bhilaspur	0	3	
9.	Gujarat	AAU	Anand	0 (1)	3	6
10.		JAU	Junagadh	2	1	
11.		SDAU	SK Nagar	2	1	
12.		NAU	Navsari	2	1	
13.	Haryana	CCSHAU	Hisar	2	1	1
14.	Himachal-Pradesh	CSKHPAU	Palampur	2	1	1
15.	J&K	SKUAST	Jammu	2	1	1
16.			Srinagar	3	0	
17.	Jharkhand	BAU	Ranchi	2	1	1
18.	Karnataka	KVAFSU	Bidar	2	1	7
19.			Bengaluru	1	2	
20.			Shivamogga	2	1	
21.			Hassan	2	1	
22.			Gadag	1	2	
23.	Kerala	KVASU	Thrissur	4	0	0
24.			Pookode	3		
25.	Madhya Pradesh	NDVSU	Jabalpur	2	1	2
26.			Mhow	2	1	
27.			Rewa	3	0	
28.	Maharashtra	MAFSU	Nagpur	3	0	5
29.			Mumbai	2	1	
30.			Parbhani	2	1	
31.			Udgir	2	1	
32.			Shirwal	1	2	
33.	North-East	CAU	Aizwal	2	1	3
34.			Peren	1	2	
35.	Odisha	OUAT	Bhubaneshwar	3	0	0
36.	Pondicherry	PU (Central University)	Pondicherry	1	2	2
37.	Punjab	GADVASU	Ludhiana	0(5)	3	3
38.	Rajasthan	RAJUVAS	Bikaner	2	1	2



39.			Udaipur	2	1	
40.	Tamil Nadu	TANUVAS	Chennai	4	0	0
41.			Namakkal	5	0	
42.			Tirunelveli	4	0	
43.			Orathanadu	4	0	
44.	Uttarakhand	GBPUAT	Pantnagar	0(2)	3	3
45.	Telangana	PVNRTVU	Hyderabad	1	2	3
46.			Korutla	2	1	
47.	Tripura	TU (Central University)	Agartala	1	2	1
48.	Uttar Pradesh	UPDUVASU	Mathura	3	0	5
49.		SVBPUAT	Meerut	2	1	
50.		NDUAT	Faizabad	2	1	
51.		BHU	Barkachha	3	0	
52.		ICAR -IVRI	Izatnagar	0 (6)	3	
53.	West Bengal	WBUAFS	Kolkata	2	1	1

**Source:** Information from the websites of the respective Universities / Colleges.

**Note:** As per the VCI (2016) regulations, the number of faculty required in the Dept. of VAE are three (one Prof, one Assoc. Prof. and one Asst. Prof.) to teach UG programme for a batch of 80 students. Figures in parentheses indicate the number of faculty in the Dept. of VAE but without the required qualifications in VAE.

## 2. Masters and Doctoral Programmes:

Contrary to the appropriate learning situation, the existing situation throws open several lacunae in the teaching of Veterinary Extension Education courses at

Masters and Doctoral levels. There are instances where the faculty specialised in Agricultural Extension have been teaching MVSc and PhD students of Veterinary Extension Education.

Similarly, Veterinary graduates who have specialised in subjects other than Veterinary Extension are teaching Veterinary Extension courses at all levels – from UG to Doctoral level (Table 2). There may be a few teachers who are teaching effectively despite the mismatch between their qualifications and the courses offered by virtue of their commitment and experience. These are exceptions and cannot be the rule.

**Table 2: The Current Situation at Masters and Doctoral Programmes in Extension**

No.	Masters and Doctoral Programmes	Syllabus & Curriculum	Faculty with Same/ Different Graduate qualification	Remarks
1.	MSc & PhD (Agri. Extension ) offered by Agricultural Colleges	Uniform syllabus prescribed by ICAR	BSc (Ag) with specialisation in Agri. Extension	Ideal
2.	MVSc & PhD (Veterinary Extension Education) offered by Veterinary Colleges	Uniform syllabus prescribed by ICAR	BVSc & AH with specialisation in Veterinary Extension/ Dairy Extension	Ideal
			BVSc & AH with specialisation in Agricultural Extension	May be continued till qualified faculty are available
			BVSc & AH with specialisation in Gynaecology & Obstetrics/Pathology/ LPM etc	To be discouraged

			BSc (Ag) with specialisation in Agri. Extension	To be discouraged
3.	MSc & PhD (Agricultural Extension Education)/MVSc & PhD (Vety. Extension) offered by NDRI, Karnal	Uniform syllabus prescribed by ICAR	BSc Ag/ BSc (H.Science)/ BSc (Dairy Husbandry) with different extension qualifications	MSc and MVSc are awarded based on the basic degree which is a contradiction
4.	MVSc & PhD (Veterinary Extension Education) offered by IVRI, Izatnagar	IVRI syllabus	BSc (Ag)/ BSc (H. Science) with Agri Extension qualifications	MVSc and PhD in Veterinary Extension Education are awarded which is a contradiction

### 3. Non-Uniformity in the Curriculum and Syllabus:

There is no uniformity in the curriculum and syllabus being followed in institutions offering Extension courses. For example, IVRI, which is a National institute of ICAR, follows its own syllabus developed some

decades back, whereas the SAUs/SVUs follow the curriculum and syllabi developed and revised periodically by the ICAR. Similarly there is no uniformity in the eligibility qualifications for admission to Masters and Doctoral programmes in Extension (Table 3).

**Table 3: Eligibility Criteria for Admission to Masters and Doctoral Courses in Extension**

No	University /College	Course offered	Eligibility
1.	IARI Deemed University	MSc (Agril.Extn)	BSc or BSc in Agriculture/Dairy Science/Veterinary Science/Animal Husbandry/Fisheries
		PhD (Agril. Extn)	Agricultural Extension/Extension Education/Dairy Extension/Fisheries Extension/Livestock Extension/Home Science Extension/Agril. Extension and Communication/ Veterinary and Animal Husbandry Extension
2.	IVRI Deemed University	MVSc (Vety.Extn. Edu)	BVSc & AH as specified by the VCI
		PhD (Vety.Extn. Edu)	BVSc & AH with Master's degree in concerned discipline/Vety. Medicine/Vety. Gynaecology & Obstetrics/Vety. Surgery & Radiology/Animal Nutrition
3.	NDRI Deemed University, Karnal	MSc (Agril. Extn Edu.) MVSc (Vety. Extn. Edu.)	BSc Dairying/BSc Dairying (DT/DH)/BTech (DT)/ BVSc & AH/BSc (Animal Sciences)/BSc (Ag.)/BSc (Ag. & AH)/ BSc(Ag.)Honors/BSc Home Science (with elective Extension Education)
		PhD (Agril. Extn. Edu.) PhD (Vety. Extn. Edu.)	MSc Dairying/ MVSc Dairying (Dairy Extn./ Dairy Extn. Edu.) MSc Agri. (Agril. Extn./Extn. Edn./Agril. Extn. Edu.) MSc (Agril. Extn. Edu. MSc Home Science (Home Science Extn. Edu.) MVSc (Vety. Extn./Vety. Extn.Edu./VAH Extn.)
4.	Veterinary Colleges under State Vety. Universities	MVSc (Vety. & AH Extn.) PhD (Vety & AH Extn Edu)	BVSc & AH MVSc (Vety. & AH Extn. Edu.)

The eligibility for PhD (Vety.Extn.Edu) at IVRI includes Master's degree in Vety. Medicine/ Vety. Gynaecology & Obstetrics /Vety. Surgery & Radiology/ Animal Nutrition. Veterinary Extension as a subject of specialisation is not even mentioned under the PhD disciplines in the information bulletin available on the National Testing Agency website.

For improving the effectiveness of Veterinary Extension, and to put at rest various controversies revolving around this discipline, these anomalies need to be addressed. It also helps in improving confidence among the faculty in fulfilling their roles as extension professionals.

## ISSUES THAT NEED TO BE ADDRESSED

### (1) Qualifications of Faculty

Probably Veterinary & AH Extension Education is the only department in veterinary universities/ colleges manned by faculty with any of the following four combinations of qualifications, although, as per the VCI the last mentioned one only is the prescribed combination.

1. BSc (Ag) with Agricultural Extension specialisation;
2. BVSc & AH with Agricultural Extension specialisation;
3. BVSc & AH with subjects other than Vety. Extension specialisation;
4. BVSc & AH with Veterinary extension specialisation.

Which of the four combinations is ideal to teach Veterinary and AH Extension courses in the veterinary colleges and animal science institutions offering BVSc & AH, MVSc and PhD in VAE? The obvious answer is 'fourth'. Then why is it not being followed in some of the colleges/institutions?

**Assumption No. 1: Agriculture graduates trained in agricultural extension are competent to teach veterinary extension courses.** The rationale behind this assumption is that the concepts of extension are the same and hence they can teach veterinary extension courses as well. These extension professionals have clarity on the concepts of extension but lack in the concepts of subject matter i.e.,

Veterinary Science and Animal Husbandry (examples discussed in Boxes 2 & 3), and hence, cannot teach veterinary extension courses effectively. ***This means they are strong in extension but weak in Veterinary Science and Animal Husbandry.*** As VAE is an applied science and attaches a lot of importance to conducting practicals, especially in situ (the village), the teachers therefore, must definitely possess the necessary knowledge and skill in both Veterinary Science & Animal Husbandry as well as Extension.

**Assumption No. 2: Veterinarians specialised in other subjects also can teach veterinary extension courses because it is very easy to teach extension.** They consider that understanding the concepts of veterinary extension is not necessary as they are well-versed with Veterinary Science and Animal Husbandry. ***This means they are strong in Veterinary Science and Animal Husbandry but weak in Extension.*** To add to this IVRI confusion, allows MVSc degree holders in Veterinary Medicine, Veterinary Gynaecology & Obstetrics, Veterinary Surgery and Animal Nutrition to register for the PhD programme in Veterinary Extension Education. If the Veterinary Universities/colleges permit their faculty to teach the courses in which they have no competence, the sanctity of specialisation is lost. Such faculty can neither effectively teach the subject in which they have no competency nor do they have the opportunity to teach the subject in which they have competency.

It amounts to double loss for such faculty members. It results in wasting of their skills in the specialised field, and creates disinterest among the students who are the ultimate victims of such ineffective teaching. The net result is that the students without clarity on Veterinary Extension concepts will pass out of such colleges and then fail to deliver extension services in the field – branded as 'weak' extension officers responsible for poor transfer of livestock production technologies and low production.

**Assumption No. 3: Inadequate Veterinary Extension-Qualified People.** This assumption was valid a few decades ago when there were not many colleges/institutions offering PG

programmes in the Veterinary Extension discipline. Now this argument that qualified veterinary extension people are not available does not hold water as to our knowledge there are more than 150 to 200 PGs/PhDs available with Veterinary Extension qualifications. When Universities like TANUVAS were able to fill

more than 30 posts with Veterinary Extension-qualified people to teach veterinary extension courses and also to provide veterinary and AH extension services to the livestock owners in the state, why cannot other universities, such as IVRI and NDRI also do so?

**Table 4: Appropriate Situation for PG and PhD Programmes in Extension**

<b>Subject matter discipline</b>	<b>Eligibility</b>	<b>Appropriate qualifications for the Faculty</b>	<b>Preferred experience/ Target group</b>
Agril. Extn. MSc PhD	BSc (Ag) MSc (Agri. Extn)	BSc (Ag), MSc (Agri. Extn) and PhD (Agri. Extn)	Experience of working with farmers
Vety & AH Extn. Edu (VAE) MVSc PhD	BVSc &AH MVSc (VAE)/MSc (Dairy Extn.)	BVSc &AH, MVSc (VAE), MSc (Dairy Extn,) PhD (VAE) MSc (Dairy Extn.)	Experience of working with livestock farmers
Dairy Extension MSc PhD	BVSc & AH, BSc (Dairy Husbandry) MSc (Dairy Extn), MVSc (VAE)	BVSc & AH, MVSc (VAE), MSc (Dairy Extn,) PhD (Dairy Extn.), MVSc (VAE)	Experience of working with livestock farmers, esp. dairy farmers
Extn. Edu and Communication management MSc PhD	BSc (HSc.), MSc (HSc/ HND)	BSc (HSc.), MSc (Extn) and PhD (Extn)	Experience of working with people in the process of improving quality of life
Fisheries Extension MFSc (FEX) PhD (FEX)	BFSc MFSc	BFSc, MFSc (FEX) and PhD (FEX)	Experience of working with fish farmers

**Hence, we consider that the faculty responsible for teaching Veterinary Extension courses must have competence in both the subject of veterinary and animal husbandry as well as in extension.**

In a strict sense it is appropriate for a person qualified in Fisheries to teach Fisheries Extension students. Similarly, the Home Science faculty is better equipped to teach Home Science Extension students. It is also equally important to set the eligibility criteria to match with the subject matter discipline (Table 4). This will help the concerned extension professionals to utilise their knowledge and skills in producing competent manpower, and also in working with their respective target groups.

**(2) Frequent Revision of Syllabus and Course Curriculum**

VCI is the regulatory body for the BVSc & AH

degree programme whereas ICAR is the regulatory body for MVSc & PhD programmes. The Minimum Standards of Veterinary Education (MSVE) 2016 Regulations as prescribed by VCI are mandatory for all the veterinary colleges in India. These MSVE regulations include: faculty strength, space and other infrastructure requirements, in addition to syllabus and course curriculum. These regulations, formulated for the first time in 1993, were revised in 2008 and 2016. As per the new regulations of 2016, the duration of BVSc & AH programme was increased to five and a half years from five years, and the course content of all the courses including VAE, were revised. The examination pattern also was changed. Due to frequent changes, it becomes difficult for the faculty to prepare the teaching material, and the faculty has to deal with two batches of students, one with old regulations and the other with new

regulations. Most of the course content was similar to that of the ARS syllabus to enable the students to compete well with other students. Now the issue is whether the course content should be in line with the (i) ARS syllabus which is agriculture oriented; or (ii) in tune with the competency required by veterinary extension professionals.

The syllabus and curriculum for the PG programme is under the purview of the ICAR. The veterinary colleges also must adhere to these regulations. This means that veterinary colleges are under two regulatory bodies – one for the UG programme and the other for the PG programme. Although the ICAR prescribes the common syllabus for PG programme, institutions like IVRI are following their own syllabus. This means there are different syllabi for PG programme in VAE depending upon the institution/college.

### **(3) Nomenclature of the Discipline**

There are different nomenclatures for the VAE discipline. The name of the department as per the VCI is Veterinary and Animal Husbandry Extension Education (previously it was 'Veterinary and AH Extension'). The nomenclature of the PG degree in Extension awarded by NDRI and IVRI has been changed several times leading to confusion. Currently, the veterinary universities award PG degrees under the name of 'Veterinary and AH Extension Education'. At IVRI, the name of the Division is 'Extension Education' and the PG degree awarded is 'Veterinary Extension Education'. The name of the Division at NDRI is 'Dairy Extension' and the degree awarded is MSc (Agri. Extn. Edu) and MVSc (Vety. Extn. Edu.) depending upon the basic degree of the student concerned. The fundamental questions are: Why is a National Dairy Research Institute offering a PG programme in Agricultural Extension? Or awarding MVSc in Veterinary Extension Education without Veterinary faculty?

### **(4) Recruitment of ARS Scientists**

The ASRB conducts ARS/NET examinations to recruit Scientists based on the demand it receives from different institutions under the ICAR. Very rarely, it used to receive demand for scientists who have specialised in Veterinary Extension. Now, a stage has come wherein the

ICAR has deleted this subject, 'Veterinary and AH Extension Education', from the list of core courses identified for conducting JRF/SRF/ARS. This is detrimental to the growth of this subject as the students with MVSc Veterinary Extension qualifications have to compete with either Agricultural Extension or Home Science Extension students and it is like fighting a losing battle. What is the fate of MVSc Veterinary Extension qualified students when ASRB does not advertise for Scientists' posts in Veterinary Extension, and ICAR does not include it as a subject in JRF/SRF examinations?

### **(5) Ineffective Veterinary and Animal Husbandry Extension/Dairy Extension in ICAR's Animal Science Institutes and KVKs**

Under the Division of Animal Science at ICAR, there are 2 Deemed Universities (IVRI and NDRI), 8 National/Central Research Institutes, 1 Bureau (National Bureau of Animal Genetic Resources), 1 Directorate (Directorate of Poultry Research), 1 Project Directorate (Project Directorate on Foot and Mouth Disease), and 6 National Research Centres (on Camel, Pig, Mithun, Yak, Equine and Meat). In addition, the Division coordinates 6 Network Research Programmes and 7 All India Coordinated Research Projects. In all these animal science institutions, programmes and projects, there are hardly any scientists with Veterinary Extension qualifications. Similarly, most of the 716 KVKs do not have subject matter specialists (SMSs) specialised in animal science, let alone Veterinary Extension. The broad extension role of ICAR - Animal Science Institutes or KVKs, is Technology Assessment and Refinement (TAAR) in the field of Veterinary and Animal Sciences and transfer of those validated technologies to State Departments of Animal Husbandry and other key stakeholders. The specific extension roles of ICAR - Animal Science Institutes or KVKs under TAAR are:

- On-farm trials;
- Frontline demonstrations;
- Capacity building and technology transfer to stakeholders.

During their association as QRT/RAC members, the authors observed that ICAR - Animal Science Institutes had developed a number of technologies which can be categorised broadly under:

- Improved germplasm;
- Reproduction technologies;
- Vaccines, diagnostics and drugs;
- Nutrition & feed technologies;
- Instruments & devices;
- Meat, milk and egg products.

However, there exists a huge gap between technologies developed and adopted due to inadequate adaptive research to take them to end users. The main reason for this is poor representation of Veterinary and Animal Husbandry Extension Education/Dairy Extension scientists in the ICAR - Animal Science Institutions/KVKs as discussed above (Rao and Natchimuthu 2019).

### **(6) Recruitment of Assistant Professors in Veterinary Colleges**

As seen from Table 1, there are a lot of vacancies in veterinary colleges but the administration prefers either to run the department of VAE with existing staff or with contract teachers or with surplus faculty of other departments.

### **THE WAY FORWARD**

1. All the Veterinary colleges and IVRI, which are offering BVSc & AH degree programme and MVSc and PhD programmes in Veterinary Extension must have the same syllabus (VCI for UG and ICAR for PG & PhD), as well as same nomenclature for the department as well as the degrees awarded. The name of the department and degrees awarded must be 'Veterinary and Animal Husbandry Extension Education'.
2. NDRI must retain its original name as 'Dairy Extension Education' both in the department and while awarding degrees.

It is wrong to award a degree in MVSc without having veterinary faculty in the Deemed University.

3. The VCI must insist on filling up of the vacancies in the Department of VAE with appropriate qualifications in all the institutions offering BVSc & AH programme, including IVRI. The VCI may not permit colleges to manage with contract Assistant Professors/Teaching Assistants and must insist on regular recruitment for vacant faculty positions through open advertisement.
4. The ICAR must include Veterinary and Animal Husbandry Extension in its list of core subjects for which the ASRB conducts examinations for JRF/SRF/ARS.
5. All Directors of ICAR - Animal Science Research Institutes must insist on filling Scientist positions in Veterinary and Animal Husbandry Extension, and SMS positions in KVKs with prescribed qualifications only.

### **ENDNOTE**

Realising the importance of the Animal Husbandry sector in farmers' lives as well as for the national economy, the Govt. of India has constituted a separate Ministry for Fisheries, Animal Husbandry and Dairying with a huge budgetary provision. A number of schemes with central sector assistance are being implemented, which definitely need the active involvement of Veterinary and Animal Husbandry Extension professionals. But unfortunately, the subject of VAE is neglected in Veterinary Colleges and ICAR - Animal Science Research institutions – right from staffing to budgets – which needs to be addressed by the two regulatory bodies, ICAR and VCI.

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# 13

## ANTIMICROBIAL RESISTANCE ISSUES IN THE DAIRY SECTOR AND ASSOCIATED HUMAN HEALTH RISK

Milk is an important component of the human diet and simultaneously a source of antimicrobial resistance and residues. The One-Health approach has largely focussed on milk health and nutrition but there are other issues requiring consideration. In this risk communication blog, **Neela Madhav Patnaik, Jancy Gupta, and Maria Correa** discuss the various facets of antimicrobial resistance and residues in milk, and the possible effects on human health.

Milk is a wholesome product, produced in an environment controlled by human actions, including the use of antimicrobials. Antimicrobial residues could enter the human food chain and have toxicological effects on humans (Khaniki 2007). Infants and growing children are more susceptible than other age groups to residues given their higher consumption of milk and milk products. Antimicrobial resistance (AMR) is also a human health concern (Scoppetta et al. 2016) because humans will slowly develop resistance to antibiotics that could be needed to treat human ailments (Katakweba et al. 2012). Thus, ensuring that milk and milk products are safe from antimicrobial residues is critically important.

How do we decrease AMR and residues in milk and milk products? The answer to this question is not an easy one. The challenge involves small and big stakeholders, dairy cooperatives, milk processing and marketing groups, veterinarians and para-veterinary personnel, researchers, and public policy makers.

### ANTIMICROBIAL RESIDUES IN MILK AND MILK PRODUCTS

Antimicrobial drugs are important for treating human infections and in animal health, therefore AMR and residues could be present in milk and milk products. The presence of antimicrobial residues in milk is well-known (Cepurnieks et al. 2015; Kabera et al. 2018; Baynes et al. 2016; Moudgil et al. 2019). Antimicrobial residues in milk affect milk quality and inhibit the starter cultures for milk products (Addo et al. 2011). Pasteurization and other heat treatment methods are effective in eliminating pathogenic microbes but their effect on drug residues is limited (Kang et al. 2005). Mastitis treatments with antimicrobials or bacteria-contaminated milk show wide-spectrum resistance to a variety of antibiotics (Aires-de-Sousa 2017; Kumar et al. 2010). Common causes of residues in milk can be attributed to extra-label drugs, over the counter antibiotics sale, poor farm records, non-compliance with the withdrawal period, among others.



Residues in milk are a public health concern and policy makers' involvement is necessary to increase detection, quantification, and control. Two important associated concepts are the maximum residue limit and withdrawal periods.

### Maximum Residue Limit

Maximum Residue Limit (MRL) can be defined as the acceptable or permitted maximum concentration of residue in milk. MRL is based on toxicological data and includes absorption, distribution, metabolism, and excretion (Bedi et al. 2015). Milk and milk products containing residues above the recommended MRL are detrimental to consumers' health and are related to a number of human health issues (Wang et al. 2017). AMR can be life threatening when a person is resistant to an antibiotic needed for a particular ailment (Aalipour et al. 2015). The Food Safety and Standards Authority of India (FSSAI) regulates the food MRLs of 103 antibiotics and other veterinary drugs in milk,

fish, poultry, meat and meat products and is in sync with the Codex Alimentarius.

### Withdrawal Period

Withdrawal period refers to the time required for the residues of concerned antimicrobials to reach safe concentration levels. Withdrawal time varies considerably depending on the chemical and physical properties of the antimicrobial, the administration route, and the recommended dosage level if antibiotics contribute to the problem with milk residues (Laxminarayan et al. 2015). In Punjab, a survey on antimicrobial use indicated that none of the sampled farmers interviewed discarded the milk of treated animals (Patnaik et al. 2019a). The reason for this practice was mainly monetary loss. Farmers lacked knowledge of the withdrawal period. Furthermore, they indicated there were no incentives for residue-free production. The need for extension interventions and actions plans is obvious.



**Interaction with Punjab livestock farmer on management of post-antimicrobial treated animals**

## ANTIMICROBIAL USE IN THE DAIRY SECTOR AND ITS EFFECT ON HUMAN HEALTH

The different types of antimicrobials include antibiotics, antiprotozoal, and antifungals products. Dairy antimicrobial therapeutical

treatments are for clinical diseases, in prophylactic use it is for disease prevention and control, and in the case of sub-therapeutical use it is for growth promotion (Patnaik et al. 2019b). The most prescribed drugs for dairy include tetracyclines, quinolones, aminoglycosides, beta-lactams, sulphonamides, and macrolides (Huber et al. 2010). The drugs may be

prescribed singly or in combination for treating ailments in dairy animals and can be administered through different methods (e.g., oral, intra-uterine, intra-mammary and topical). Oxytetracycline, chloramphenicol and streptomycin are the drugs excreted through milk due to their pharmacokinetics (Zahid et al. 2010). WHO (2007) listed critically important antimicrobials for human health that need to be restricted in the dairy sector, for example, Gentamycin, Erythromycin, Ampicillin, Cefadroxil, Amoxycillin, Chlortetracycline, Sulfadiazine, Doxycycline, Flumequine, Veneomycin, Spiramycin, and Sulfadimethoxine.

Though antimicrobials have improved animal health and milk production, antimicrobial resistance is a huge concern in the dairy industry. Indiscriminate use of antimicrobials increases the possibility of resistant bacteria

and transmission from animals to humans. Given the importance of veterinarians in different field situations and as a vehicle of information for farmers (Patnaik et al. 2019c), in-service training programs for livestock department personnel should include emerging trends in AMR policies and control measures (Ramesh et al. 2018). The acute and chronic adverse effects in humans are summarised as nephropathy, mutagenicity (Gentamicin); reproductive disorders, bone marrow toxicity, hepatotoxicity (Chloramphenicol); allergy (Penicillin) and carcinogenicity (Oxytetracycline, Sulphamethazine). Chronic exposure to oxytetracycline results in changes in blood such as atypical lymphocytes and leucocytosis, lung congestion, thrombocytopenia purpura and toxic granulation of granulocytes, and brown discolouration of the teeth (Navratilova et al. 2009).

### Box 1: GLOBAL AMR CONTROL INITIATIVES

As a global threat, AMR if unchecked by 2050 is predicted to be associated with an estimated loss of 10 million lives, and yearly global GDP loss of 1.1 – 3.8%. A multifaceted strategy has been developed by WHO (2015) with five objectives including a reduction of the incidence of infection; promotion of judicious use of antimicrobials; perception improvement and understanding of AMR; knowledge strengthening through research and surveillance; and the investigation of sustainable development for new medicines, vaccines, and diagnostic tools. In 2011, the European Union (EU) developed an action-plan framework advocating the control, emergence, and spread of AMR. The United States of America, the United Kingdom, Canada, and the EU, have well-coordinated AMR strategic action plans (Kasimanickam et al. 2021). Some of the developing countries seem to lack AMR national action plans, infrastructure, and have a poor understanding of antimicrobial use, improper regulation and compliance (Pokharel et al. 2019). In 2017, in India, the National Action Plan for AMR was conceived with a focus on surveillance, awareness increase, prevention and infection control, research, antimicrobial use, investing in collaborative work across health care and livestock sectors.

### EXTENSION INVOLVEMENT ON AMR ISSUES IN THE DAIRY SECTOR

Antimicrobial use in the dairy sector and herd-health management involves mainly stakeholders and veterinarians. AMR control has gained momentum in India and it is an emerging field. This opens exciting opportunities for extension personnel and researchers to make significant contributions towards AMR containment at the national level.

Dairy farmers' attitude, knowledge level, risk perception, and expectations from antimicrobial use, are important issues to consider in

extension research. Devising AMR stewardship programs and action plans ought to actively involve primary stakeholders, effective communication, and information exchange. Many external variables associated with farming (e.g., housing conditions, animal sanitation) and personal variables (e.g., farmers' age, education) are involved in antimicrobial use decisions (Willock et al. 1999). Additionally, antimicrobial price, withdrawal period, antimicrobial education level, and farmers' socio-economic status, are other factors highlighted by Gibbons et al. (2012) and Patnaik et al. (2020).



### Vaccination of livestock by Mobile Veterinary Unit, State Livestock Department of Odisha

Antimicrobial use practices in both humans and livestock sector have shifted the attention to reducing and optimizing antimicrobial use in dairy farms (EFSA and ECDC 2013). Developing interventions for the judicious use of antimicrobials require surveying the internal and antecedent variables and considering farmers' and veterinarians' perspectives on antimicrobial use and prescription practices.

### THE WAY FORWARD

Based on our experience, we recommend the following herd-health practices (non-exhaustive list):

1. Recording dairy antimicrobial use and residues present in milk through a monitoring and surveillance system;
2. Structured campaign and awareness drives on AMR issues for farmers, veterinarians, and the general public;
3. Development of dairy regulations and enforced capabilities for antimicrobial use;
4. Focused research on alternative treatments;
5. Sensitivity-testing centers at the village level to facilitate appropriate antimicrobial prescriptions by veterinarians;
6. Bio-security measures to be followed at dairies to prevent infection spread;
7. An identification system for antimicrobial-

treated animals that complies with the withdrawal period; and

8. Additional incentives given to farmers with residue-free milk.

### CONCLUSIONS

Producing good quality milk without antimicrobial residues should be a priority for the dairy sector. The high incidence of antimicrobials in milk and ever-increasing reports on MRLs above recommended levels, points towards widespread use and misuse of antimicrobials in dairy animals. Inflating the problem is the lack of a consistent regulatory framework for antimicrobial use. Although many organizations and researchers advocate the ban of antimicrobials in livestock, this proposition is unlikely to succeed given the economic factors needed to maintain a large livestock population in India, and the heavy dependence of rural owners on livestock for their livelihood. Instead, farmers ought to be informed on proper antimicrobial handling and on the importance of the withdrawal period. Along with good communication, monitoring and surveillance of veterinary drug use, increased understanding of antimicrobial resistance, and intra- and inter-agency collaboration, will facilitate appropriate planning, program development, and policy making.

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# 14

## UPLIFTING THE PIGGERY SECTOR IN INDIA: ROLE OF EAS

In this blog **Misha Madhavan M, N H Mohan** and **V. K. Gupta** argue that, for uplifting the piggery sector in India, we need to overcome certain challenges and strengthen our Extension and Advisory Services. They also highlight the role and performance of different actors in the pork value chain.

Pig rearing is an important means of livelihood for the tribal population in the North-Eastern Region of India and is associated with socio-cultural fabric of the region. Pig farming has been identified as one the key areas for poverty reduction and agri-business venture. Increasing demand, short generation interval, high feed conversion efficiency, and large litter size, makes pig farming an attractive option for investment and profitability. Unlike other livestock sectors, the pig sector is neither well-developed nor suitably organized in India. The major share of pigs is held by smallholders in India. Several households in North Eastern India rear one to two pigs under the backyard farming system for earning their livelihood and source of dietary protein (Mahak et al. 2020). To bridge demand-supply gap, for pigs and pork, which is almost 50%, the commercial pig farms are on steady increase in the North-Eastern Region of India.

### MAJOR CHALLENGES IN THE PIGGERY SECTOR

Pig farming in the country also faces some major challenges, which are to be tackled in an appropriate way for overall development of the sub-sector. Specific challenges can be listed under different heads, such as challenges specific to backyard piggery, challenges specific to commercial farms, challenges related to value chains, and challenges specific to lack of scientific knowledge. The generic and specific challenges in piggery value chain are listed in Figure 1. Non-availability of superior germplasm in farmer's field is one of the major bottlenecks that limit pig production. Traditionally, farmers are rearing indigenous or nondescript pigs with relatively lower growth rate and productivity as compared to exotic or crossbred germplasm. Few animals are maintained besides the sheds made of locally available materials and fed with kitchen, vegetable waste, tubers such as colocasia and rice beer waste (jugli) in a low input system. Most the farmers procure piglets and grew for a period until achievement of marketable age and sell in local market or to butchers.

## Current Status of the Piggery Sector in India

The total pig population of India is 9.06 million as per the 20th Livestock Census, 2019, of which nearly 90% is from rural areas and about 10% from urban areas. The total pig population has decreased by 12% over the previous livestock census (2012). Pigs contribute 1.7% of total livestock in India. Out of the total pig population, 79% is indigenous/nondescript animals, and 21% is exotic/cross-bred animals. With regard to pig production in India, Assam is the highest pig producer with 2.10 million pigs followed by Jharkhand (1.28 million), Meghalaya (0.71million) and West Bengal (0.54million). The remaining major contributors are Chhattisgarh, Uttar Pradesh, Nagaland, Bihar, Karnataka and Mizoram. About 47% of the pig population in the country is concentrated in the rural areas of North-Eastern States India exported 894.04 MT of pig products worth Rs. 18.06 crores during the year 2020-21 (APEDA 2021).The annual meat production in India is 8.6 MT in 2019-20. Pigs contribute nearly 5% to the total meat production in India. Pork production has shown a positive growth at 5.98% during 2019-20. It is reported that value addition of meat is limited and less than 2% of total meat is only processed into products for trade in India as compared to more than 60% in developed countries (Thomas et al. 2021).

the field conditions. The linkage between production units also needs to be strengthened to promote exchange of germplasm to reduce inbreeding.

It has been observed that the difficulties of maintain boars and limited resources for maintaining several animals, restricts development of breeder farmers. Here, the artificial insemination (AI) technology can contribute to the production of a large number of quality germplasm in a low cost and effective manner, without actually maintaining a boar. Most of the states have a pig breeding policy to promote appropriate breeds suitable for the agro-climatic conditions.

Feed alone costs for 60-70% of pig rearing costs, and hence, high cost of quality feed is another major concern of pig producers. In commercial piggeries where farmers use concentrated feeds for obtaining early market weight for finisher pigs, the cost of feed plays an important role in determining market price of the animals.



Feeding of grower Large White Yorkshire pigs

Therefore, reduced number of breeder farmers limits production of superior germplasm in

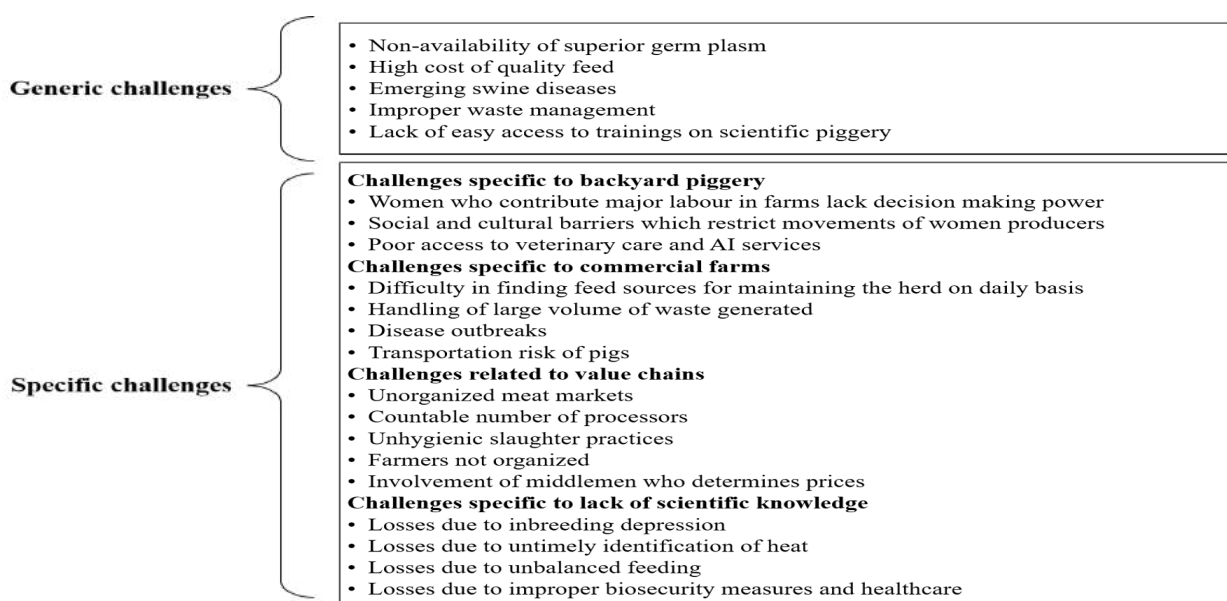


Figure 1: Generic and specific challenges in the piggery sector

In recent years, emergence of various pig diseases pose a major threat for pig farming as they are capable of wiping out the entire herd causing severe financial losses. The incidences of African Swine Fever (ASF), Porcine Reproductive and Respiratory Syndrome (PRRS) and re-emergence of Classical Swine Fever (CSF) are some of the major viral diseases of pigs. Lack of vaccines for ASF, PRRS and inadequate veterinary services are major concern. Pig-borne zoonosis is another important challenge which demands special attention from farmers. EAS can play a major role in creating awareness need for adopting proper biosecurity measures in the farm, especially for those diseases for which no vaccines are available.

As pig farms are often blamed for spreading bad odour in the environment, proper cleaning and management of waste is of utmost concern. Integration with fish farming, vermicomposting, biogas production, are some of the solutions for proper waste management in pig farms.

In recent years, the global warming and impending climate change is also posing threats to pig farming. Increase in ambient temperature leading to reduction in feed intake, growth rate, reproductive failure and increased susceptibility to various diseases. The awareness on management of pigs during among the farmers in summer and winter also form the part of EAS programmes.

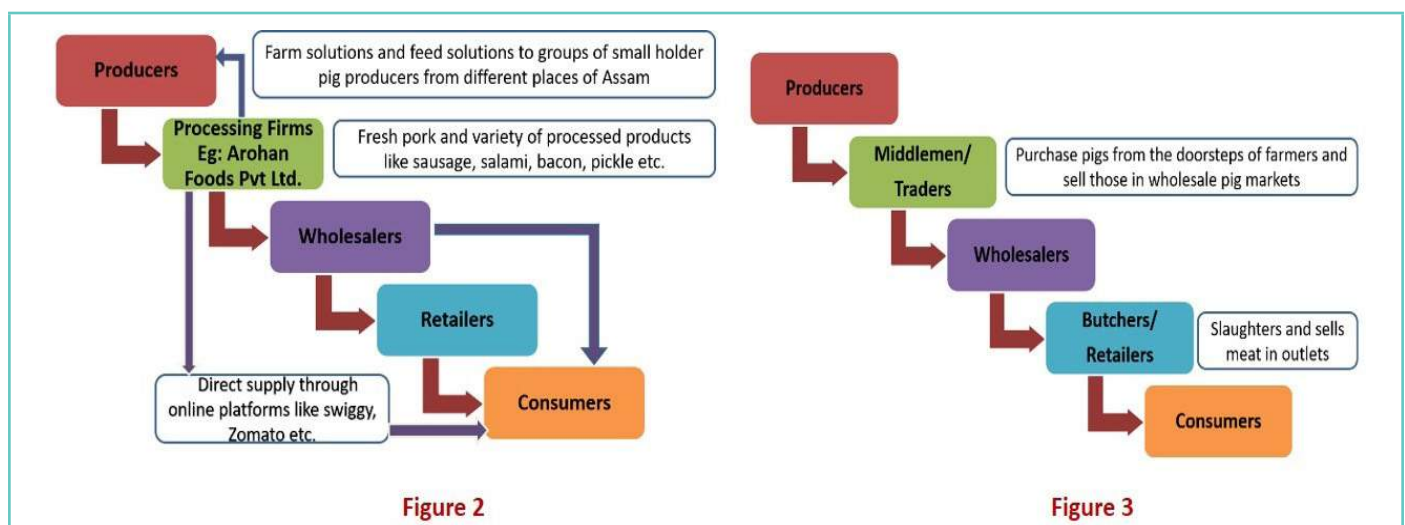


Figure 2

Figure 3

### Examples of pork value chains in Assam

In Figure 2, a value chain in which the processing firm plays a major role. The processor has developed a model of extension by reaching the smallholders and development of contract farmers. The ICAR-National Research Centre on Pig, Guwahati, has provided initial support by providing trainings to the start-ups, who subsequently established forward and backward linkages in the piggery sector. Presently, they provide support and services to clusters of smallholder farmers who rear pigs and ensure a sustainable income from piggery and expanded their network through increasing the capital. Similarly, several such startups were initiated, indicating further scope for entry and expansion of entrepreneurs in this sector.

In Figure 3, another value chain – without the involvement of processors – can be observed in Assam. In this, the middleman collects finisher pigs from the doorsteps of smallholders and sells those pigs in wholesale markets. Later butchers/retailers buy these animals, slaughter and sell the fresh meat to the consumers in their pork outlets.

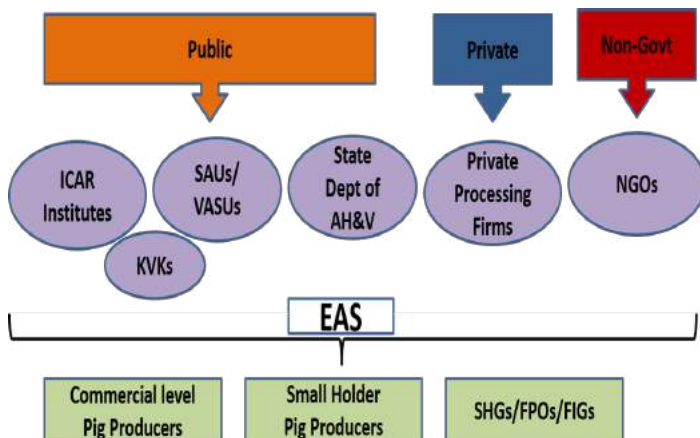
### ROLE OF EXTENSION AND ADVISORY SERVICES (EAS) IN THE PIGGERY SECTOR

Currently, the role of EAS in piggery is played by public, private and Non-Governmental Organizations with limited convergence at the ground level (Figure 4). The State Animal

Husbandry and Veterinary Department, KVKs, State and Central Agricultural Universities, ICAR institutes and NGOs are some of the major stakeholders for extension services. The diversity of animals to be handled and wider range of job requirements apparently leads to generalized EAS activities rather than those specific to pig



producers. On an average, farmers are 3.2 kilometres away from veterinary services of public and private institutions in Assam (Deka et. al. 2019). Value chain-based extension in piggery still has a long way to go.



**Figure 4: Different actors who play the role of EAS in piggery sector**

The National Livestock Mission (NLM), implemented by Department of Animal Husbandry and Dairying, Government of India, with the objective of sustainable development of livestock sector in the country covers a sub-mission on Pig Development in North-Eastern Region (NER). Under this scheme different components such as Entrepreneurship Development and Employment Generation (EDEG), modernization of breeding infrastructure, risk management and insurance, and establishment of rural slaughter houses provide a boost to the piggery sector by ensuring credit support.

ICAR research institutes, including ICAR-NRC on Pig, Guwahati; ICAR-Research Complex for NEH Region, Umiam, Meghalaya, ICAR-IVRI, Bareilly are conducting a large number of capacity development programmes including trainings, agri-business incubation support, and demonstrations for supporting pig producers and processors. Scientific pig farming is also supported by providing free trainings, quality germplasm, Artificial Insemination (AI) services, along with inputs like feed, medicines, vaccines etc., under Tribal Sub Plan (TSP) and Scheduled Caste Sub Plan (SCSP) schemes.

The private pork processing companies also provide EAS for ensuring the continuous supply of good quality pigs reared in smallholder systems. This ensures that the farmers get

enough technical and financial support for rearing pigs and purchase pigs regularly from them without compromising on the quality of the animal, hence the meat produced. The Non-Governmental Organizations (NGOs), also assist farmers and farmer groups to create backward and forward linkages. Under the World Bank-funded 'Assam Agribusiness and Rural Transformation Project (APART)' the main objective is of adding value and improving resilience of selected agriculture value chains, focusing on smallholder farmers and agro-entrepreneurs in targeted districts of the State of Assam. Under the project, the piggery sector is getting targeted EAS from different service providers together with better convergence in Assam.



**waste by scientists of ICAR-NRC on Pig**

## THE WAY FORWARD

The piggery sub-sector in India demands more focused EAS for its expansion and profitability. Being a sector with immense scope for profit generation, the expectation from the farmers and entrepreneurs are ever increasing. Through focused EAS, we can strengthen and expand the existing value chains in piggery sector. Some suggestions from the field experience in North Eastern India are given below:

- The convergence and strengthening of EAS activities by different agencies should be done. Under different schemes, capacity development programmes are being organized in randomly selected villages, that can lead to overlap of inputs distributed. Similarly, the programs with monitoring and follow-up can result in large outcomes



**Piggery Farmer Field School organized by ICAR-NRC on Pig at Kamrup District, Assam**

- In North Eastern India, tribal women play a major role in the backyard pig rearing system. Therefore, gender specific sensitization programs will be required for their empowerment, in which female extension professionals have an important role to play. One of the suggestions would be to include female resource persons with proficiency in local language to encourage them to come forward for initiating and continuing piggery-based entrepreneurship.

- In recent years, group-based EAS has received tremendous acceptance in agriculture and livestock sector. Establishment of Farmer Producer Organizations for improving the bargaining power of smallholders can strengthen piggery value chain. In the piggery sector there is requirement for development and nurture of more FPOs for ensuring sustainability.

- The role of EAS in piggery can be more effectively performed by extension professionals with education in animal science. The limited number of such qualified persons in the pig-dominated areas, demands others from different academic backgrounds, including basic sciences, to perform this task and may create some gaps in transfer of knowledge and skills.

- The value chain-based extension approach should be practiced instead of adopting the traditional way of EAS focusing only on production for overall development of piggery sub-sector.

- Group-based learning approaches such as Farmer Field Schools (FFS), adopted by many South Asian countries since long in the crop sector, can be implemented for encouraging more participation and learning by women farmers and smallholders. The guidelines provided by FAO in organizing FFSs for small scale livestock producers elaborates on the flexible approach of group-based learning through FFS (FAO 2018).



**Awareness camp organized at Baksa District, Assam by ICAR-NRC on Pig**

## END NOTE

With population growing, increased per capita income, urbanization and changes in lifestyle and food habits, the demand for meat and meat products are also rising in India. Therefore, the food supply chain has to be strengthened, including pork value chain, to cope with this scenario. To ensure sustainability of production, the piggery sector needs further attention from both policymakers and field practitioners. By empowering pig producers and other actors in the pig or pork value chain, we can uplift the piggery sector of India for livelihood and nutritional security.

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# 15

## MARKETING OF LIVESTOCK PRODUCTS – DOES QUALITY AND HEALTH OF CONSUMERS REALLY MATTER?

The Government of India stipulated several standards, regulations and guidelines to produce and market livestock products. But, compliance to standards is neither enforced nor monitored in a desirable manner. All stakeholders are to be blamed for the production, processing and marketing of poor quality livestock products, argue **SVN Rao and PVK Sasidhar**.

There is a phenomenal increase in the demand for foods of animal origin over the years, mainly due to population growth, urbanization, enhanced per capita income and shift in consumers' preference to these high energy products. Concomitantly, the production of livestock products such as milk, meat and eggs has also gone up. With increase in demand and supply, the quality of these food products is being compromised leading to public health concerns. An estimated 600 million people in the world fall ill after consuming contaminated food, and 420,000 die every year. Outbreaks of Salmonellosis were mainly due to consumption of infected eggs and poultry meat, food poisoning with *Campylobacter* species was due to the consumption of raw milk or uncooked poultry meat, and *Escherichia coli* infections were due to the consumption of unpasteurised milk and undercooked meat (WHO 2022).

The Government of India (GOI) has created the Animal Husbandry Infrastructure Development Fund of Rs. 15000 crore under the AtmaNirbhar Bharat Abhiyan stimulus package in 2021 to establish i) the dairy processing and value addition infrastructure; ii) meat processing and value addition infrastructure; and iii) animal feed plants. The GOI also stipulated several standards, regulations and guidelines to protect both farmers and consumers. But, compliance to standards is not enforced or monitored in a desirable manner in the field of agriculture, which is a serious concern (Prasad et al. 2021).

The major issues in the production, processing and marketing of poor quality foods of animal origin (milk and milk products, and meat and meat products) are discussed in this blog.

### MILK AND MILK PRODUCTS

Most of the dairy farmers are smallholders who rear a few heads of cattle and produce 5 to 10 litres of milk/day. They do not follow the basic practices of clean milk production resulting in poor quality of milk.

The initial bacterial load is high and there are no quick tests to test it. The marketing agencies in the organised sector (milk cooperatives, private dairies) make payment to the producers on the basis of 'Fat' and 'SNF' but not on the bacterial load. This is one of the main reasons for supply of poor quality milk to consumers. When the initial quality of milk is low it is not possible to improve it. As the saying goes 'you can never get good quality cheese from poor quality milk'.

The unorganised sector – comprising of vendors and contractors – supplies about 60 per cent of the liquid milk to the consumers in India. The reasons being, vendors collect the milk from the doorsteps of the producers and provide services such as advancing loans for the purchase of cattle, feed, or even for family functions. Some vendors (milker-vendors) even milk the cows and collect the (unadulterated) milk from the producers. These vendors usually supply poor quality or sub-standard or adulterated milk to the consumers. The consumers also purchase milk from the vendors because of door delivery, payment at the end of the month, and they do not put much thought on the quality of the milk they purchase.

Even at the processing stage also some of the dairies neglect the Standard Operating Procedures (SOPs) in processing, packing and storage, resulting in supply of poor quality milk products to consumers. Here are some

examples which illustrate how the consumers are taken for a ride and risk their lives.

### 1. Violating FSSAI Regulations

The FSSAI survey reported that 41 per cent of the milk samples were of poor quality, and 7 per cent samples were unfit for human consumption. There were several instances wherein the quality of the dairy products, especially Ghee, Milk powder, Paneer, Milk sweets, etc., was compromised. These milk products are being prepared by many – ranging from small scale processors to large scale multinational companies. The small scale processors usually violate all the FSSAI regulations because they handle small quantities of substandard milk, unhygienic practices including unhygienic premises. Even the multinational companies have been found violating food safety norms and regulations (Box 1).

### 2. Adulteration of Milk Products

There are several ways of adulterating high value milk products such as Ghee, Butter, Cheese, etc. For example, palm oil is used in the preparation of ghee as the former is much cheaper than ghee (Box 2). Similarly, some unscrupulous elements supply their substandard milk products in well-established branded packaging materials to hoodwink consumers (Box 3).



Milking of cows in unhygienic premises ©Dr.M.Rajalakshmi, River, Puducherry

### Box 1: Are Trusted Brands Failing FSSAI Regulations on Food Safety?

The Food Safety and Drug Administration (FSDA) in Agra found detergent in milk samples of Mother Dairy. While FSDA officials say that they have started the process of cancelling Mother Dairy's license for its Shahpur plant at Bah tehsil for using detergent in milk, the company denies the charges. Mother Dairy will also be charged a fine of Rs. 5 lakh for producing substandard quality of milk at its Gajauraha plant. While the products were first tested at the Meerut laboratory, Mother Dairy was not convinced of the results and sent them to Central Food Laboratory in Kolkata. Like the Meerut lab, here too one sample tested positive for detergent and another showed 50% deficiency of SNF (solid, not fat) powder in milk which makes it a substandard product. In its clarification, Mother Dairy has said that the milk undergoes four levels of thorough testing at input, processing, dispatches and even at market level as determined by FSSAI regulations. They further stated that every tanker of milk that reaches their plants has to pass 23 stringent quality tests. Only after getting clearance for contamination, whether water, urea, oil or detergent, is the milk accepted for processing.

Live beetles were discovered by a mother in a packet of 'Cerelac' (Nestle) that was bought from a local pharmacy in Perur (Tamil Nadu). The father has filed a complaint with the Food and Safety department who have sent the sample for testing. Once the report is obtained the official complaint will be filed. Nestle has not yet replied to the email sent by the Food Safety Department. In another case, a young IT employee was shocked to find that the 'Cerelac' he had bought for his one-year-old son contained red worms in the wheat and milk powder. In this instance too the product has been sent to the government food laboratory for testing. The officials are of the opinion that the worms may have multiplied after packaging and they look like weevils that infect wheat. These worms have a way of penetrating wheat and laying eggs which get hatched once the wheat is crushed. Live larvae were also found in a packet of Nestle NanPro 3 milk powder last week.

Source: <https://foodsafetyhelpline.com/are-trusted-brands-failing-fssai-regulations-on-food-safety/>

### Box 2: Palm Oil being used as an Adulterant in Desi Ghee

Palm oil was being used as an adulterant in the manufacture of desi ghee, revealed a report by the state Food Testing Laboratory, Kharar. Notably, Patiala police had seized 250 kg of spurious desi ghee. Now, on the basis of the report, the District Food Safety Officer (FSO) will file a case in the court of Additional Deputy Commissioner (ADC) against the owner.

The District Health officer (DHO) Satinder Singh said the report had already revealed that palm oil was used as an adulterant in desi ghee which was a clear violation of the Food Safety Act. He said, "Usually palm oil is used in desi ghee to fulfil the required fat content because it is cheaper. However, the use of any adulterant to increase fat is not permissible." Significantly, health officials informed that desi ghee prepared by MS Traders, at Cheeka town in Haryana — to whom the samples belonged — was being sold under the name of prominent brands, including Milkfood, Nutkhat and Amul Desi Ghee.

Source: <https://www.tribuneindia.com/news/archive/punjab/palm-oil-used-to-manufacture-desi-ghee-reveals-report-837019>

### Box 3: Selling Sub-standard Milk and Milk Products in Branded Packaging Material

In a big relief to the country's biggest dairy brand 'Amul' (Gujarat Co-operative Milk Marketing Federation or GCMMF) who had filed a suit against one of the exporters, namely Capital Ventures Pvt. Ltd, seeking restraining orders for illegal and unauthorized export of Amul's milk and milk products, the Delhi High Court directed the Customs Authorities to mandatorily seek the requisite certificates/approvals issued by Export Inspection Council prior to such consignments being permitted from all the exporters of milk and milk products. Capital Ventures Pvt. Ltd conceded that it did not have the statutory approvals and gave an undertaking to the effect that it shall not export 'AMUL' milk and milk products without obtaining the necessary approvals and certificates. The Delhi High Court has passed specific directions to the Customs Authorities to mandatorily seek from exporters of milk and milk products all requisite certificates/approvals before allowing the consignment for export as per Export of Milk Products (Quality Control, Inspection & Monitoring) Rules, 2000.

This order comes as a major relief for Amul as there had been a huge illegal and parallel export of 'Amul' products, which products were meant for sale within the territory of India only. These products were exported without any authorization, approvals or certificates. Amul further states that it is in receipt of names of many such export houses which have been illegally exporting its products. The organisation, in order to completely uproot such illegal and parallel exports, is determined to take necessary action against such exporters under the Customs Act which would include prosecution against such exporters under suitable provisions that would invite imprisonment of up to three years.

Source: <https://www.nuffoodsspectrum.in/news/49/7127/gcmmf-aims-to-uproot-illegal-and-parallel-export-of-amul-products.html>

Some unscrupulous people started selling their sub-standard milk and milk products packed in branded sachets, tins and bottles posing a serious threat to the dairy industry. Hyderabad (Patancheru) police conducted searches on a milk factory at Pashamailaram Industrial Estate on city outskirts and seized adulterated dairy products, particularly curd, cheese and paneer. Police found several used buckets of top brands from the premises. Around 50 top brand buckets filled with curd made in the factory were found. They are supplying curd to hotels mostly in the old city. Every day, they are supplying 1000 to 5000 kg of curd. The factory manager was taken into custody and a case of cheating was registered.

Source: <https://timesofindia.indiatimes.com/city/hyderabad/milk-unit-raided-adulterated-products-of-top-brands-seized/articleshow/89126562.cms>



Milk vendor collecting milk from doorsteps of the farmer © Dr.M.Rajalakshmi, River, Puducherry

### 3. Supply of Synthetic Milk

Even worse is synthetic milk being manufactured by mixing glucose, urea, refined oil, milk powder and water. Other chemicals,

including hydrogen peroxide, are also used. Some of the by-products manufactured are synthetic cheese and mawa (Box 4).

#### Box 4: Two Brothers turned into millionaires in seven years, Sold Synthetic Milk in Delhi, UP

Seven years ago, two brothers from a village in Madhya Pradesh's Morena district could be seen supplying milk on a motorcycle to a nearby dairy. Today, they are said to be owners of a Rs 2 crore milk chilling plant, milk tankers, three bungalows, SUVs and agricultural land, according to police. It's not a magic wand that has changed the fortunes of Devendra Gurjar (42) and Jaiveer Gurjar (40), who live in the village of Dhakpura of Morena district, some 465 km from Bhopal. Rather, it is their illegal business of manufacturing synthetic milk and its by-products that are slow poison for consumers, an investigation of Madhya Pradesh police's special task force (STF) has revealed. Along with Devendra Gurjar, a few other dairy owners in Chambal whose names appear in an FIR became rich in just five-seven years by allegedly selling synthetic milk not only in Madhya Pradesh but also to renowned companies in Haryana, Delhi, Uttar Pradesh and Rajasthan, the investigation has shown.

Source: <https://www.hindustantimes.com/india-news/how-synthetic-milk-powered-the-meteoric-rise-of-chambal-traders/story-baBu9ldQfrz2H6SFCHyzCK.html>



Synthetic milk (Source: The Hans India, 5 July 2016)Puducherry

### 4. Antibiotic Residues in Milk and Milk Products

Antibiotics are commonly used in veterinary practice to treat various ailments, especially mastitis, and as a result milk of some animals may contain residues of antibiotics. When humans consume milk and milk products which contain antibiotic residues, and then when they fall sick they may not respond to some antibiotics as the disease causing organisms

might have developed resistance, i.e., Anti-Microbial Resistance (AMR).

A study published in the Indian Journal of Medical Research in 2019 indicates that with 700,000 people losing their lives due to AMR every year year and with 10 million people projected to die from it by 2050, AMR will claim rising disproportionately in India over the last few decades, and a multi-pronged approach



is required to minimise its devastating effects (Myupchar 2020).

AMR is caused mainly due to indiscriminate use of antibiotics by farmers and veterinary professionals. "Farmers often sell milk while the animal is under treatment, which increases the chances of antibiotic residues (passing on to consumers). While milk sold directly to consumers is not tested, contrary to what one would expect, processed milk sold in packets is also largely unchecked for antibiotic residues," says Amit Khurana, Programme Director, Food Safety and Toxins Programme, Centre for Science and Environment (CSE). The necessity to bring about awareness among the livestock extension personnel on the impact of AMR on livestock and human health was very well discussed by Ramesh et al. (2019).

AMR is considered to be a serious threat to public health. A recent study (Toth et al. 2020) revealed the presence of AMR genes in raw milk for human consumption. They analysed raw milk samples from public markets sold for human consumption. The samples contained complete ARGs influencing the effectiveness of Acridine dye, Cephalosporin, Cephamycin, Fluoroquinolone, Penam, Peptide antibiotics and Tetracycline. One of the ARGs, PC1 beta-lactamase, may also be a mobile element that facilitates the transfer of resistance genes to

other bacteria, e.g., to the ones living in the human gut.

In June 2017, ICMR organized a meeting with all the relevant stakeholders to discuss the possibility of reserving a few classes of drugs for human use and mitigating the impact of AMR (Box 5).

The CSE's assessment shows that dairy farmers indiscriminately use antibiotics for diseases such as mastitis (infection/inflammation of the udder), a common ailment in dairy animals. Often these include critically important antibiotics (CIAs) for the growing crisis of antibiotic resistance. Biswas et al. (2019) reviewed the research on AMR and made the following recommendations to conserve the effectiveness of antimicrobials in humans and animals:

1. Educate farmers, veterinarians and consumers on the dangers of AMR;
2. Phase out the sub-therapeutic use of antibiotics;
3. Nationwide surveillance and monitoring system to track veterinary antibiotic use, resistance and residues;
4. Develop new antibiotics and diagnostic tests to keep up with resistant bacteria as well as new diagnostic tests to track antibiotic resistance.

#### Box 5: Recommendations of the ICMR (2017) on Mitigating the Impact of AMR

1. Critically important or 'last line' antibiotics for humans (WHO 2017) Viz polymyxins, Glycopeptides, Fluoroquinolones and fourth- and fifth-generation Cephalosporin should not be used for treatment in food-producing animals.
2. Penicillin, Tetracyclines, Cephalosporins, Quinolones, Sulphonamides, and Aminoglycosides should be exclusively used for the treatment of animals. Glycopeptides and Carbapenems are to be used in pets.
3. Diagnostic methods for the detection of AMR in animals to be standardized and uniformity should be maintained throughout all veterinary laboratories.
4. Research should be carried out to study the spread of AMR between animals, humans and fisheries. Action points were suggested for urgent implementation of antibiotics used in food animals with the help of DAHDF, ICAR, and Drug Controller General of India.

#### 5. Illegal Use of Oxytocin and Other Hormones

When dairy animals are unable to give milk due to calf's death or separation from calf, oxytocin injection of up to 5 IUs is given twice a day to stimulate milk let-down, especially in buffaloes.

Injecting growth hormones to hasten growth and oxytocin hormone to relax udder muscles for milk let-down are painful and stressful to dairy animals. As per the PCA Act, 1960, Oxytocin, a hormone is not supposed to be used other than for treatment of animals and

it should not be sold by pharmacists without a proper prescription by a qualified veterinarian. Furthermore it is an offence as per Section 12 of Criminal Procedure Code, 1973, as well (Box 6). However, oxytocin injections are freely available and dairy farmers, especially those maintaining buffaloes, usually stock them.

It was reported that the consumption of milk and milk products containing oxytocin may lead to early onset of puberty among girls,

development of breast in male, and deficiency of testosterone production due to hormonal imbalance. It may also lead to abortions if the milk containing oxytocin is consumed by pregnant women. Taking serious note of this misuse of oxytocin, the Government of India banned its use for purposes other than treatment of certain ailments (Box 6). Despite this ban, over the counter sale of oxytocin and its use for milk let-down by dairy farmers continues.

### Box 6: Ban on Import and Over-the-counter Sale of Oxytocin

The Government of India banned the import and over-the-counter sale of the feel-good hormone oxytocin that is used by child traffickers to speed up puberty in girls who are then pushed into prostitution. The hormone is widely used in dairy farms leading to harmful effects on humans and livestock. The government also restricted its manufacture to the public sector to check its growing misuse. The hormone is permitted for use mainly to speed up labour in pregnant women so as to avoid risks or complications. However, the hormone, in its various forms, is increasingly being used illicitly, and manufactured clandestinely without proper license. The health ministry issued an order to regulate and restrict its manufacture, sale and distribution after going through recommendations made by the Drugs Technical Advisory Board, a statutory body under the Drugs and Cosmetics Act, 1940.

Source: Hindustan Times, New Delhi April 28, 2018.

## MEAT AND MEAT PRODUCTS

Meat is mostly obtained from sheep and goats, poultry, pigs, cattle and buffaloes. Most of the animals are slaughtered in unauthorised slaughter houses violating all the existing laws and regulations. A conservative estimate indicates that there are only 3600 legal slaughter houses, but there are more than 32,000 illegal slaughter houses in the country (Kang 2003). As on 17 February 2022, there are 65 integrated abattoirs-cum-meat processing plants, which include Al Kaif Industries, Al Aqsa Frozen Food Export, Allana Cold Storage Pvt. Ltd and seven stand-alone slaughter houses in India registered under APEDA. Most of these were registered for slaughter of buffaloes and processing of buffalo meat and are located in Uttar Pradesh. (Source: <https://apeda.gov.in/apedawebsite/Announcements/PLANTS-1-APPROVED-INDIAN-ABATTOIRS.pdf>).

Slaughtering is performed in open and dirty premises in public and that too without stunning (humane slaughter), using unhygienic water, and unclean vessels etc., for supplying unhygienic and poor quality meat to consumers. One can notice roadside slaughter houses in almost all parts of the country. These slaughter houses dispose of the waste in the

nearby drains, produce a lot of stink that is unbearable to the residents in the locality. They pollute water, land and air. It is a pity that this unscrupulous practice is going on since decades and the concerned municipalities and corporations are turning a blind eye to these slaughter houses. Unfortunately, the consumers keep purchasing such poor quality meat for the sake of convenience as these meat shops are operating within their close vicinity, and anyway there are very few meat shops which sell quality meat. Although, the GOI has introduced a scheme to promote modernization of slaughter houses with huge subsidies, there are not many takers including the municipalities.



Road side slaughter house © Dr.M.Rajalakshmi, RIVER, Puducherry

The violation starts from the transport of animals for slaughter to sale of meat which is discussed briefly under the following heads:

### 1. Transport of Animals for Slaughter

The conditions for the transport of animals for slaughter are prescribed in OIE Terrestrial Animal Health Code 2019, The PCA (Slaughterhouse Rules) 2001 and amended in 2010, and Food Safety and Standards Regulations (FSSR), 2011. Almost all the conditions are laid down clearly in these rules and regulations for transport of animals but the regulatory authorities turn a blind eye on violation of these standards. One can notice the way cattle and buffaloes (overcrowded without any space to move) are transported in trucks from Andhra Pradesh, Telangana, Tamil Nadu and Karnataka to Kerala.

### 2. Meat Shops and Slaughterhouse Offences

Food Safety and Standards Act, 2006, has laid down certain conditions pertaining to slaughter houses and sale of meat. Some of the important provisions that are being violated are:

- a. Sale of meat or slaughter of animals without FSSAI License - attracts punishment of imprisonment up to six months and a fine up to Rs.5 lakhs;
- b. Misbranded meat (e.g., beef sold as mutton) and selling meat covered with flies, dust, and smoke, or anything else that is not supposed to be in the meat - Penalty may extend up to 1 lakh rupees;
- c. Meat prepared and sold in unhygienic conditions - Penalty may extend up to 1 lakh rupees.

Details of Slaughterhouse Rules, 2001 and FSSR 2011, can be obtained from the following websites:

- [http://awbi.in/awbi-pdf/\(SLAUGHTER%20HOUSE\)%20RULES,%202001.pdf](http://awbi.in/awbi-pdf/(SLAUGHTER%20HOUSE)%20RULES,%202001.pdf)
- <https://fssai.gov.in/>

The violation of rules or standards is very common in almost all the slaughter houses in the country, except for a few modernized slaughter houses in the private sector (Box 7).

## Box 7: Violation of Rules or Standards in Slaughterhouses

### The Sad Story of Idgah Slaughter House

Idgah, Delhi's principal slaughter house spread over seven acres in Sadar Bazar area of Delhi, is more than 100 years old and it is owned by the Delhi Municipal Corporation. About 8000 animals (instead of the permitted 2500 animals), which include sheep, goat and buffaloes are slaughtered every day. In addition to this, the only authorised slaughter house, there are more than 15,000 illegal slaughter houses in Delhi. The Idgah slaughter house alone generates about 60 to 70 tonnes of slaughter house waste every day. After a long legal battle, the Supreme Court ordered the shifting of the slaughter house from Sadar Bazar. The Idgah slaughter house, was then shifted to a newly constructed modernized slaughter house at Ghazipur (East Delhi) in 2009. Despite incurring an expenditure of Rs. 150 crore on modernization, all the FSSAI regulations are being violated in slaughtering of animals. The panel of experts reported that no ante mortem and post mortem inspection of animals were carried out according to FSSAI and Supreme Court directions. The odour emanating from the premises was obnoxious and overpowering.

### Aligarh's Slaughterhouse Woes

A DTE correspondent visited Aligarh to check its kattighar (slaughter house) and came back with a gory story. The Aligarh office of Uttar Pradesh Pollution Control Board ordered shutting down of the kattighar in November 2002. But the Nagar Nigam Aligarh (NNA) has not yet acted on the order. It has in fact contracted out the slaughter house located in Makdoomnagar to a private contractor, who has further sub-contracted it to three butchers and the NNA is not even aware of this! The municipal body on its part earns Rs 12 lakh per annum from the private contractor. The three butchers carry out the slaughtering, not in the kattighar premises, but in three private godowns, which have no arrangement for drinking water and are poorly ventilated. "The minimum we expect from NNA is to provide us with drinking water," says a butcher. One butcher slaughters about 70 buffaloes every day. At least 2,500 buffaloes are slaughtered in these godowns daily and the meat is supplied to various cities such as Aligarh, Khurja, Mathura and even to Delhi. As per the Uttar Pradesh Nagar Nigam Act, 1955, all animals to be slaughtered have to undergo a health check-up. But Aligarh kattighar follows no such rules. And NNA officials admit to this. Some of the waste, such as hides and wastes, are sold to private parties and the rest is dumped as landfill at Makdoomnagar.

**Source: In - Depth The meat you Eat** <https://www.downtoearth.org.in/indepth/the-meat-you-eat-13283>

It is clear that the meat coming out of these slaughter houses (both legal and illegal) is sold in the market without any quality check. One can also see that even meat unfit for human consumption is sold in the market. The methods prescribed for disposal of slaughter house waste and treatment of water are not being adopted, leading to pollution of air, water and land, leading to serious health hazards in the country.

### 3. Modernization of Abattoirs

Ministry of Food Processing Industries is implementing the Central Sector Scheme for Setting up/ Modernization of Abattoirs under which assistance in the form of grant-in-aid is provided for setting up of new and modernisation of existing abattoirs to local bodies (Municipal Corporations and

Panchayats), Public Sector Undertakings/ Co-Operatives/Boards under Government. However, strangely, no grant-in-aid has been released under this component till March 2016. Source: [https://www.business-standard.com/article/government-press-release/modernization-of-abattoirs-116031501191\\_1.html](https://www.business-standard.com/article/government-press-release/modernization-of-abattoirs-116031501191_1.html)

### 4. Privatisation of Slaughter Houses

There are a few slaughter houses in the private sector which are supposed to be better than those being operated in the country. These slaughter houses claim to be adopting the standards and SOPs to mitigate the stench coming out of slaughter houses and treatment of water and disposal of the waste (Box 8).

#### Box 8: Modern Private Slaughterhouses

**Al Kabeer Abattoir:** Al Kabeer, an NGO, operates the largest integrated meat processing complex in Asia, located in Zaheerabad (Telangana). It has been in operation since 1979. Every month Al Kabeer exports over 4500 tonnes of quality meat to several Gulf and South Asian countries. Even this sophisticated slaughter house is not free from allegations, which include over loading while transporting buffaloes to slaughter house, inhuman practices in slaughtering of animals and slaughtering more number of animals than permitted.

**Allana Abattoir:** M/s Fregaerio Conserva Allana Ltd first set up a modern slaughter house at Mourigram, Kolkata in 1999. It has a capacity to slaughter 1500 buffaloes per day. It has an Effluent Treatment Plant (ETP) to treat slaughter house waste water and has a rendering plant to process slaughter house waste. Later, this company set up slaughter houses at Ghaziabad, Agra, Chandigarh, Aurangabad, New Delhi, Mumbai, and Zaheerabad (Telangana). Some of these plants are not in a position to run ETPs for one or the other reasons and is leaving the untreated water to pollute the nearby rivers. The one at Zaheerabad appears to be an exception, which claims to be treating water and the treated water is being used for horticulture and pisciculture. Similarly, solid waste of about 60 tonnes is used to generate energy through biomethanation process and the same is being used for running refrigeration units. It is also selling animal hair, hides, horns, etc.

But, each of these plants being food processing plants require a huge quantity – that is 20 lakh litres – of fresh water per day. Till date there is no solution to reduce the use of precious water.

### 5. Poultry Meat/Pork/Fish

Poultry meat production in India has been increasing over the years and it has touched an all-time high of 4.1 million tonnes in 2021. Poultry meat comes from broilers, exclusively reared for meat, spent chicken (layers after completion of egg laying period), and local or desi birds (used for both meat and eggs). Broiler chicken usually reared for 6 weeks or less than that reach about 1.5 to 2 kilo body weight during this period. The meat obtained from broiler chicken is considered inferior in quality because they are fed with feed

additives and growth promoters. In addition they are reported to be hosts of bacteria such as salmonella, campylobacter and Escherichia species, responsible for causing food poisoning. Indians prefer desi chicken and desi eggs but their cost usually prohibit many from consuming broiler chicken. Spent chicken is considered as tasteless since the bird has spent its life all along in producing eggs and by that time it will be more than one year old. As most Indians prefer to consume fresh meat, the birds are usually slaughtered in unauthorised slaughter houses which are a source of

pollution. Fortunately, the organised poultry giants like Suguna, Venakateswara, etc., follow SOPs in slaughtering, dressing, packing, storing and selling in the organised markets such as malls, departmental stores, etc. Although the consumption of these packed products is increasing these days, its share is less than fresh chicken.

The slaughter of country pigs for pork is totally unorganised and the quality of such pork is very poor. There are now organised farms where mostly the white pigs or crossbreds are reared for production of white pork, which is in great demand. However, the practice of keeping the carcass in cold storage for about 12 hours is mostly not followed, rendering the quality of pork very poor. This is a serious concern, especially in the North East where the consumption of pork is more. Fish production, both inland and marine fisheries, has also registered an all-time high of 14.16 million tonnes in 2021. Fish consumption also poses serious threats to human health as it is contaminated with a variety of bacteria and virus. Increased use of antibiotics in aquaculture is also a great concern which is a potential source of AMR to humans. The emergence of aquaculture is also posing serious threat to the environment as it is polluting the water, air and land. In addition the fish coming out of aquaculture is considered harmful as the fish are fed with a variety of feed additives and food waste to increase the weight. The ponds, rivers, and seas are also being polluted with the release of pollutants into these water bodies. The fish coming out of these water bodies are not free from several pollutants (insecticides, pesticides, heavy metals, etc.) which cause various health problems in fish (Malik et al. 2020). These unhealthy fishes naturally pose serious health problems in fish consumers.

## 6. Storage of Meat and Meat Products

Meat and meat products are supposed to be stored in refrigerators or deep freezers. The star hotels and super markets need such facilities. But unfortunately, due to improper maintenance and lack of monitoring and supervision by the concerned officials, poor quality meat and meat products are sold to the consumers who are therefore at risk. The possible reasons for low food poisoning cases are summarised in Box 9.

### Box 9. Why are there not many food poisoning cases in India?

When the Indians are consuming such poor quality milk and meat why are there not many food poisoning cases in India? Probably it is because consumer preferences, such as buying fresh meat – that too in small quantities – inability to store the meat due to lack of refrigerators, and the practice of cooking meat in pressure cookers and boiling the milk (even if it is pasteurised) may be the reasons for fewer food poisoning cases than expected.

## 7. Advent of Modern Meat Shops

Realising the increase in demand for fresh meat products, companies like Fresh to home, Licious, Tender Cuts, Zappfresh, Fipola, etc., were established with a vision to provide quality meat to their consumers. These companies claim to be supplying hygienically processed quality meat and meat products and varieties of fish to consumers. They supply their products through various marketing channels, including home delivery through online modes.



Modern meat shops ©Dr.J. Tamizhkumaran, Dvara E-Dairy Solutions, Chennai

## THE WAY FORWARD

There is a lot of scope to improve production, processing, packing and storing of all the food products of livestock origin that will enable consumers to get quality food. Quantity or production of these products is not an issue, but the quality is. Losses due to food poisoning in terms of productivity and treatment costs are enormous. These costs could be reduced substantially if appropriate measures are taken

to ensure supply of quality products to consumers. Unfortunately, this sector does not get the attention that it deserves because of the indifferent nature of all the stakeholders, which include policy makers, producers, processors, feed manufacturers, various intermediaries, veterinarians as well as the consumers. It is high time these stakeholders work with the unified goal of producing and supplying quality food of animal origin to the consumers without compromising on animal welfare standards as well. The following suggestions could be of help:

1. The veterinary extension professionals have a greater role to play in educating the stakeholders on various quality aspects and steps to improve the quality of food products viz. dairy farmers on clean milk production, milk co-ops on proper quality testing, processing plants (milk plants, slaughter houses and meat processing plants, feed manufacturers, etc.) to follow SOPs and proper packing and storage of these perishable products.
2. Mandatory standards prescribed must be strictly enforced. There has to be proper monitoring and supervision of all the products – starting from production to the sale of these products – to check food adulteration. The people involved in unhealthy practices such as adulteration, misbranding, etc., must be dealt with severely.
3. Organise consumer awareness campaigns to enable the public to understand the importance of consuming quality products.
4. The respective local governments when not in a position to ban the illegal slaughter houses, especially in cities and towns, must look towards regularising at least the minimum standards like separate covered sheds for slaughter and sale, use of quality water, proper disposal of slaughter house waste instead of throwing it in the drains or gutters, and so forth. The butchers need to be trained in following standard procedures so as to improve the quality of meat.
5. The mandatory procedure of conducting ante-mortem and post-mortem examination by qualified veterinarians must be made both in letter and action.
6. Efforts must be made to increase the number of organised slaughter houses to produce quality meat and meat products that will properly meet consumer demand.
7. The establishment of modern meat shops must be promoted. The animal science institutions (ICAR institutes, Veterinary colleges, Dairy Science colleges, and Fishery Science colleges) must be encouraged to process and sell their farm produce through their respective sale counters.

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# 16

## DEALING WITH LUMPY SKIN DISEASE: LESSONS FOR THE FUTURE

The Lumpy Skin Disease (LSD) outbreaks of 2022 had devastating impact on animal health and livelihoods of livestock farmers across India. In this blog, **Devesh Thakur and Atul Gupta** look at the handling of LSD outbreaks across various states of India and the lessons that we need to learn so that this disease does not impact livestock-based livelihoods in future.

Lumpy Skin Disease (LSD) is an economically devastating disease categorised as a notifiable disease by the World Organisation for Animal Health. India has witnessed unprecedented economic loss due to LSD outbreaks this year. The first outbreak of LSD was reported from Odisha, in August 2019. Subsequently cases were reported from Madhya Pradesh, Kerala and Assam in 2020. However, not much was learnt and this year the country had to face large scale devastation from this disease. According to government estimates, over 2.4 million animals were infected and over 110,000 cattle died due to this disease in India (BBC, October 19 2022). In this blog, we discuss the possible factors associated with the spread of disease, the roles played by major stakeholders in the management of LSD across several affected states, and the actions that are necessary to address similar crises in the future.

### SPREAD OF LUMPY SKIN DISEASE IN INDIA

Lumpy Skin Disease (LSD) is caused by the lumpy skin disease virus (LSDV), a virus from the family Poxviridae, genus Capripoxvirus. Sheeppox virus and goat pox virus are the two other virus species in this genus. LSD is endemic in most African countries. Since 2012, it has spread rapidly through the Middle East, southeast Europe, and West and Central Asia. In Asia, the emergence of LSD was first reported from Bangladesh, in mid-2019 (Hasib et al. 2021). Then it spread to India, Bhutan, Nepal, Hong Kong, Vietnam, Myanmar, and Thailand (Shah and Khan 2022).

In August 2019, the first outbreak of LSD was reported from Odisha, India (Gupta et al. 2020). Subsequently cases were reported from Madhya Pradesh, Kerala and Assam in 2020 (Pandey et al. 2022 and Shagun et al. 2021). This May, Kaiyari village in Lakhpat Taluka of Kutch region of Gujarat reported the initial outbreak (USDA 2022; report dated August 9 2022). Then it spread to Rajasthan and further up to the northern



states of Punjab, Haryana, and Himachal Pradesh (USDA 2022 report of August 12 2022). Then it spread like wildfire across 251 districts in 15 states and affected over two million animals. Gujarat, Rajasthan, Punjab, Uttarakhand, Himachal Pradesh, Madhya Pradesh, Jammu & Kashmir, Uttar Pradesh, Haryana, Maharashtra, Goa, West Bengal, Andhra Pradesh, Delhi,

and Bihar have been affected. According to government estimates over 2.4 million animals were infected and over 110,000 died due to this disease in India (BBC, October 19 2022). Thus, India has suffered unprecedented economic loss (Box 1) due to Lumpy Skin Disease outbreaks this year.

### Box 1: Economic loss from this deadly epidemic

LSD, due to its economic impact, has been categorised as notifiable disease by the World Organisation for Animal Health (OIE - Terrestrial Animal Health Code – Lumpy Skin Disease, 2022). Economic losses happen largely due to milk losses, mortality and control costs. Furthermore loss in body mass, abortions, delay in next conception, draft power loss, damage to hides, and temporary or permanent sterility in bulls and cows are other economic losses. The country also loses due to domestic and international trade restrictions on live animals (Molla et al. 2017). In the current outbreak more than one lakh cattle have died which easily puts a direct loss of INR 300 crores, assuming INR 30,000 as value of one animal. However, maximum deaths have happened among pregnant cattle so the opportunity cost from calves besides cattle needs to be included as well. Also the affected animal suffered production losses. These losses may range from 26-42 percent in indigenous cattle and 50 percent in exotic cattle (Shagun 2022).

Milk production dropped significantly in some states (Milk collection by Rajasthan Co-operative Dairy Federation was reduced by 3-4 lakh litre per day in September when compared to June this year (Press Trust of India: Milk collection in Rajasthan reduced by 3 to 4 lakh litre per day due to lumpy skin disease [ptinews.com]).



LSD Vaccination at Uttarakhand

### CONTAINING 2022 LSD OUTBREAK IN INDIA: ROLE OF DIFFERENT STAKEHOLDERS

State animal husbandry departments of various state governments remained a frontline organisation in the management of LSD outbreaks across the country. Aside from the departments of animal husbandry and dairying, Ministry of fisheries, Government of

India, different state agricultural/veterinary universities, NGOs, gaushalas, municipal bodies, panchayats, mass media channels and district administration played important roles in the management of disease outbreaks.

State animal husbandry department  
The veterinarians and para-veterinary staff of state animal husbandry departments played an extremely important role in prevention and

control of this disease. Their role has been primarily divided into three important aspects – spreading awareness about diseases prevention, vaccination, and treatment of cattle.

### Vaccination programme

Vaccinating animals was an important activity undertaken by veterinary doctors and para-veterinary staff across the country. Nearly sixty million cattle were vaccinated in the LSD vaccination drive in India against a target of 250 million (LSD: Testing times for dairy farmers, vax makers - The Hindu BusinessLine). The vaccination programme was affected due to shortage of veterinary manpower in various states. In some states, such as Maharashtra, private veterinary doctors, and retired animal husbandry officers were asked to volunteer in the Lumpy Skin Disease vaccination campaign. Further, in Maharashtra final year students, internees and PG scholars were also roped in for

administering vaccines and holding awareness programmes.

### Awareness measures

Personnel from the state department of animal husbandry played an important role in various awareness drives against LSD through toll free numbers, pamphlets, loudspeakers, public meetings and mass media. Several state departments of animal husbandry (Maharashtra, Haryana, Delhi, and regions of J & K) initiated toll free services for help, advice and disease reporting. Some of the state departments, such as Himachal Pradesh, used daily report charts and useful material for awareness among farmers through its web portal (<http://hpagrisnet.gov.in/hpagris/AnimalHusbandry/Default.aspx?SiteID=3&PageID=1494>).

The departments of animal husbandry in Karnataka and Uttarakhand used social media tools to build awareness among farmers.

**GOVERNMENT OF KARNATAKA**  
Department of Animal Husbandry And Veterinary Services

**Lumpy Skin Disease**

Not transmitted to humans

Is the milk from LSD infected cattle safe for human consumption?

**-Yes, the pasteurized or boiled milk is safe for human consumption.**

**-Boiled milk can be fed to calves also.**

Animal Welfare Helpline 24/7 8277100200 @AHVS\_Karnataka @AHVSKarnataka www.ahvs.karnataka.gov.in

**जम्मू-काश्मीर सरकार**  
पशुपालन निदेशालय जम्मू

सावधानीकी ड्रीट सतर्कता

**ढेलेदार त्वचा रोग**

पॉक्स वायरस के कारण होने वाला एक वायरल रोग जो गायों और बैलों को प्रभावित करता है। यह मक्खनों, मच्छरों, काटने वाले चिचड़ और पिरसू जैसे वेक्टरों द्वारा फैलता है।

रिक्तवरी की अवधि <b>2-3 हफ्ते</b>	अस्वस्थता दर <b>10-20%</b>	मृत्यु दर <b>1-5%</b>
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**प्रमुख लक्षण**

- पूरे शरीर या पंख व चोंटी मोटी कट्टें
- बुलारा
- दूध उत्पादन में कमी
- निष्क मोहरा में सूजन

**रोकथाम और निवृत्तन**

- प्रभावित पशु को स्वस्थ पशुओं से अलग करना।
- संनिध्य जानवर को अग्रगण्य काम/बुद्ध में न डालें।
- मोटा किराईक और एंटीबिआइब्स का उपयोग करके वेक्टर आवादी का नियंत्रण।
- रोग की शक्ति होने पर धूम्र तेलों/सो/आधार/वालाचों पर प्रतिबंध।
- प्रभावित क्षेत्रों में पशुओं की आवाजाही पर तत्त्व विधान।
- प्रभावित परिवार जवला रोड की सफाई के लिए किनोल (15 मिनट के लिए 2%) / फॉर्मलिन (1%) / सोडियम हाइपोक्लोराइट (2%-3%) / ईथर (20%) का उपयोग करें।

**इलाज**

- अपने पशुकी पशु चिकित्सा केंद्र से तुरंत मदद लें।
- पशु चिकित्सक के प्रत्यक्ष पर्यवेक्षण के तहत एंटीबायोटिक्स, एंटीहिस्टामाइन, एंटीफ्लूटाइनाइड, बन्टी विटामिन और एंटीसैप्टिक त्वचा मालिश / सने (मक्खी विकर्षक पुराने के साथ) का उपयोग करके रोगवृत्तक उपचार।
- रोगी पशु को नरन चार, नरम चार और रसीला चार ही खिलाएं।

**संन्यास** - शव को नष्ट करने का तरीका

ढेलेदार त्वचा रोग के कारण मृत्यु होने की स्थिति में पशु के शव को गहराई में दफनकर नष्ट किया जाना चाहिए।

हिसा: विस्तार और प्रचार विंग पशुपालन विभाग, जम्मू

हिसा भी सम्बंधित सहायता के लिए संपर्क करें: 1962 या 0191-2505552, 9419845999

### Awareness drive by different State Departments of Animal Husbandry

#### Treatment of infected cattle

Treatment of sick animals was another important aspect that was taken care of by veterinarians across the affected states. Mobile veterinary clinics and rapid response teams were also set up to treat animals and build awareness among farmers. In certain states, such as Delhi, veterinary hospitals were equipped with a special isolation ward and a 24-hour emergency helpline number to tackle the spread of virus among cows. A special isolation ward in the Rewla-Khanpur area was set up to treat the

infected animals. Arrangements were ensured for isolation spaces in case the owner/caretaker does not have enough space to isolate their infected cattle.

Immediate reporting of diseases, such as LSD, by veterinarians in Indonesia is extremely critical. Case study from FAO, Indonesia (Box 2) underlines the importance of early disease reporting.

## Box 2: A reasonable doubt saves livelihoods of thousands of farmers

Discovery of the LSD outbreak started in Indragiri Hulu regency, seven hours drive from Pekanbaru, the capital of Indonesia's Riau province, on the island of Sumatera. There, a farmer reported sick cattle to Nuryadi (25), a community veterinary health officer. He thought, the cattle only just had an allergy. But the remedy did not work. He felt lingering doubts, afraid that something big was waiting. This young officer immediately consulted his senior, Jebul Soeharto (59). From Soeharto's personal collection of veterinary books, they learned the symptoms of LSD seemed to match with what they saw on the field. They quickly turned into high alert mode after realising how contagious this disease could be for cattle. Later they found out that LSD has been well known among farmers around the world as a serious illness that reduces productivity of cattle and triggers major loss. Like any other pandemic, a huge economic downturn is expected if the disease spreads in the farms.

Immediately, Nuryadi, reported this suspicious disease to the authorities of Indragiri Hulu District, in Riau province of Indonesia. Not long after that, the Government of Indonesia officially reported the outbreak to the World Organization of Animal Health (OIE) on March 2 2022. At that time, LSD had already infected Malaysia, Singapore, Thailand and other countries in Asia. The outbreak report from Indonesia had further alerted other neighbouring countries, such as Australia, which has a large cattle industry. The emergency reporting chain then reached the governor of Riau and eventually the Minister of Agriculture. But simultaneously Pariza's team alerted the national information system for animal health (iSIKHNAS). She also worked with Disease Investigation Centre of Bukittinggi to take samples and detect the suspicious disease, which then confirmed it as Lumpy Skin Disease. The government launched emergency vaccination programme on 17 March 2022 as one of the disease control strategies, along with community education campaigns, vector control, cattle movement restriction, surveillance and early detection in Riau and neighbouring provinces. Pariza hoped that her experience would alert other regions around the world: "If in the slightest oddness one finds symptoms of a suspicious disease, please immediately follow the emergency alert system in place. It will save farmers at home and other countries from financial loss and save the public from food supply disruptions."

Source: FAO in Indonesia, 22/4/22



LSD affected cattle

## **State Governments & District Administration**

State governments in general and district administration in particular are the second important stakeholders in LSD management. Various state governments and district administration stopped all animal gatherings by banning animal fairs, for example, in the last week of July Gujarat State banned all animal fairs. The district administrations in some parts of the state issued notifications to ban the movement of cattle from other states, districts, taluks and cities. Similarly, Maharashtra government declared the whole state as a 'controlled area' to curb the spread of LSD in cattle on September 9 2022. On similar lines UP banned cattle trade with four neighbouring states and also imposed a 'lockdown' on intrastate movement of animals from 28 districts to prevent the spread of this disease on September 22 2022.

## **Municipal Bodies & Panchayats**

Managing an LSD outbreak requires huge human effort. The role of local civic bodies, such as panchayats and municipal bodies is imperative in the disposal of animal carcasses. Certain Municipal Corporations in parts of Patiala (Punjab) and Jaipur offered helpline numbers/WhatsApp helpline for proper disposal of carcasses. However, in many regions there were reports of people unable to dispose the cattle properly and heaps of cattle carcasses remained at open sites. On the other hand certain municipal corporation followed proper disease management protocols by complete fogging at all gaushalas falling under its jurisdiction ([Lumpy skin disease: Panchkula MC completes fogging at all gaushalas: The Tribune India](#)).

## **Research & educational institutions**

ICAR's National Research Centre on Equines (NRCE) at Hisar, Haryana, and the Indian Veterinary Research Institute (IVRI) at Izatnagar, UP, developed vaccine against the Lumpy Skin Disease (LSD) virus. Later on, the technology was sanctioned by the research institutes for commercial use to vaccine manufacturers. Further, in a bid to decentralise the LSD testing/screening the Government of India in its notification allowed LSD testing across various veterinary colleges of the affected states across the country on September 14 2022.

Internationally the World Organisation provided guidance and communication material for local veterinarians and animal health workers. Similarly, it also offered communication material for cattle owners, dairy farmers and dairy animal traders. Besides, it also provided Frequently Asked Questions (FAQ) on LSD for the public and veterinary services. The FAQs on LSD were offered on June 2022 while FAQs on vaccination were released on September 2022. The Government of India through Vikaspedia portal offered guidelines for prevention of LSD (Guidelines for prevention of Lumpy Skin Disease — Vikaspedia). Likewise various state agricultural/veterinary universities offered expert advice through field visits and advisories to the farmers.

## **Mass media**

Mass media, including social media, played an extremely important part in reporting and highlighting the LSD problem in the country. Down to Earth, the leading science magazine forewarned about possible havoc the disease could cause in the country on January 13 2021 (Shagun et al. 2021). A national daily, The Hindu (July end to mid-August) started by reporting on the disease spread from August 2022. The daily started providing information about disease etiology, spread, and control in various articles from September. Another prominent newspaper, The Indian Express published its first article about this disease: 'What is Lumpy Skin Disease? (indianexpress.com) on August 12 2022. It also reported regularly about the threat the disease posed to the livestock-based economy of the country. A prominent Hindi daily, Amar Ujala started reporting on the disease in its regional town/city wise editions from August 2022. The national channel for farmers, DD Kisan, telecasted two programmes on this disease on July 24 2022 and August 21 2022 under its *Apna Pashu Chikitsak* programme.

On the other side, several lies and rumours about disease transmission to humans through consumption of milk from LSD-infected cattle through social media also spread rapidly. This misinformation created panic among consumers and farmers (Box 3).

### Box 3: Misinformation about LSD on social media

Misleading information about spread of LSD in humans were also circulated with unrelated images of humans with lumpy skin diseases. Many viral social media posts falsely claimed that milk becomes unsafe for human consumption due to the spread of LSD, and that drinking milk from an infected animal will lead to the development of skin disease in humans as well. The posts were often accompanied by images of visibly diseased human bodies covered in lesions, meant to create fear. Further misinformation about large scale cattle deaths due to vaccination were widely circulated. In such posts, videos of cattle carcasses in a dumping ground, with the claim that tens of thousands of cattle died due to LSD vaccination went viral across social media platforms. Thus, misinformation compounded the problem of LSD management among farmers and stakeholders in the affected regions (BBC, 2022).

The spread of LSD was contained at India's milk capital, Anand, when compared to Gujarat and other affected states of India. This case study

can be a roadmap for containing spread of LSD or similar livestock disease epidemics in the country (see Box 4).

### Box 4: How the 'milk capital' prevented disease spread

Even as LSD raged across Gujarat, the district of Anand, known as the milk capital of India saw very little impact on its milk production. Decades of investment in animal health, disease reporting infrastructure, and vaccinations helped Anand escape the full impact of the disease. Unlike the rest of Gujarat, where farmers keep indigenous cows for personal dairy needs, Anand dairy farmers have hybrid cattle. Ideally, they should be more susceptible to the disease. But since these cows are more expensive, the farmers do not let them out for grazing. They are all stall fed, reducing their risk. Last year, all the animals were vaccinated with the goat pox vaccine. Farmers are trained on shed hygiene.

Artificial insemination experts in the district also double up as first responders when a case is reported in a village. As a result, the infections are detected at an early stage, preventing further spread. The nutritional profile of the cattle was also better than those at gaushalas or on the street.

"Just like in humans, well-nutritioned cattle are able to fight the disease better. At gaushalas, the cattle may be well fed, but they often do not get the nutritional supplements that cows reared for dairy get in Anand."

Source: Early detection, vaccine & hygiene — why India's milk capital saw fewer lumpy skin cases (theprint.in)

## FACTORS WHICH LED TO SPREAD OF DISEASE AND ASSOCIATED GAPS

### Early warning signs ignored

Early warning signals about the spread of disease in Kerala and several other states of southern and central India were not taken seriously as possible nationwide spread was predicted earlier by Down to Earth, a leading science magazine in its article published on January 13 2021 (Shagun et al. 2021). The Government of India itself had admitted that lumpy skin disease was one of the three major disease outbreaks the country had witnessed over last three years in its press statement on December 14 2021 (PIB 2021). Yet one could

not prevent the mammoth scale of spread of this disease. Scientific evidence showed that once the disease is detected in a region or country, stand still and quarantine are the very first measures to be undertaken quickly (Tuppurainen et al. 2017). However, despite possible outbreaks and advisories, proper protocols on movement of cattle in the country did not follow. Cattle movement across borders and interstate/region movement continued without due consideration even after the earlier outbreaks of 2020 and 2021. The situation could have been averted by restricting the movement of cattle and launching early awareness and vaccination drive in the country.

## **LSD spread faster among cattle markets, gaushalas and stray cattle**

The role of cattle markets, gaushalas and stray cattle remains particularly important in the spread of LSD in India. Weekly cattle markets and communal grazing allowed animals to mix freely without effective biosecurity controls. Purchased livestock by farmers resulted in the regular and frequent entry of new animals into villages. In the earlier stage, lack of awareness among farmers also led to ignoring the disease as many farmers thought of the disease symptoms as possible skin allergies or minor infections.

In cities of Gujarat and Rajasthan, LSD spread rapidly among stray cattle and gaushalas. This happened due to weak nutritional and immunological status of animals. In several gaushalas of cities hundreds of animals packed together led to worse LSD situation among city cattle (Basu 2022). In villages, for example in Kutch of Gujarat, open communal grazing led to the spread of disease. Farmers also ignored the need to segregate the affected cattle from healthier ones owing to traditional way of open grazing.

## **Shortfall in vaccination delivery**

Pre-emptive vaccination is highly recommended when LSD is detected across borders in neighbouring countries. However, even after outbreaks the vaccination efforts have been far from satisfactory, for example, till September 10, 2022 vaccination of bovines was yet to commence in seven districts of Rajasthan. Even the Union Animal Husbandry minister pointed out that Rajasthan was the worst affected state and had achieved only 40% vaccination from all the total doses available (Devdiscourse 2022).

## **Lack of sufficient veterinary care and medicines**

Lack of proper veterinary care, lack of medicines, food for sick cattle, and proper disposal of dead cattle were major shortcomings faced by cattle owners and animal handlers across several regions of the country. Acute shortage of antibiotics and vaccines was reported by animal husbandry officials in district Kangra, Himachal Pradesh (Tribune News, 2022). Several states, such as Delhi, Karnataka,

Himachal Pradesh, Gujarat, and Jammu & Kashmir reported shortage of veterinary doctors and other infrastructural facilities. As a result, farmers faced huge livelihood losses (Basu 2022).

## **LEARNING FROM THE CRISIS: NEEDED ACTIONS**

Based on our experiences with containing LSD spread, we need to consider the following actions in order to be prepared for dealing with similar crises in the future.

### **Bringing LSD under the Ambit of NADCP**

Experiences of countries (Israel and Balkan region of Europe) with successful LSD control and eradication suggest that repeated annual vaccination for several years after the cessation of clinical cases is the best possible measure to be undertaken (MitikuT 2022). Given that vaccination offers year-long protection against LSD it becomes imperative that the vaccination for lumpy skin disease may be brought under the ambit of National Animal Disease Control Programme (NADCP). This program, launched in September 2019, currently covers two of most important infectious diseases – Brucellosis and FMD – in India. Private players can be roped in for forming start-ups to offer vaccination for LSD and other infectious diseases. This will not only meet the shortage of animal vaccinators in the country but also improve the state of livestock vaccination in the country. Instead of presently used heterologous Goat pox vaccine, vaccination through homologous vaccine developed by ICAR –NRC Equine & ICAR IVRI may be put to use as early as possible as ICAR itself has admitted that heterologous vaccines provide partial protection and are not as efficacious as homologous vaccines (<https://www.thehindu.com/news/national/icar-develops-vaccine-for-lumpy-skin-disease-in-cattle/article65754097.ece>).

### **Disinfection and surveillance of livestock markets and gaushalas**

Studies in African countries where LSD has been endemic have suggested that livestock markets are potential hubs of virus transmission. But these places, at the same time, can be a potential place to implement surveillance and control measures. Therefore, measures

such as separating affected animals as well as animals coming from affected herds or flocks in livestock markets, disinfecting, fumigation livestock markets during closing dates and awareness generation would help to reduce the transmission rate of disease among livestock. Rapid screening tests for disease is an area which may looked into for effective disease surveillance. Further proper monitoring of trade, transport of cattle along with health checks by setting up security check posts manned by veterinarians must be put into place to prevent spread of LSD (Limon et al.2020).

### **Massive extension awareness**

Massive extension efforts are needed among farmers to take informed decisions when purchasing animals. Efficient disease control is impossible without good cooperation among farmers and other cattle value chain actors. The awareness campaigns should be targeted at veterinarians, veterinary students, farmers, herders, cattle traders, cattle truck drivers and artificial inseminators. The FAO suggests that certain individuals, such as cattle truck drivers, are in a particularly good position to identify infected animals on farms, in slaughterhouses, or at cattle collection and resting stations and to notify veterinary authorities about

any clinical suspicion as soon as possible (Tuppurainen et al.2017). Therefore, targeted extension awareness strategy may work well in the prevention and control of LSD outbreaks in future.

### **Use of PashuSakhis under A-HELP Programme**

Though laboratory confirmation of causative agent and its isolation are helpful in epidemiological investigations of infectious diseases such as LSD. Often, such facilities are not readily available or affordable in rural India. Alternatively, rural animal health workers such as PashuSakhis under A-HELP programme launched by the Government of India can collect necessary clinical and epidemiological data quickly and reliably while offering immediate advice to animal keepers.

### **Setting up emergency drug banks**

LSD being a trans boundary animal disease, requires massive veterinary infrastructural support. Emergency drug banks may be created at district or block veterinary hospitals to tackle shortage of medicines during such outbreaks. Frequent health check-ups of cattle in all districts and village veterinary hospitals should be conducted with free treatment of cattle.

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# 17

## CHALLENGES FOR VETERINARY EXTENSION PROFESSIONALS IN THE CHANGING LIVESTOCK EXTENSION SCENARIO

Veterinary extension professionals have to understand the complex conditions under which livestock farmers live and help them in getting their due share from the prices consumers pay by improving their voice in policy matters that are of concern to them, dissemination of appropriate technologies, effective and efficient delivery of livestock EASs, argue **SVN Rao and PVK Sasidhar** in this blog post.

India has come a long way in increasing the production of milk, meat and eggs, and other livestock products between 2014-15 and 2021-22:

- 146.31 to 220.78 million tons of milk (51% growth);
- 6.69 to 8.80 million tons of meat (32% growth);
- 78.48 to 122.11 billion eggs (56% growth rate).

These achievements could be attributed to the efforts of millions of small and medium farmers, field veterinarians, researchers, input suppliers, extension advisory services (EAS) and several other stakeholders. But livestock farmers, especially smallholders, are finding it difficult to sustain their livelihoods through livestock alone. This is resulting in the younger generation losing interest in traditional livestock farming and many of them are switching to wage earning occupations, which is a serious cause of concern.

The reasons for these negative changes include:

- Falling income of producers and exploitation by intermediaries;
- Mismatch between farmers' needs and research goals;
- Inability of the public sector EAS in addressing the needs of small and medium farmers;
- Unorganized market of livestock and livestock products;
- Weak bargaining power of livestock farmers, etc.

### CHALLENGES VETERINARY EXTENSIONISTS FACE

India is experiencing several changes in its Animal Husbandry sector. These changes raise several new challenges for veterinary extension professionals. These include:

1. Doubling the income of farmers;
2. Multiple service providers and collaboration;
3. From free service to paid services;
4. Dairy co-operatives losing ground to private dairies;

5. Shift from unorganized backyard poultry to organized commercial poultry;
6. Milk procurement still unorganized;
7. Shift in consumer preference from raw
8. Increased use of ICTs in delivery of EASs; and
9. Increasing threats arising from animal disease outbreaks.



These aspects are discussed in detail below:

**Doubling the Income of Farmers**  
 Many of the earlier policies focused primarily on increasing production outputs and improving food security through foods of animal origin. The policies did not clearly state the need to improve livestock farmers' income simultaneously. To address this, in 2018 the Government of India (GOI), set a target of doubling farmers' income by 2022, and bring farmers' incomes on par with non- agricultural occupations' income. The income of the farmers could be doubled by:

- Increasing production without concomitant increase in inputs;
- Increase the price of farmers' produce keeping
- the input cost constant;
- Increase farmers' share in the consumers' price.

The last one is comparatively easy to achieve if the margin of the intermediaries is reduced through interventions. In the case of liquid milk, the producers' share in the consumer's price ranges between 45 to 60% which is comparatively better than in other livestock products (Box 1).

**Box 1: Milk Procurement vis-à-vis Producer's Share in Total Price\***

Commodity	Consumers Price for Toned Milk (Rs.)	Milk Procuring Company's Earning (Rs.)	Producers Share (Rs.)	Percent of Producer's Share in Company's Earning
Milk / litres	51	85.80	40	47%

\*Milk procurement price is determined not per litre, but according to per kg of Fat and SNF (Solids-Not- Fat) content of milk. As of January 2023, the maximum procurement price is Rs. 680/ kg of Fat. It means if a farmer sells 100 kg buffalo milk with 6% Fat and >9 SNF, it will have 6 kg Fat which translates to Rs. 4080 or Rs. 40.80 per litre of liquid milk. However, the consumer's price is Rs. 5100 per 100 litres. In addition, the milk procuring company sells 6 kg Fat@580/kg translating to Rs 3480. The total earning to company is Rs. 8580 per 100 liters or Rs. 85.80 per litre of milk procured. While the producer's share is Rs. 40.80 per litre of milk produced. This is even lower in the case of cow's milk as Fat and SNF levels are low.

(Source: Authors)

Resource use efficiency/saving in cost of production as envisaged in GOI ambition of 'Doubling the Farmers' Income' does not really

benefit farmers always. There is the glaring example of Contract Poultry Farming (CPF) (see Box 2).

## Box 2: Does Saving in Cost of Production Result in Doubling Farmers' Income? Case of Contract Poultry Farming (CPF)

Studies conducted by the authors revealed that the total cost of production per kg of live chicken produced under CPF was Rs. 55.50 with rearing charges of Rs. 4.00/kg of live chicken produced going to farmers. Including incentives, the net return to a contract farmer was Rs. 4.59/kg of live chicken produced, while the average farm gate live chicken price ranged from Rs. 65/kg to Rs. 90/kg in 2015. This showed that integrators made profits in the range of Rs. 10 to 35/kg of live chicken. Despite producing the chicken at a very low production cost, the total returns to farmers were significantly low because the efficiency surplus is largely taken in by contract companies and part of it passed on to consumers. In the overall value chain, the farmers were the last beneficiaries – after the companies and consumers – with a variable share of 13% to 40% from the consumer's price.

(Source: Sasidhar and Suvedi 2015; Thamizhselvi and Rao 2010)



## Box 3: How to Help Farmers in Getting a Higher Share so as to Double Incomes

**Challenge:** The biggest challenge to EAS professionals is: How to help farmers get a higher share, so that their incomes are doubled.

The milk procurement prices are based on a two-axis pricing policy i.e., based on fat and SNF content. These prices do not take into consideration the costs of feed and other inputs. Whenever milk procurement prices are increased input prices also go up and there is hardly any benefit to farmers. Instead, the milk procurement prices must be linked to the feed cost as is being followed in many developed nations. The milk-feed ratio indicates the amount of feed (in kg) the producer can buy by selling one litre of milk. This ratio should ideally be 1:1.5 – which means the producer can buy 1.5 kg of concentrate feed by selling one litre of milk. The prevailing ratios are less than 1:1.2 (calculated).

The government must establish organized livestock and meat markets on cooperative lines to protect the interests of both livestock farmers and consumers. Similarly, the minimum support prices must be fixed for chicken under contract system.

Another of those worst affected are the small ruminant farmers/pig farmers who are being exploited by the intermediaries who purchase the animals on approximate weight basis, and that too on credit. The farmer will not get more than 50% of the consumer's price for rearing the animals for about one year. The market is totally controlled by middlemen and the livestock farmers have no say in the price set for their animals or their produce. The live animal markets (shandies) are totally unorganized and the brokers dominate the markets. Without increasing producer's price it is almost impossible to double their income.

### Multiple Service Providers

In the past, Veterinary EAS were being provided by Animal Husbandry Departments (AHDs) which was almost a monopoly service provider to livestock farmers. The focus of an AHD is to provide health care and breeding services to farmers free of cost. A stage has come that AHD is not able to provide quality EASs to millions of small herders whose demands vary depending upon the farming system in which they operate. Additionally, farmers are also not satisfied with the inaccessible and ineffective services provided (Rao and Natchimuthu 2019). As a result, several service providers have entered into the system to cater to the requirements of livestock farmers (Box 4).

**Box 4: Pluralistic EAS Providers in the Livestock Sector**

Service provider	Inputs	Services	Comments
AHD	Semen, medicines, vaccines, fodder seeds	Free breeding and health care services	Monopoly in the past
Dairy Corporations	Cattle feed	Milk / milk products marketing	Milk production enhancement programmes
Milk Cooperatives (1970)	Semen, medicines, vaccines, cattle feed, fodder seeds	Marketing, EASs, Breeding, Health care (paid services)	Milk procurement, processing and marketing; Discontinued services
Producer Companies	Semen, medicines, vaccines, cattle feed, fodder seeds	Extension advisory Breeding, Health care (paid services)	Dairy unions were converted into dairy companies / FPOs
NGOs (BAIF, JK Trust, etc.)			Considered as effective in delivery of services
KVKs (1975)	Fodder seeds	EASs (free)	OFTs and trainings; Few Animal Science SMS
Poultry Integrators	Chicks, feed, vaccines, medicines	EASs and marketing	Farmers are paid rearing charges
FPOs (2020)	Credit	Production input services	Capacity building of members
Cooperative banks	Credit		Many are financially sick
NABARD/ Lead banks	Credit for projects	Finance capacity building and trainings	Promoting FPOs

## Box 5: Inadequate Collaboration among Various Service Providers

**Challenge:** How to achieve effective collaboration among various service providers in efficient use of scarce resources for effective delivery of EAS.

This can be achieved mainly by maintaining good relations with all the service providers, establishing multi-stakeholder platforms, organizing regular coordination meetings, sharing resources and working together for a unified goal, namely, farmers' well-being. The present authors have suggested institutional mechanisms to promote better interaction, knowledge flows, and collaboration between important stakeholders for effective veterinary service delivery (See Rao et al. 2015).

### Why is there a need for collaboration among stakeholders for livestock development?

The target of all service providers is the livestock farmer. But each differs in their mandates, motives, approaches, capabilities, resources, etc. Collaboration among them is a must for the following reasons:

- Farmers' problems are complex and calls for multiple inputs;
- Helps in saving scanty resources by avoiding duplication;
- Produces synergistic effect— by complementing each other;
- Sharing of information – helps in joint planning and implementation;
- Win-Win situation for all collaborating agencies.

### From Free Service to Paid Services

In the past most of the EASs were provided by public sector institutions, such as AHDs on subsidy/free of cost. The farmers have no choice to either choose a service provider or demand quality services. Since the early 1990s the public sector monopoly came under increasing threat as many started questioning its economic merit and efficiency. For example, the AHDs of Gujarat, Himachal Pradesh, Haryana, Maharashtra, UP, Tamil Nadu and Andhra Pradesh had spent 50 to 60% of their budget on administration (Ravikumar 2005). There is robust evidence that livestock farmers were not convinced with the services provided by

the public sector and they are willing to pay for effective and timely services in Andhra Pradesh (Badhulal 1999; Jagadeeswary 2003; Ravikumar et.al. 2006; Ahuja et.al. 2008), Bihar (Kumar and Rao 1999), Gujarat (Ahuja, et.al. 2000), Karnataka (Channappa Gouda 2009), Kerala (Ahuja, et.al. 2000), Rajasthan (Ahuja, et.al. 2000; Rajput 2006), Sikkim (Rao 2002), Tamil Nadu (Rajashree 2000; Kumar 2006), Uttar Pradesh (Chander et.al. 2006) and West Bengal (Sen and Chander 2003a). The options suggested were decentralization, cost sharing, cost recovery, withdrawal from selected services and PPP.

In India there is a mismatch between farmers' needs, and research areas taken up by researchers. For example, researchers focus on cloning, sexed semen, etc., (high tech research which help the researchers to get their research output published in high impact journals) instead of focusing on reducing the incidence of repeat breeding in bovines, and prevention and control of mastitis, the two main ailments because of which dairy farmers are incurring heavy losses every year. It is in the realm of anybody's wisdom that these two ailments if not treated successfully make the animals unproductive, and finally land them in slaughterhouses.

Unless farmers occupy the centre stage by sharing the cost of services, there is little scope for them to demand need-based research and quality services (Box 6).



## Box 6: Farmers' Willingness to Pay vs. Quality of Services

**Challenge:** How to motivate the livestock owners to share the cost of services

Today Artificial Insemination services are being provided by AHDs, dairy cooperatives, private practitioners, NGOs, etc., on payment. Similarly, poultry farmers have a choice to choose the integrator with whom they can enter into a contract or dairy farmers have options to sell the surplus milk to a vendor, or collection centers operated by three or four dairy plants within the same village. Livestock farmers will also have a say in demanding the quality of services when they share the cost of the service. Another advantage is that there is scope to improve the quality of services when there is positive competition. Demand-driven paid services also have the disadvantage of service providers paying attention mostly to resource-rich farmers but poor farmers have to bear the financial burden.

Privatization of EAS was started in European countries in the early 1990s and later many livestock developed countries followed suit. They have demonstrated that it is advantageous for farmers to share the cost of services, including EASs, and also finance the research. This has resulted not only in improvement in the quality of services but also in farmer-oriented research (Sulaiman and Sadamate 2000).

Farmers must be made aware of the advantages of demand-driven EAS as compared to supply-driven services, because it will i) enhance their capacity to demand quality services; ii) make the service provider accountable to the farmer; and iii) give them a choice to select the service provider (Balamatti 2017).

Private service providers may not be much interested in working in remote areas because it may not be cost effective for them. In such instances, the public sector service providers must come forward to provide technical inputs at reasonable prices and EASs free of cost. It is always a challenge for public sector EASs to reach the unreached. Therefore, farmers must be encouraged to form farmers' organizations to demand quality services and seek effective technological solutions for their problems.

### Dairy Cooperatives Losing Ground to Private Dairies

Dairy cooperatives, until recently touted as harbingers for socio-economic change among dairy farmers, especially smallholders, are now on the verge of collapse. Except in Gujarat and to some extent in Karnataka, dairy cooperatives paved the way for the growth of private dairies. Now, the volume of milk procured by private dairies is more than that of dairy cooperatives. Private dairies procured about 560 lakh kg per day compared to 540 lakh kg per day by cooperative dairies in 2020-21 (CRISIL 2021). Damodaran had clearly predicted in 2017 that private dairies would overtake cooperative dairies by 2020 (Harish Damodaran 2017). There are several reasons for the failure of dairy cooperatives in India (Rao 2019):

- Private dairies – such as Godrej Jersey Dairy (Jersey), Hatsun Agro product Limited (HAP), Nestle – are well entrenched in processing

and marketing a variety of products in addition to producing cattle feed;

- Due to political reasons some of the cooperative dairies were converted into milk producer companies;
- NDDDB is promoting producer companies in different states of India;
- As suggested by the Alagh Committee, the GOI has come out with hybrid models of Co-ops. and private institutions, as an alternative to Co-ops. The objective of this hybrid model of Farmer Producer Organization (FPO) is to increase farmers' income;
- FPOs are conceived in order to facilitate farmers' participation in marketing, help in eliminating intermediaries in marketing, provide better bargaining power with input suppliers and bulk purchasers, and improve the farmers' access to technology, inputs, value addition and services. The FPOs are yet to prove their worth.

## Box 7: Dairy Cooperatives or Private Dairies

**Challenge:** Is it necessary to sustain dairy co-ops or encourage privatization?

Unless the dairy co-ops are able to successfully compete with the private dairies, it is difficult for them to survive. The dairy co-ops are established basically to help both the milk producers in collecting milk regularly and consumers in selling the milk and milk products at reasonable prices. They are losing their market share to private dairies. This could be attributed to the inability of the dairy co-ops to adhere to cooperative principles, large scale corruption, mismanagement of co-ops, and interference from the concerned state governments.

Now there are several methods of milk procurement, and the producer has an option to choose depending upon the situation. Similarly, consumers also have options to choose, namely, i) dairy co-ops; ii) private dairies; iii) vendors; iv) Milker-vendor; v) direct to consumers, etc. The milk procurement prices vary from Rs. 25 to Rs. 60 and sale prices vary from Rs. 42 to Rs. 90 depending upon the species (crossbred cow, desi cow, buffalo), quality of milk (fat and SNF percentage), presentation (raw or pasteurized milk; loose or packed, etc.) and delivery point (milk booth or door delivery).

A study on the impact of the milk incentive scheme being implemented by AHD-Karnataka reported that the milk procured by the rural dairy farmers increased from 11% to 39% in a span of seven years through implementation of the Milk Incentive Scheme. This scheme envisaged giving an incentive of Rs. 2 per liter of milk supplied by dairy farmers to the milk cooperative societies. This increase was attributed to the gradual shift of rural dairy farmers from private milk collection centres to milk cooperative societies (DAHVS 2020).



### Shift from Unorganized Backyard Poultry to Organized Commercial Poultry

Today, with commercialization of the poultry sector, more than 80% of India's poultry output is contributed by organized commercial farms. The farmers engaged in backyard poultry

farming have also come down to about 30 million (19th Livestock Census). Five major players – Suguna in Coimbatore, Venky's in Pune, CP, Sneha, and Shalimar in Kolkata – constitute 60% of the broiler meat market (DAHDF 2016).



medium farmers (Thamizhselvi and Rao 2010; Sasidhar and Suvedi 2015), they are successful in enhancing their market share mainly because of the provision of integrated inputs, EASs, and marketing services to the contract farmers.

The farmers are to a great extent free from production and marketing risks. The integrators also have the biggest advantage of holding lakhs of birds that are reared by millions of farmers in different locations, thus freeing them from the risk of losing entire flock(s) due to disease outbreaks if all the birds are reared in one or two locations. The total backyard poultry population has also increased by 45.8% from 2012 to 2019, indicating a positive trend in the growth of backyard poultry. This could be attributed to the release of several crosses of improved poultry for backyard rearing (Vanaraja, Giriraja, Gramapriya, Chabro, CARI Gold, Swarnadhara, Kalinga Brown, Nandanam, Rajasri, etc.) and encouraging the BPL families to rear these birds through implementation of Rural Backyard Poultry Development under the National Livestock Mission of the GoI.

The chicken and egg prices are set by the Pune-based NECC (National Egg Coordination Committee) on a daily basis, which is accessible to all through mass media (print and digital). At present integrators, having come a long way, are ruling the roost in production, processing and marketing of chicken. It is estimated that about 70% of the poultry population (215 million layers and 480 million broilers) being reared by small and medium farmers under the contract farming system. Although integrators are seen as exploiters of small and

#### Box 8: How to Promote Backyard Poultry for Supplementary Income for the Resource Poor

**Challenge:** How to promote backyard poultry which is considered as a supplementary income source for resource poor families.

It is of paramount importance to encourage backyard poultry as it provides supplementary income and animal protein to BPL families. Instead of supplying 4- to 6-week old birds to BPL families, it is worth supplying day-old chicks which help the families develop affinity for the birds, so farmers hesitate to sell or slaughter the birds. They rear the birds till the completion of the egg laying cycle which is necessary for exploiting the full benefit of these wonderful strains (Rajalakshmi et al. 2015).

The EASs providers must impart necessary skills on brooding, feeding, etc., and other services to the beneficiaries. It is also equally important to encourage rearing of desi chicks, especially in those areas where veterinary services are not readily accessible.

#### Milk Procurement Still Unorganized

Despite a vast network of organized dairies, milk procurement is still in the hands of the unorganized sector. Vendors are still holding the ground despite being seen as exploiters of both milk producers and consumers. The well-known reasons are that they collect milk

from producers' doorsteps and deliver milk at consumers' doorsteps in addition to providing services such as credit, milking the animals, information on animal management, etc., to the producers. The importance of this informal milk sector in India was very well highlighted by Joseph et al. (2011).

#### Box 9: Elimination of Milk Vendors from the Dairy Business

**Challenge:** What to do to eliminate milk vendors from the dairy business

When it is not possible to eliminate the milk vendors in dairying the best way is to train the vendors on hygienic milk collection and transportation to the consumers, which will help the consumers to get good quality milk. It is also better to train them in management of dairy animals and use them as key information providers to the producers.



## Shift in Consumer Preference from Raw Products to Processed and Packed Products

Although it is unsafe to purchase products in raw form rather than as hygienically processed and packed products, more than 80% of consumers purchase raw milk (instead of pasteurized and packed) and live broilers and wet meat (instead of packed products). The consumers have to pay more for the packed products when compared to raw products. Because of this milk vendors, roadside butchers or meat shop owners survive as they sell only raw milk and live broilers or wet meat.

The live broiler meat market still constitutes more than 90-95% of total volume of sales against 5% of the processed chicken meat segment. Realizing the increase in demand for fresh meat products, companies like Freshtohome, Licious, TenderCuts, Zappfresh, Fipola, etc., were established with a vision to provide quality meat to their consumers. These companies claim to be supplying hygienically processed meat and meat products and varieties of fish to the consumers through various marketing channels.

### Box 10: Raw Products to Processed and Packed Products

**Challenge:** How to encourage consumers to go for hygienically processed products?

The GOI stipulated several standards, regulations, and guidelines to produce and market livestock products. But compliance to standards is not enforced or monitored in a desirable manner. All the stakeholders are to be blamed for the production, processing and marketing of poor-quality livestock products (Rao and Sasidhar 2022).

The GOI has come up with a scheme to provide assistance for modernization of slaughterhouses and carcass utilization plants, but the response is poor. The GOI must insist that municipality-owned slaughterhouses be modernized so that their slaughterhouses provide hygienically processed meat to consumers and mitigate the problem of pollution of land, water, and air. The veterinary extension professionals have an important role to play in organizing consumer awareness campaigns that will enable them to understand the importance of consuming quality products. The establishment of modern meat shops must be promoted. The animal science institutions (ICAR institutes, Veterinary Colleges, Dairy Science Colleges, and Fishery Science Colleges) must be encouraged to process and sell their farm produce through their respective sales counters. The consumers' preference to purchase products from these sales counters need to be exploited. When it is not possible to shut down the roadside slaughterhouses, a big source of pollution, it is necessary to train the butchers in hygienic slaughter of animals and proper disposal of slaughterhouse waste.



## Increased Use of ICTs in Delivery of EAS

ICTs were handy for reaching livestock farmers during the COVID-19 pandemic. The biggest advantage is that almost all the farmers own

mobile phones. Many extension professionals could effectively deliver information pertaining to animal health, management and marketing of livestock products through this medium.

### Box 11: ICTs in Delivery of EASs

**Challenge:** How to exploit the potential of ICTs in transfer of information

The potential of the ICTs in communicating to several million livestock owners is yet to be realized as the tall claims made by several project leaders on the use of ICTs on sustainability, scalability and impact of several ICT projects are doubtful. Blum et al. (2020) recommended research to: i) study and understand the developmental and empowerment implications of ICTs; ii) assess the contribution of ICTs in agriculture and rural development; and iii) study its contribution in empowering the rural poor. Chander et al. (2020) presented the ways and means to support livestock and poultry farmers during pandemics. Shaik (2020) believed that EAS must acquire and implement digital tools for a truly modern, farmer-centric, retail-like operating model that integrates available and emerging digital technologies to meet and exceed expectations of the agriculture sector.

Based on their experience with using YouTube in effectively providing advice to livestock farmers on preventive measures during Gaja cyclone in the southern districts of Tamil Nadu and COVID-19 lockdown period, Tamizhkumaran and Saravanan Raj (2020) suggested that EAS providers should take up this platform to transfer knowledge to a larger audience.

Veterinarians, institutions, NGOs and extension agencies from all the states need to take up ICT initiatives in local languages to give wider coverage. If this initiative is started after conducting a need-based analysis it will become more effective.

## Increasing Threats from Animal Disease Outbreaks

Livestock are under constant threat from various diseases and some of them are of zoonotic importance. Now India is witnessing outbreaks of African swine fever and Lumpy Skin Disease that are playing havoc in several states causing deaths of thousands of pigs and cattle. The cases of classical swine fever in human beings are also reported. These are

in addition to the already existing diseases of zoonotic significance, such as TB, Rabies, Anthrax, Brucellosis, Toxoplasmosis, Japanese Encephalitis, Leptospirosis, etc.

All these happen due to lack of awareness about good animal husbandry practices, poor waste management practices, and weak food safety enforcement that contribute to disease outbreaks, causing significant economic losses.

### Box 12: Control and Prevent Diseases and adopt Integrated One Health

**Challenge:** How to control and prevent these diseases and establish integrated One Health

India is not able to eliminate most of these diseases due to poor adoption of good livestock management practices, poor hygienic conditions, and lack of political will to strictly enforce public health measures. One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent. It is a big challenge for the veterinary extension professionals to adopt the One Health approach to prevent and control these diseases. Thakur and Gupta (2022) dealt at length about the lessons the veterinary extension professionals must learn to reduce the impact of such diseases on the livelihoods of livestock farmers.

Therefore, the One Health approach and close collaboration between human and animal health professionals is recommended by the World Health Organization and the World Organization for Animal Health.

## CONCLUSIONS

In general, the world is experiencing sea changes in delivery of EAS and these include:

- Provision of EASs by a single public sector organization to multiple EASs providers with multiple funding sources;
- Standard one-size-fits-all model to country-specific models;
- Centralized to decentralized public-private partnerships;
- Focus on technology and enhancing production to address a wide range of problems, viz., natural resource management, marketing, adaptation to climate change, nutrition etc. (Blum et al. 2020).

Many of these changes impact the veterinary extension sector too. Veterinary extension professionals have to understand the complex situation of livestock farmers, positive global changes in delivery of EASs, and how best to use these experiences in helping livestock farmers.

Even though production of livestock products is increasing steadily, India is struggling to meet the expected targets fixed for 2023. Although the per capita availability of milk is more than the required quantity, it is unfortunate that about 20 to 25% of people below the poverty line cannot afford to drink milk. Similarly, some dairy cooperatives and many of the private dairies and milk producer companies are reaping profits, but the milk producers especially the smallholders are finding it difficult to sustain their livelihoods. The poultry integrators who dominate the chicken and egg production field are doing good business, but contract farming is considered as exploitative of the farmers. The plight of the small ruminant owners and pig farmers is much worse as the marketing is mostly unorganized and exploited by the intermediaries. So, veterinary extension professionals must help livestock farmers get their due share from the consumers' prices by addressing these issues.

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# 18

## PROMOTING DIVERSITY, EQUITY & INCLUSIVENESS IN THE VETERINARY PROFESSION

The veterinary profession has a very diverse clientele. This diversity poses a challenge, of equity and inclusiveness in veterinary practice. Diversity, Equity & Inclusiveness (DEI) practices help to provide care tailored to meet the unique needs of diverse populations, including under-served communities. In this blog, **Devesh Thakur** explores the importance of DEI practises in the provision of first-class animal care by veterinary professionals.

Diversity, equity, and inclusiveness have gained worldwide prominence across all sectors. The Google search of the words 'diversity', 'equity', and 'inclusion/inclusiveness' has increased by 700 percent since 2020 (Source: Google Trends 2023). The top universities of the world – such as Harvard Medical School, Yale, and Stanford School of Medicine – are embracing the measures of diversity, equity and inclusiveness in their institutions. Multinational Corporations (Facebook/Amazon/Microsoft, etc.) have embraced Diversity, Equity, and Inclusiveness/Inclusion (DEI) measures. The Indian corporate sector has published a manual on DEI practices in the workplace (Assocham 2022). Sports bodies around the world (Sports Ireland, England Cricket Board, Cricket Australia) also have equity, diversion, and inclusion policies in place. As in all other sectors veterinary institutions in the USA and Europe have embraced DEI. Some of the noteworthy ones are the America Association of Veterinary Medical Colleges, the Royal College of Veterinary Surgeons, the British Veterinary Association, and several other vet schools in the US and UK. With these developments, it becomes essential to understand the concept of Diversity, Equity & Inclusiveness in the Veterinary Profession.

### WHY DO DIVERSITY, EQUITY & INCLUSIVENESS MATTER IN THE VETERINARY PROFESSION?

Diversity, Equity, and Inclusiveness have gained prominence in the veterinary profession. The goal is to provide educational experiences about varied forms of livestock production to students from diverse backgrounds who are interested in becoming veterinarians (Cannedy 2016). Increased diversity improves access to healthcare in the regions where serious forms of socio-economic, regional and other disparities exist. It can lead to accelerated advances in veterinary medical research as greater diversity in backgrounds and experiences of researchers shape their critical thinking. Diversity also encourages active thinking.

## Box 1: Definitions: Diversity, Equity and Inclusion

**Diversity:** Recognizing and celebrating differences in people, including various characteristics that distinguish individuals from one another (University of California - Berkeley 2015; McKinsey 2022).

**Equity:** Ensuring fair treatment for all individuals, including the identification and elimination of systemic and structural barriers that prevent participation in the workforce (University of California - Berkeley 2015; McKinsey 2022; Hirasuna et al. 2023).

**Inclusion:** Creating an environment where everyone feels welcome and valued, including providing access to resources, involvement in work groups, and the ability to influence organization-wide decisions (University of California - Berkeley 2015; Hirasuna et al. 2023; McKinsey 2022).

Together, Diversity, Equity, and Inclusion promote a workplace culture that values and respects differences, ensures fairness, and enables everyone to make meaningful contributions.

*"Diversity is having a seat at the table, inclusion is having a voice, and belonging is having that voice be heard."* (Liz Fosslien)

There are three important reasons why DEI practices are important for those in the veterinary profession. These are:

### **Implementing DEI practices can help to overcome errors in decision-making by veterinarians while performing their jobs**

The literature review suggests that this concept has origins primarily in the USA and UK. The veterinary profession is among the least diverse professions in the US (American Association of Veterinary Medical Colleges). Further, like other human beings, veterinarians can have unconscious biases. Groupthink, unconscious biases, and cultural incompetence are common problems among vets (Khuly 2020). These cognitive biases routinely impact the decisions of veterinarians. Furthermore, these biases create barriers and disparities in animal care based on the background of ownership. By implementing DEI practices veterinary professionals can mitigate the impact of these biases and ensure that every animal and its owner receive equitable and fair treatment.

### **Implementing DEI practices can overcome disparities in animal care arising from owners' background**

Research suggests that low-income clients face barriers when seeking clinical/advisory services from vets. Inaccessibility, poor communication, lack of empathy, and cultural incompetence are some of these barriers. For example, people with disabilities, women, and the poorest of the

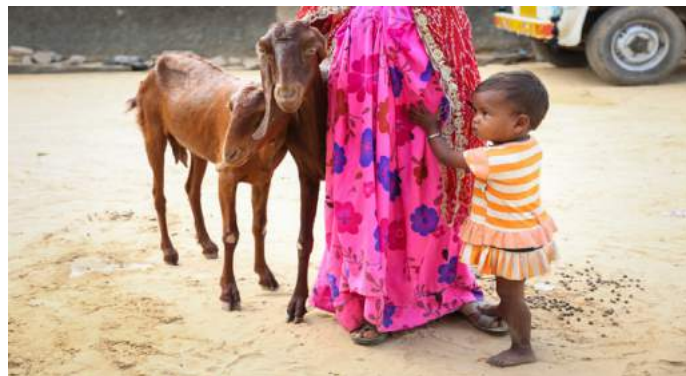
poor livestock owners have limited access to competent veterinary care. The clientele in the veterinary profession is very diverse.

Clientele ranges from urban affluent women pet owners to aged single women undertaking backyard poultry enterprises. Similarly, when it comes to animal care the needs range from those of educated youth engaged in commercial livestock farming to migratory pastoralists.



**DEI practices ensure that animals are not neglected due to demographic differences**

Limited veterinary diversity creates challenges in the provision of access to veterinary care in areas with socio-economic and other demographic diversities. This gap is normally filled by para-veterinary staff which results in compromised quality of service. Thus, the veterinary sector needs diversity in terms of professionals so that the profession's ability to provide quality care is enhanced. DEI practices in veterinary medicine would enable the sector to better serve a diverse population (Burkhard et al. 2022). A diverse population of veterinarians will see the same problem in different ways, broadening the approach to solutions, and promoting innovation (Packer 2021). Moreover, a varied and diverse range of knowledge and experience in the veterinary profession is better suited for the development of new services and processes to meet diverse demographic needs (RCVS 2019).



**Women, and the poorest of the poor livestock owners have limited access to competent veterinary care**  
(Source: <https://www.globalgiving.org/projects/veterinary-care-for-animals-of-indias-rural-poor/>)

### **Implementing DEI practices can reduce job stress and improve a sense of belonging in the workspace and profession**

Lack of diversity, equity, and inclusiveness (DEI) in the veterinary profession has been identified as one of the factors for increased stress among veterinarians across demographics (British Veterinary Association 2019). Student discrimination is a serious issue attributable to ethnic diversity at most veterinary universities (Robinson et al. 2019).

Members of the Lesbian, Gay, Bisexual, Trans, Queer, and Intersex (LGBTQI+) community experience more mental health problems and suicidal ideation in veterinary school and as veterinary professionals (Witte et al. 2020).

Globally the number of female veterinarians is increasing and this number has outpaced male veterinarians in many countries and regions, for instance 58% of all European veterinarians are female (FVE VETSURVEY 2018).

Yet client sexism (clients often demanding a male vet or insisting on a second opinion from 'one of the boys'.) is common. There is a lack of respect for female practitioners, especially following childbirth and/or working part-time (FVE VETSURVEY 2018). The gender pay gap is also reported in veterinary practice (Kersebohm et al. 2017). All factors call for the promotion of DEI practices to minimize stress among veterinarians.



**Meeting diverse client needs is important. Here we see the yak rearing community inspecting the needs of a breedable male yak in Kugti, Bharmour, Himachal Pradesh.**



**Migratory pastoralists often have poor access to proper veterinary care**





DEI practices enable better understanding of various diversities – age, gender, and socio-economic background – of livestock clientele

## MEASURES TO PROMOTE DIVERSITY, EQUITY AND INCLUSIVENESS/INCLUSION IN THE VETERINARY PROFESSION

DEI practices in the veterinary profession have to be understood from various angles. Ensuring DEI at workplaces, such as veterinary educational and service institutions, will ensure fair treatment of all people. This will minimise biases, prejudices and stereotypes. Workplace aggression and conflicts would be reduced; and an improved sense of belonging will enhance workplace productivity and enrich client service delivery.

In terms of service delivery, DEI practices can ensure that every animal and its owner receive equitable and fair treatment. Veterinarians are humans and therefore can have unconscious biases affecting decisions leading to disparities in animal care. Improved bias awareness through an understanding of diversity, equity and inclusiveness would help them mitigate the impact of these biases on their clinical/advisory decisions.

Box 2 throws some light on measures to promote DEI (Burkhard et al. 2022). For more read his article.

### Box 2: Measures to promote DEI

#### I. Build a pipeline for diversity

- Implement pipeline programs, for example the vet up programme of Purdue University (<https://vet.purdue.edu/diversity/vetup/>);
- Offer volunteering opportunities for under-represented groups.

#### II. Create an inclusive campus environment

- Encourage affinity groups;
- Discuss micro-aggressions and safe spaces.

#### III. Redesign curricula for DEI

- Cover topics such as implicit bias and cultural differences;
- Build cultural competency and ethical understanding.

#### IV. Provide opportunities for diverse learning

- Work with community organizations and low-income individuals;
- Develop social awareness and civic responsibility.

#### V. Other measures

- Respect diversity and avoid hurtful remarks;
- Establish DEI committees and recruit diversity officers;
- Initiate community inclusion certificate programs.



**EFFORTS BY VETERINARIANS OF HIMACHAL PRADESH ON THE SUBJECT OF DIVERSITY, EQUITY & INCLUSIVENESS IN THE VETERINARY PROFESSION**

Though awareness about DEI practices may be minimal among veterinarians, yet some of the veterinarians ensure that clinical and advisory services are inclusive. This means that based on nature of ownership, animals are not neglected. DGCN College of Veterinary and

Animal Sciences celebrated World Veterinary Day 2023 with a lecture on Diversity, Equity and Inclusiveness. It was organised by Veterinary and Animal Science Teachers Association (VASTA), Dr GC Negi College of Veterinary & Animal Sciences, Palampur. Some of the examples where ethnicity, difficult locations, and socio-economic background do not create barriers and disparities in animal care are mentioned below.

**Some Examples of Inclusiveness in Veterinary Practice by Veterinarians in the State of Himachal Pradesh**



Treatment of Pet Owned by Tibetan by Tashi Ihamo at Bir by Dr Sachin Sood



Treating cow of Gojri Devi, Old Single woman at Bharmour by Dr Atal Sharma



Equine castration by of Kartar Singh Equine Owner at remote location in Sirmour by Dr Amit Mahajan

**Ensures animals are not neglected or mistreated because of their owner's background.**



Treatment of Stray Dogs owned by Tibetan Monks at Bir Monastery by Dr Sachin Sood

Pix Courtesy:  
 Dr Sachin Sood Vet Officer Bir  
 Dr Atal Sharma Vet Officer Bharmour  
 Dr Amit Mahajan (Through LinkedIn)  
 Dr Rakesh Bhangalia AD Sheep Development Bharmour



Dr Rakesh Bhangalia Senior Vet attending to animal outbreak of Pastoralist at remote high altitude pasturelands

**Some noteworthy instances showing diversity, equity and inclusiveness in veterinary practice**

The American Veterinary Medical Association (AVMA) and the Royal College of Veterinary Surgeons (RCVS) have taken various steps to improve diversity, equity, and inclusion (DEI) in

the veterinary profession. Some of the common steps taken by both organizations are given in Box 3 along with Cannedy's (2016) steps to promote diversity in veterinary practice.

### Box 3: Steps to improve DEI in the veterinary profession and veterinary practice

#### a) Veterinary Profession (AVMA and RCVS)

- Commissioned research to better understand barriers in the veterinary profession;
- Established training and resources to promote diversity and inclusion within the profession;
- Strengthened the codes of professional conduct to enable more confident reporting of poor behaviors and promote accountability;
- Developed materials, such as case studies, ambassadors, and career resources, for school-age children from all backgrounds to promote diversity in the profession;
- Provided financial assistance, such as scholarships, to help students from diverse backgrounds access veterinary education.

These steps are critical to creating a more diverse, equitable, and inclusive veterinary profession, which will benefit all – animals, pet owners, and the broader society.

#### b) Veterinary Practice (Cannedy 2016)

- Treat each client as they request to be treated;
- Get to know your clients and their families;
- Invite them to your practice;
- Celebrate their achievements;
- Communicate in their language when possible;
- Accept their invitations and gifts;
- Acknowledge their culture and show acceptance;
- Thank them for being your client.

### CONCLUSION

The awareness of diversity, equity and inclusion practices is generally low in the veterinary profession. However, the thriving and modern veterinary profession needs increased openness and acceptance of DEI measures. Experiences of various businesses across the globe suggest that DEI practices bring more innovation, a sense of belonging, and improved productivity. Implementing DEI practices will ensure inclusion in veterinary institutions. Further, DEI practices would ensure animals are not neglected based on ownership background. Various veterinary institutions and professional veterinary associations in the developed world are encouraging/adopting DEI practices.

It's time for DEI to become a part of the Veterinary Profession in India.

As Dr Niall Connel, Royal College of Veterinary Surgeons, Senior Vice President and Chair of the Diversity and Inclusion Group, observes, If we are losing colleagues to discrimination or just not attracting people from diverse backgrounds in the first place because they think it's 'not for people like them', then we are losing out as a profession, and if we aren't drawing on a diverse range of backgrounds, experiences, and attitudes in our work, then we are also potentially doing a disservice to our patients and clients. This is why this strategy is not just a case of being seen to be doing something, but is actually crucial for the ongoing vitality and credibility of the veterinary team.

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# Digital Extension

03

# 19

## FROM UTOPIA TO DYSTOPIA: SOCIAL MEDIA AS THE FUTURE OF AGRICULTURAL EXTENSION

In this blog, **Aditya K S, Bhuvana N and Subash S P** explore a potential pitfall for farmers with social media usage, possibly exposing them to a barrage of fake news resulting in polarization, impediment to extension efforts and their undermining. The authors hope that this blog goes 'viral' and ignites discussion in the extension system on how best the system can be prepared to face this challenge in these changing times.

'Never let a crisis go waste' Winston Churchill once said. In times of crisis, trying out innovative and out of the box ideas is much easier; people won't question even if they fail. Historically, many unconventional, disruptive and never tried before approaches were implemented during times of crisis; be it the World Wars or Great Recession. Covid-19 pandemic is a recent addition to the list of crises, probably biggest of them after World War II. Covid-19 lockdowns have resulted in many hardships, particularly to weaker sections of the society, like daily wage earners, who have little savings and resources to fend for themselves. According to CMIE database, the unemployment rate has increased to 23% in lockdown period.

Many people have tried to look for a silver lining during these stressful times. Covid-19 lockdown has taught us the importance of hygiene, importance of maintaining good health, work-life balance amongst many other things. Another positive is that the lockdowns and social distancing norms have given a push for digital learning platforms. Many social media platforms like YouTube and Facebook are also used as substitutes for classroom teaching or training in both formal and informal education systems.

### AGRICULTURAL EXTENSION AND SOCIAL MEDIA

Agricultural extension has also quickly adjusted to the new normal and has started to increasingly use social media platforms to reach out to the farmers. In this blog, we argue that, though increase in use of social media use seems to be a good option for reaching out to a large number of farmers, which is economical both in terms of cost and time, this digital transition of agriculture brings with it a new set of challenges. One of those challenges is related to fake news and polarization, which might become serious issues for transferring new and scientifically valid knowledge. Hope some of you might have viewed the

'viral' documentary "The Social Dilemma" streamed on Netflix. (<https://www.youtube.com/watch?v=uaaC57tcci0>). The documentary

talks about the monetization of social media platforms (Box 1); they earn money if we spend more time on social media.

### Box 1: Monetization model of social media

We might think that YouTube, Facebook and many other social media services are platforms which are free and for a humanitarian cause; but these platforms earn by making us spend time on them. As stated in the documentary "if you are not paying for a product, then you are the product", social media platforms mint money by selling our attention, time or precisely by subtly changing our perceptions and behaviors. These social medias are run by algorithms, or simply say machine learning tools, which tracks activity of each user, including likes and dislikes, the posts scrolled, commented, time of videos paused and viewed content, and based on these individual access and usage analysis, the Artificial Intelligence system further shows us the content which is most likely to get us addicted and make spend more time. These are based on thorough knowledge of psychological principles aimed at getting us glued to social media feed. In summary, social media platforms have no incentive to show you what is useful to you in your media feed. What the algorithm tries to do is to learn from your past activities, and suggests similar content, to make you spend more time on these platforms. (Think of this next time when you open your Social Media feed. Know this for a fact that even when you know social media is trying to show you the things you might like and make you addicted (in reality the content may be useless), it is hard to refrain from watching it. Scary isn't it? Well who is in charge of your life now?



Source: Illustration by Sandeep Joshi-<https://www.tribuneindia.com/news/archive/business/punjab-govt-to-reach-out-to-farmers-via-social-media-679679>

Let us turn our focus on understanding what this means for using social media for agricultural extension. Most agriculture extension agencies have used Facebook live sessions for reaching out to farmers. Few others Agricultural Practices on YouTube (read recent have created and uploaded videos on Good blog by Tamizhkumaran and Saravanan 2020a) and shared links to farmers using different social media like WhatsApp. Everyone is aware of the advantages of e-Extension or digital extension; it can reach large number of people, saves time and money, and can effectively integrate multimedia into content. A study by

Bhattacharjee and Saravanan (2016) on social media in agricultural extension showed that Facebook is the most popular social media. The study also raised concerns on lack of authenticity of the information shared online.

Let us take a minute to look at the possible challenges that we, as an extension system, has to face in future. This is a possible offshoot of social media use.

Cost-effective smartphones, internet packs and local language support has increased social media use by rural populations in recent times.



Covid-19 lockdown has provided a further push to it (read Tamizhkumaran and Saravanan 2020b). From a utopian perspective, it is for the good that any person can access to essentially limitless quantity of information easily with a click. Paradoxically, it has become a much tougher job to discern the authenticity of information available on the internet. How to say which information is correct and which is not? Seems like a philosophical question for which there is no straightforward answer.

### Fake News

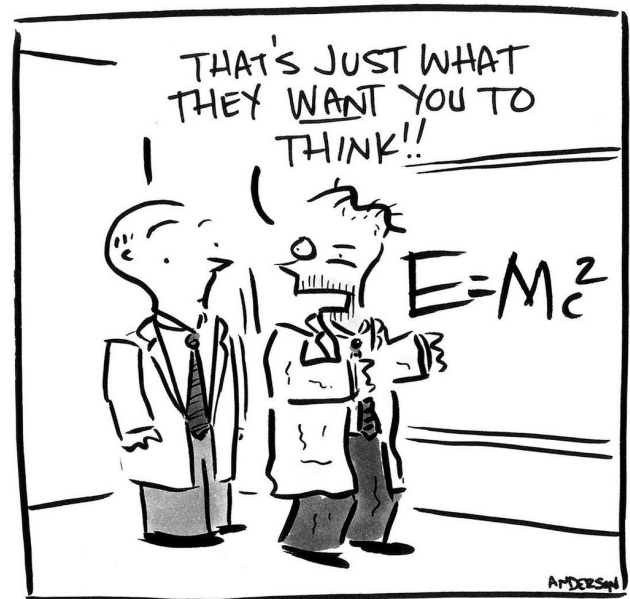
Research indicates that fake news spreads six times faster than authentic news (Visoughi et al 2018). There are famous cases of conspiracy theories, which seems like outright rubbish, but have a huge supporter base. Have you ever heard 'Earth is Flat' conspiracy theory? Many videos that claim the earth is flat have millions of views (<http://tinyurl.com/cbyf6p2f> is the link if you wish to watch it. But, let us warn you, you might get many similar videos in your YouTube recommendations! Hope you won't end up being supporter of flat earth theories!). There is a separate class of people who believe in it.

Even during Covid-19 times, many conspiracy theories claimed that Covid-19 is a hoax to keep people indoors, leading to massive protests across the USA and Germany against lockdown measures. There are continuous efforts by various international organizations to quell these conspiracy theories (Ball and Maxmen 2020).

So, how will the fake news that floods social media affect farmers and what are its implications for agricultural extension? To begin with, there is no dearth of conspiracy theories in agriculture. People have various kinds of theories to say that all modern agricultural practices are harmful to both environmental and soil health, there are magical formulations which can control all kinds of pests and diseases, and the list goes on. When a farmer either watch such videos or comes across such content a few times, there are chances that he/she might believe in few of them. It could lead to dangerous consequences. A more recent incidence is effect of fake news on sale of animal products during the early days of the pandemic. There was a delay by the

government agencies in clearing these rumors (Chander et al 2020).

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Conspiracy theory of relativity

Source: <https://andertoons.com/science/cartoon/6154/scientist-equation-conspiracy-theory-of-relativity>

Let us consider an example. A farmer, let us call him 'X', watches a couple of Facebook/YouTube videos and posts that claim that new ordinances or policies the government has made is to promote private interest and farmers get nothing from it (though truth may be farfetched from it). The same is also true of Facebook and video posts from beneficiaries of a policy when they try to present only one side of the story that goes with their interests. The machine learning algorithms of Facebook and YouTube estimate that if videos and post which X has seen before are shown, there is higher likelihood of them being watched. In turn, X spends more time in doing so (the more time X spends on social media, and it is good for the platforms as they can push more advertisements and earn more). So next time X opens his social media feed, he/she finds more content which is similar to content he/she has watched earlier, and reaffirms his/her views that the policy is bad. He/she individually builds a lopsided view of the issue, which results in confirmation bias; we generally search for evidences which support our hypotheses and tend to ignore the information which is not consistent with our earlier hypotheses, rather than objectively looking at the evidence.

## Polarization

This reaffirmation of one-sided information leads to what is called 'Polarization'; people with extreme opinions on either side of any issue. And it is extremely difficult for anyone to change their opinions as we are in such an era where people often consider the information they read on the internet as more authentic than what the person in front of them says (to quote a famous dialogue of another web series Patal Lok, the lead character Hathiram Choudhary says "Aise Mahabharata me likha hai, lekin maine WhatsApp me pada hai!!; English translation- "...Its written in Mahabharata, but I read it in WhatsApp "). Similar perceptions might result in technology adoptions as well. For instance, claims on using cow urine and dung alone to maintain soil fertility has got lot of traction online. But, these recommendations may work only in a few places and for a few soil types but are not generalizable. Extension agents are also not immune to confirmation bias!

## IMPLICATIONS FOR AGRICULTURAL EXTENSION



Source: <http://tinyurl.com/yt66b8u5>

This can be a real tough challenge going forward. There is a saying that incomplete knowledge is more dangerous than ignorance. When pushing for adoption of new technologies, perceptions shaped through exposure to social media can act as a major hindrance. It takes a lot of effort to make farmers unlearn and look at other side of the story. With the internet, you can find evidence for almost any type of hypotheses (for example,

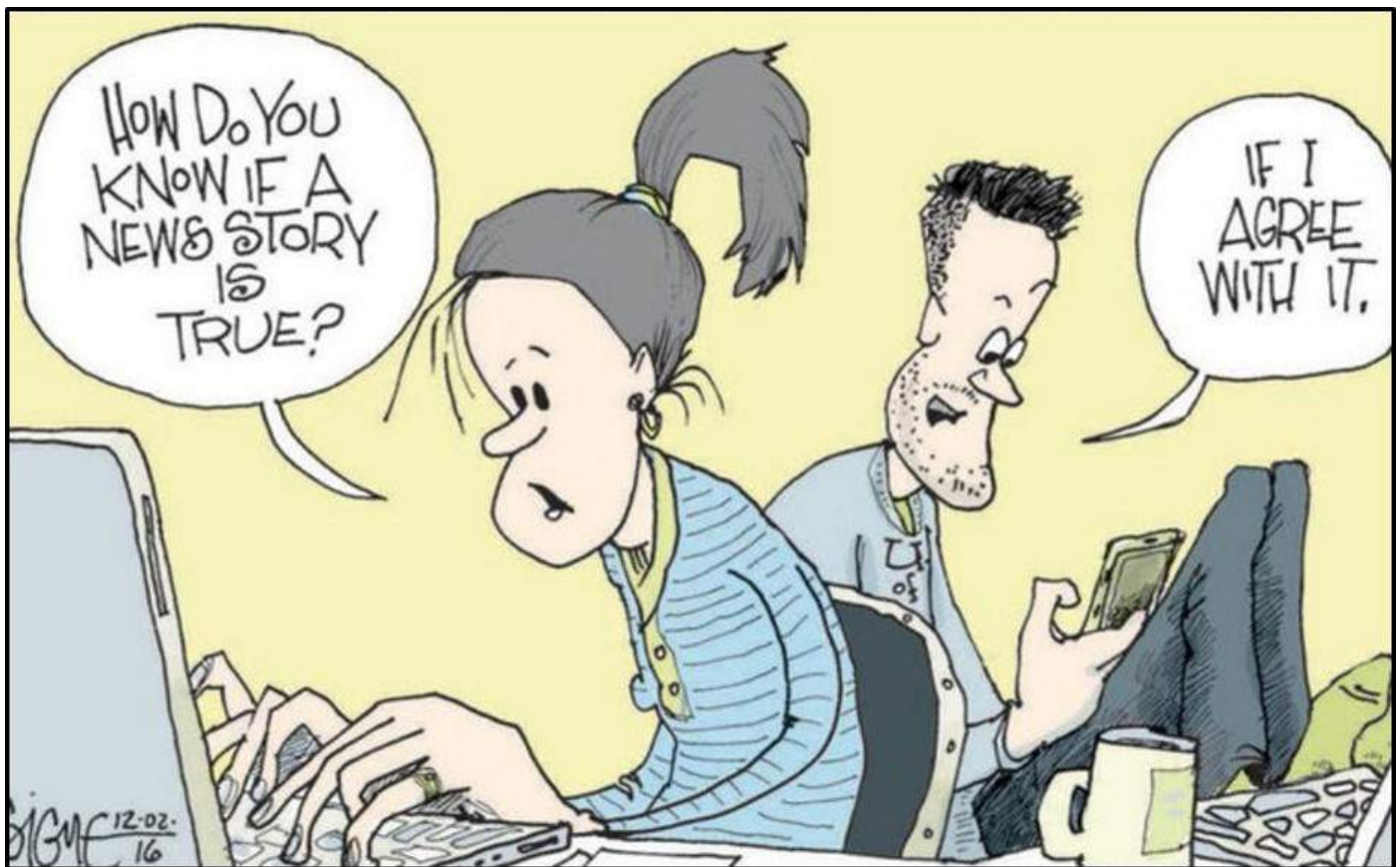
there is a hypothesis that 5G towers caused Covid-19. Later, YouTube removed all videos that had claimed a link between 5G and Covid-19 but it was too late). Watch the BBC documentary here <https://www.youtube.com/watch?v=Gi5dOvIMCgE>.

Fake news is not new; the ways and means to spread them have improved due to internet and social media. Algorithms developed as business models for advertisement targeting are inadvertently helping spread false information at a rapid pace. People have little incentive to be true when they are making social media content; incentives are large to look good and appeal to more people. Platforms have no incentive to push for contents which are factually correct (even identifying fake news is a herculean task in itself), they want to push content which audience are more likely to see and spend time on.

So, how do we, as agriculture extension professionals, address the issues of fake news and polarization? We really don't have a definitive answer to this, but wish to highlight some possible strategies.

Social media is here to stay and we need to address the elephant in the room; we need to train both extension agents and farmers in discerning authenticity of the information they obtain through the internet. Farmers need to be taught that whatever they see or read on the internet cannot be considered true. One option is to advice farmers to discuss new information or some interesting things that they saw or read on the internet, in closed social media groups in the presence of experts or in groups mediated by extension personnel. Also, extension organizations and research institutes need to play a pro-active role in quashing fake news in the initial stages itself.

World Health Organization is playing that role in controlling fake news related to Covid-19. We need organizations to shepherd media content, identify fake news and flag it. Social media platforms like Facebook have stringent policies against fake news and if an organization can identify and report fake contents, they will take quick action. Also, we need more research to understand roots of the problem, which often forms a part of the solution we are looking for.



Source: <https://theconversation.com/science-contre-fake-news-la-bataille-est-engagee-90161>

PS: There is a difference between using ICT in extension verses using Social media platforms for extension. As discussed, social media has a business model behind it which using its algorithm might not be as benign as we think.

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# 20

## AI-ENABLED SOLUTIONS IN INDIAN AGRICULTURE: THE WAY FORWARD

In this blog, **Suchandra Dutta, Aditya Sinha, and Debabrata Basu** discuss how Artificial Intelligence (AI) technology is shaping our response to addressing several challenges in Indian Agriculture.

Artificial intelligence (AI) is a multi-approached interdisciplinary science that seeks human intelligence simulation in machines designed to think like humans and imitate their behaviours, such as learning and problem solving. Research scientists and extension professionals are currently using AI technologies to address problems in agricultural production. AI technologies can help farmers to generate more yields by selecting appropriate crop varieties, adopting better practices in soil and nutrient management, pest and disease management, and help the government in determining crop production estimates and predicting commodity prices.

### AI IN AGRICULTURE

AI uses machine learning, deep learning, image processing, artificial neural network, Wireless Sensor Network (WSN) technology, robotics, Internet of Things (IoT) technologies, and many more advanced tools to render solutions to agricultural problems. For instance, a rice forecasting model, pest attack prediction, and advisories for sowing developed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in collaboration with Microsoft<sup>1</sup> is a major initiative towards creating increased income and providing stability for the agricultural community. Using the Internet of Things (IoT) technologies, Infosys<sup>2</sup> has built a precision crop management testbed to address the increasing demand for food. The testbed focussed on improving crop yield through the analysis of real-time data obtained from environmental sensors located in the commercial crop fields. Intello Labs,<sup>3</sup> uses image-recognition software to monitor crops and predict farm yields. Aibono<sup>4</sup> uses agri data science and AI to provide solutions to stabilise crop yields. Trithi Robotics<sup>5</sup> uses drone technology to allow farmers to monitor crops in real time and provide precise analysis of their soil.

These AI technologies can now help farmers to monitor several items in real time, such as weather, temperature, water usage, or soil conditions obtained from their farm to better inform their decisions (Armstrong et al. 2020). Using artificial intelligence we can establish smart farming practices to reduce farmers' losses and provide them with high yields.

The mechanism that drives smart farming is Machine Learning, which is a subset of AI (Figure 1). It is the one of the outstanding tools to analyse, understand, and identify a pattern in agricultural operational environments. Machine learning begins with a seed being planted in the soil – starting with soil preparation, then seeds breeding and water feeding measurements– and it ends when robots pick up the harvest determining the ripeness with the help of computer vision.

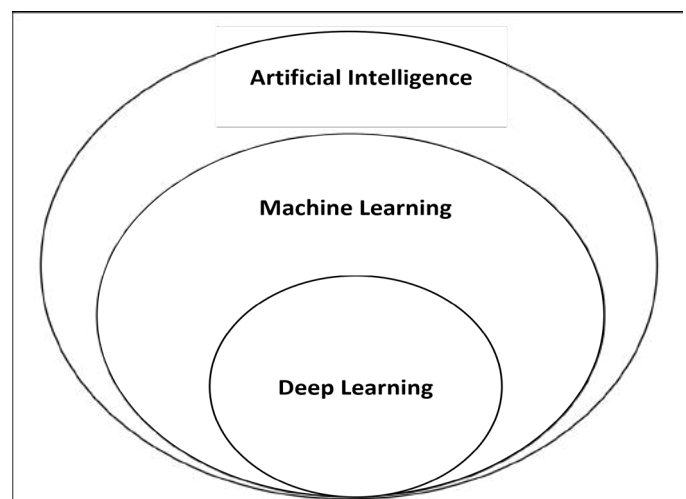
An example of a firm engaged in such activity is SatSure,<sup>6</sup> which is a start up with roots in India, using machine learning techniques to assess images of farms and predict the economic value of their future yield. They respond to emerging risks with advanced warnings and decisional insights. Field operations are improved through strategic information gained from satellites, sensors, and markets. Furthermore, the health of large areas is monitored remotely and crop yields predicted accurately. SatSure has recently partnered with agricultural insurance companies in India, such as Reliance General Insurance Company Limited (RGICL), for satellite-based monitoring of crops and using predictive analytics for improving the efficiency of crop insurance operations.

Similarly, Deep Learning is another AI tool which is a subset of Machine learning (Figure1) that is mainly used to solve the problem of writing a particular programme for every object to be identified. It saves both time and efforts of a programmer who needs to undertake the tasks of feature specification or optimisation (Ahir et al. 2020). Plantix,<sup>7</sup> a mobile crop advisory app for farmers, extension workers and gardeners, has been developed by Progressive Environmental & Agricultural Technologies (PEAT), Germany, in collaboration with its knowledge and extension partner, ICRIASAT, and the Acharya N G Ranga Agricultural

University.<sup>8</sup> It uses deep learning techniques to diagnose pest damages, plant diseases and nutrient deficiencies affecting crops, and offers corresponding treatment measures.

### **Use of AI tools (satellite imagery and drones) for prediction**

A wealth of new data opportunities has opened up the emergence of artificial intelligence along with its associated technologies. Remote sensors and satellites can gather information continuously over an entire field. These can monitor the health of plants, soil condition, temperature, humidity, etc. Remote sensors allow algorithms to interpret the environment of a field as statistical data that can be understood and then used for decision-making by farmers. The more inputs and statistical information collected, the better the algorithm will be at predicting a range of outcomes. The aim is for farmers to use this artificial intelligence to achieve the goal of a better harvest through better decision-making on the field.



**Figure 1: Subset of Artificial Intelligence (Dutta et al. 2020)**

Machine learning algorithms, together with images captured by satellites and drones, could enable AI technologies to help predict weather conditions, analyse crop sustainability and evaluate farms for the presence of diseases or pests and poor plant nutrition on farms – based on data such as temperature, precipitation, wind speed, and solar radiation. The current environmental conditions make it difficult for farmers to predict rainfall, soil conditions, and groundwater levels. Artificial intelligence can play a key role in modernizing agricultural activities.

The aim is to allow farmers to gain a shrewder overview of the scenario on the farm through technological advancement (such as remote sensing) that would tell them more about their situation than they can see with their naked eye. It is not just more accurate but also quicker than visually seeing it by walking or driving through the fields.

### Customized farm-based advisories

The nature of the extension system and approach could be redesigned to make location-specific agro meteorological information and sensor-based soil, plant, water and pest conditions useful for farmers' expert systems. If these technologies are

made easily available and user-friendly, it can support millions of farmers across India. These AI techniques can also be the enabler of a paradigm shift from location-based advisory services to personalized and context-specific advisories for the millions of farmers in our country. A large amount of data – from government and public websites or real-time monitoring of various crop & field data – can be analysed with precision. In addition, comprehensive testing and validation of emerging AI applications in this sector will be crucial, because unlike other fields where risk is easier to model and forecast, agriculture is impacted by environmental factors that cannot be tracked.

### Box 1: AI-based sowing advisories with comprehensible visualizations by ICRISAT

In collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, Microsoft has developed an AI-Sowing App powered by Cortana Intelligence Suite that includes Machine Learning and Power BI (for providing interactive visualizations for easy understanding of the data). The app sends sowing advisories to participating farmers on the optimal date to sow. Farmers don't need to install any sensors in their fields or incur any capital expenditure. All they need is a feature phone capable of receiving text messages. The advisories contain essential information including the optimal sowing date, soil test-based fertilizer application, farmyard manure application, seed treatment, optimum sowing depth, and more. In tandem with the app, a personalised village advisory dashboard provides important insights into soil health, recommended fertilizer, and seven-day weather forecasts. In 2017, the programme was expanded to touch more than 3,000 farmers across the states of Andhra Pradesh and Karnataka during the Kharif crop cycle (rainy season) for a host of crops including groundnut, ragi, maize, rice and cotton, among others. The increase in yield ranged from 10% to 30% across crops.



For a multi-lingual society such as India's, with farmers having limited knowledge of advanced tools and techniques, AI techniques like auto-translation among various languages, 'text to speech' and 'speech to text' in Indian languages can help the farmers in accessing the required knowledge generated by the National Agricultural Research and Education System (NARES).

However, the practical challenges that farmers face are: inadequate availability of AI expertise,

manpower and skilling opportunities; high resource cost and low awareness for adopting AI in farming processes; ambiguous privacy, security and ethical regulations.

### APPLICATION OF AI IN GOVERNMENT INITIATIVES AND AGRI-STARTUPS IN INDIA

Realising the importance of AI, the Government of India has adopted AI technologies in several developmental initiatives. A few examples are given in Table 1.

**Table 1: Application of AI in the initiatives of the Government of India**

Initiative	Purpose of AI	Role of AI	User of AI technology
Pradhan Mantri Fasal Bima Yojana (PMFBY)	Provide financial assistance	Reduced time lag of claims using remote sensing data	Insurance companies and Farmers
Crop yield prediction model (In partnership with NITI Aayog and IBM)	Predict crop yield and provide real time advisory to farmers	Improve crop productivity, soil yield, control agricultural inputs, and early warning on pest/disease outbreak using data from remote sensing (ISRO), soil health cards, IMD's weather prediction and soil moisture/temperature, crop phenology, etc., to give accurate prescriptions to farmers	Farmers, Extension Personnel, and Policy makers
Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)	Provide income support to all landholding farmers' families for procuring various inputs related to agriculture and allied activities, as well as domestic needs	Establish a proper overall growth structure for farmers and agri-sector by collecting enormous amounts of data from multiple government agri-schemes	All landholding farmers' families
AGRI-UDAAN	Promote innovative agricultural protection technologies	Mentor and direct shortlisted Agristart-ups with creative business models to strengthen their operations, develop marketing, enhance product validation and planning of business plans, risk analysis, customer engagement, finance management, and fundraising	Agri-entrepreneurs, Potential Investors, Farmers and Policy makers
Krishi Megh	Provide real time data related to agriculture	Equipped with AI, deep learning software and tools which will be of importance in pest detection through the analysis of images, detection of fruit ripening, various diseases affecting livestock, and other related aspects	Agriculture researchers, Extension professionals, and Farmers

In the 2019 budget, Finance Minister Nirmala Sitharaman emphasised "*Gaon, Garibaur Kisan*" as the government's agenda. AgriTech has become a booming field in India, with a range of start-ups working with technologies such as data analytics, machine learning and satellite imagery, among others, enabling farmers to optimise their production. According to a National Association of Software and Service

Companies (NASSCOM) report, the Indian Government specifically supports AgriTech start-ups through its start-up India programme. With more than 500 AgriTech start-ups in India, the agritech momentum is gaining pace in India. Some of the recently launched and promising agristart-ups in India utilizing AI in farming are shown in Table 2.

**Table 2: Application of AI in Agricultural Start-Ups in India**

Agristart-ups using AI	What it does	Utility
Gobasco (Gurgaon- and Lucknow-based AgriTechstartup founded in 2017)	Provide solutions that include transaction discovery, procurement optimization, and optimising transportation with real-time data. They employ real-time data analytics aided with AI-optimized automated pipelines to dramatically increase the efficiency of the current agri supply-chain.	Data-driven online agri-marketplace gives both the producers and buyers the best prices at their fingertips by leveraging real-time data analytics on data streams.
CropIn (Bengaluru-based AgriTech start-up founded in 2010)	A full suite of farm management, monitoring and analytics solutions. Using AI they developed a new product called SmartRisk to identify and minimise the risk in lending and insurance business.	Digitise farmer producer organisations and also to help farmers fight climate change through climate resilience programmes.
Stellapps (IIT Madras incubated, Bangalore- based, Internet of Things (IoT) start-up founded in 2011)	Digitization of the dairy supply chain	Digitize & optimise milk production, milk procurement & cold chain management through SmartMoo™ platform (Full Stack IoT solution) which helps dairy farmers and cooperatives maximize profits while minimizing effort
AgricxLab (Thane-based online B2B platform founded in 2016)	Reduce cost of cultivation and increase quality and yield, through an AI-powered platform for horticulture, delivering farm specific, crop specific, crop-stage specific, actionable advisories. Propagate sustainable agriculture and provide solutions that impact social, economic and environmental facets.	It records a variety of growing conditions on the farm and then uses artificial intelligence and data science to make on-farm predictions.

**BENEFITS OF AI**

The agricultural sector is embracing the use of AI technologies to improve decision making. The use of data in agriculture is increasingly being utilized and processed for decision making. This is made possible through developments made within the sector such as increased use of sensors, improved rate of access to satellite images, reduced costs of data loggers, increased use of drones, and better access to government data repositories.

AI in agriculture is emerging in the following categories:

- i. Soil and Crop Monitoring: The monitoring of crops and soil is a common application of artificial intelligence. Data can be obtained using technologies such as Internet of Things (IoT), drones, and field satellite imagery, and then tracked and analysed by AI-based applications to find the right solutions. AI-enabled applications promote the understanding of soil defects, plant pests



and diseases. Data can be analysed very quickly and easily with the aid of machine learning algorithms. Mobile agricultural apps can help farmers evaluate crop data, keep records, monitor weather changes, and generally run their farms more efficiently.

ii. Predictive analytics: AI technology is useful to predict the weather and other conditions related to agriculture such as quality of the soil, weather and groundwater level, etc. It is speculated that AI-based advisories would be useful to extend production by 30%. The biggest challenge to farming is crop damage due to different kinds of disasters, including pest attacks. Most of the time, due to lack of proper information farmers lose their crops. AI-enabled image recognition is going to be useful in such cases. The data will also be useful in enhancing production.

iii. Increasing efficiency of farm mechanisation: Image classification tools combined with remote- and local-sensed data can bring a revolutionary change in utilisation and efficiency of farm machinery, especially in areas of weed removal, early disease identification, produce harvesting and grading. Horticultural practices require a lot of monitoring at all levels of plant growth and AI tools provide round-the-clock

monitoring of these high value products. The unavailability of farm labour has led to the introduction of self-driving tractors. Mahindra and Mahindra Ltd,<sup>9</sup> India's largest manufacturer of tractors, showcased its first driverless tractor in September 2019. Mahindra's tractor can steer automatically using GPS-based technology, lift tools from the ground, recognise the boundaries of a farm, and can be operated remotely using a tablet.

iv. Increasing the share of price realisation to producers: Current low levels of price realisation to farmers (as low as 20% in fruits and vegetables) are primarily due to ineffective price discovery and dissemination mechanisms, supply chain intermediary inefficiency, and local regulations. Predictive analytics using AI tools can provide more accurate supply and demand information to farmers, thus reducing information asymmetry between farmers and intermediaries. As commodity prices are interlinked globally, big data analysis becomes imperative. Data from e-NAM, Agricultural Census (with data on over 138 million operational holdings), AGMARKET and over 110 million Soil Health Samples provide the volumes required for any predictive modelling.

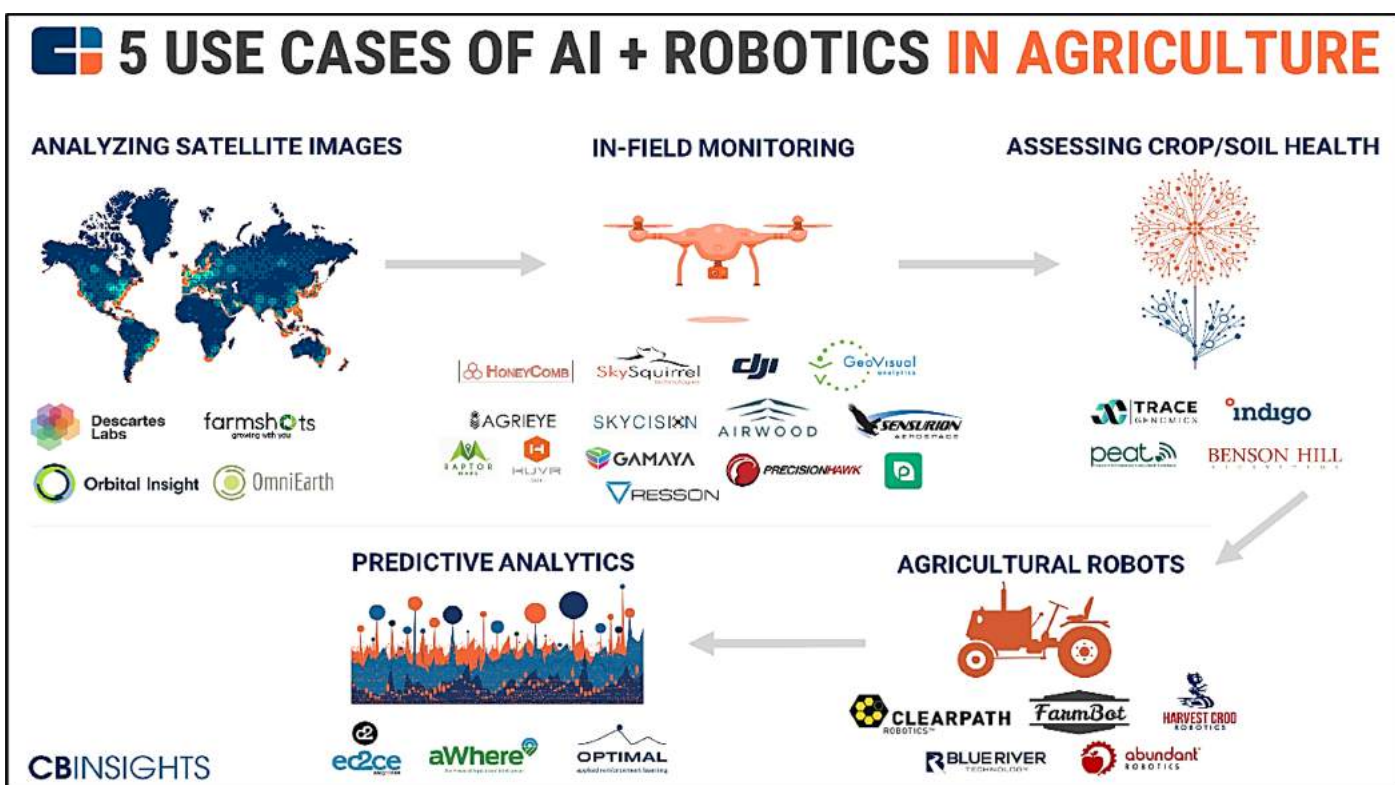


Figure 2: Various uses of AI in agriculture (cbinsights.com)

## CHALLENGES IN IMPLEMENTING AI IN INDIAN AGRICULTURE

Although AI is seen as a prospective technology to provide us with life-changing agricultural solutions, it is well known that AI relies solely on the quality of available data. This is a big challenge in the Indian context, especially with regard to getting the data required at farmers' level. Data collection is a problem, but as privacy issues are common individuals are often not happy to share their data. Therefore, a technical approach to data collection is necessary. We need to devise ways to collect data without infringing on farmers' privacy, in an automated manner.

While applying AI technology it must be noted that most farmers in India have very small landholdings as well as low resource base. Thus, the extension personnel must encourage the farmer to look at agriculture as a business and use AI technology to increase their profit sustainably. There is also a need to generate farmers' interest in using the AI model already available in the market. Suitable demonstration and training must be given on using specific AI-based technology to farmers. AI technology is needed to solve real issues on the ground. For broader adoption, AI needs to

be applicable, affordable, accessible, achievable and sustainable.

## FUTURE PROSPECTS AND CONCLUDING THOUGHTS

AI has immense potential in the current decade within the context of developing countries, such as India. The solutions offered by AI could help in the precise monitoring of crops and deal with the issue of labour shortages that is found in agriculture to a large extent.

With improvement in the IT infrastructure of the country, we are very well-poised to harness the potential of AI technologies in agriculture, and thus contribute to enhanced agricultural growth. To exploit the full potential of AI, there is a need to orient the students studying agriculture on applying AI technology in agriculture. Artificial Intelligence in agriculture should be added in the UG curriculum to increase their interest and awareness of the rapid advancements in this area. We also need more collaboration among agricultural scientists, machine learning engineers, and data specialists to develop relevant AI applications in agriculture.

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## ENDNOTES

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<sup>2</sup><https://www.infosys.com/services/engineering-services/features-opinions/precision-crop-testbed.html>

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<sup>7</sup><https://plantix.net/en/>

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# 21

## ENHANCING THE CONTRIBUTION OF TELEVISION TO AGRICULTURAL EXTENSION IN BANGLADESH

Television programmes on agricultural topics are attracting a lot of viewers in Bangladesh. It is also inspiring youth to take up agriculture as an important profession. But the potential of these programmes could be significantly enhanced if the producers consider making some improvements in the programme content and delivery format, argues **Wais Kabir** in this blog.

Television programmes on agriculture are widely regarded as a significant tool of agriculture extension because they can reach a huge number of farmers all at once. These programmes can provide them with knowledge and information relating to many aspects of agricultural production, processing and marketing. It is encouraging to see many TV channels in Bangladesh presenting agricultural programmes which are attracting viewers from all sections of life. Inspired by *Mati o Manush* (Soil and People) programme from the mid-1980s (Box 1) in the public sector Bangladesh Television, several other private channels, have started their own agricultural programmes. Currently, Bangladesh has 31 TV channels broadcasting either agricultural reports or dedicated programmes; two are from the government and rest are from the private sector. Names of some of these TV channels and their year of establishment are provided in Table 1 for reference.

### Box 1: *Mati O Manush*

*Mati O Manush* was originally called *Amar Desh* and it was a pioneering television programme on Bangladesh Television. The programme started in 1978 and covered a wide range of programmes on the rural livelihood-based economy, including agriculture. The programme was renamed as *Mati O Manush* in 1980 and was dedicated to agriculture. It is one of the most popular and oldest programmes of Bangladesh Television. Afterwards, most television channels produced programmes on agriculture that was based on the *Mati O Manush* model. This programme was able to successfully impact television viewers on agriculture and attracted intellectuals and young professionals in electronic media.

TV channels have dedicated programmes on agriculture (Table 1) such as *Mati o Manush*, *Banglar Krishi*, *Krishi Dibanishi*, *Hridoye Mati o Manush*, *Hridoye Mati o Manusher Dak*, *Fire Cholo Matir Tane*, *Shamol Bangla*, *Shabuj Bangla*, *Deepto Krishi*, *Matir Shubash*, *Shonali Din*, *Krishi Jog*, *Khamarbari* etc., and all are in Bangla language (Choudhury et al. 2020). These agricultural programmes have created

awareness about the recent developments in agriculture and aided in development of skillful farmers and concerned stakeholders.

Apart from the dedicated agricultural programmes discussed, the TV news programmes also cover information related to agricultural production constraints and successes. The prime focus of most of the programmes is on application of agricultural technologies/success stories from different parts of the country. One of these channels (Channel 1) and another news-based channel (*Ekattor*) broadcast separate agriculture bulletins.

Some dedicated programmes are telecast weekly along with Question and Answer sessions. The Ministry of Agriculture, Bangladesh, also broadcasts agricultural news and daily programmes in the name of *Banglar Krishi* (Agri of Bangla) on TV channels. The Agriculture Information Service (AIS) under this ministry covers TV programmes on different agriculture development initiatives. In the current COVID-19 pandemic situation, many viewers in rural and urban areas are confined at home and are spending more time watching television.

**Table 1: TV channels in Bangladesh showing agricultural programmes**

No.	Name	Establishment Year	No.	Name	Establishment Year
1.	Bangladesh Television (BTV)-State owned	1964	11.	Channel 9	2010
2.	ATN Bangla	1998	12.	Maasranga TV	2010
3.	Channel i	1999	13.	Mohona TV	2010
4.	Ekushey Television	2000	14.	My TV	2010
5.	NTV	2003	15.	Gazi TV (GTV)	2012
6.	RTV	2005	16.	Asain TV	2013
7.	Bangla Vision	2005	17.	Bangla TV	2017
8.	Boishakhi TV	2005	18.	Nagorik	2018
9.	BTV World-State owned	2005	19.	Ekattor	2012-
10.	Diganta Television	2007	20.	BTV Chottogram State owned	---
<b>News channels</b>					
1.	ATN News	2010	5.	Channel 24	2012
2.	Independent Television	2010	6.	Jamuna TV	2014
3.	Somoy TV	2011	7.	News 24	2016
4.	Ekattor TV	2012	8.	DBC	2016

Source: Alam and Haque (2014)



Shooting at an aquaculture pond

## CONTENT OF AGRICULTURAL PROGRAMMES

The contents of a few of these agricultural programmes were appreciated at national and international levels, which brought recognition for these TV channels and media personalities that encouraged them to work further on broadcasting and improvising more agricultural programmes. Although there is an impressive record of agricultural programmes on TV, there are some concerns that need to be taken care of with regard to the content of programmes. Most of these programmes had similar content – role of agriculture in the economy of the country, more crop related information with limited focus on market opportunities, pricing or agri-business aspects. It covered a narrow range of topics, thus limiting its potential. Seasonal crop-based reporting is quite visible on these channels. The content is covered in the form of news, discussions and sponsored programmes on agriculture-related aspects. There is a need to broaden the content of these agricultural programmes considering the fact that agriculture is going beyond rural livelihood and production. Moreover, many other actors are involved in agriculture now, including legal, business, post-harvest management, supply chain and so on.

To understand the different perspectives on agricultural programmes telecasted in Bangladesh, I interacted with some experts who deal with development and broadcasting of agricultural programmes. Some of these discussions revealed that company management as well as production managers in most of the TV channels are not interested in investing additional time in understanding the topic and resources, especially logistics that are needed for developing more innovative

agricultural programmes as these programmes are not that profitable to the channel.



Dr Kazi Khaliqzaman Ahmad, Renowned Economist being interviewed by Mr Rezaul Karim Siddique, Anchor Mati O Manush, Bangladesh

Meanwhile, some hard truths about content being telecast were also revealed during these discussions, such as those given below:

- Usually, success stories are presented. Success has come about through the application of one or two production technologies without considering either the spatial and temporal variations of the technological package or the total package of practices that led to the success story.
- The risks associated with technology are not usually demonstrated. Many youngsters watching these 'success stories' on television get inspired by the potential of getting higher income. So they invest their money (some of it coming through remittances from abroad) in farming without fully realising the risks (natural disasters, pest and disease management, market fluctuations), and without the necessary agri-business expertise, to be successful in such an enterprise.
- Talk shows are usually organized with public research and extension personnel and there is no critical analysis of the outcomes of applying new technologies, especially on aspects related to marketing and income of farmers. Only yield is highlighted and agricultural programmes are still traditional and follow a monologue format. While many other news programmes follow a panel discussion format that allows a more thorough discussion on the socio economic

aspects and benefits of any new information, agricultural programmes are still traditional and follow a monologue format. While there exists a wide range of perspectives and pathways in agriculture, this is less evident in the agricultural programmes telecasted.



**Preparation for shooting a documentary on Mati o Manush for a German TV channel**

- The TV programmes sponsored by companies are usually limited to the format suggested by the companies with little or no scope for highlighting risks. This is mostly designed to propagate public attention on the company’s products, especially agro-inputs.
- Reporting with partial science-based findings affect the production process and also creates panic among consumers (fear of adding ripening agents in fruits, antibiotic use in animals, adulterated feed, etc.). TV programs may take opportunity of distinguishing facts and fiction prevailing among the producers and consumers.

## WHAT NEEDS TO CHANGE?

### Programme Development

To exploit the full potential of television as an important extension channel, a few changes have to be made in the way agricultural programmes are made for Television (Table 2).

**Table 2. Shift needed in agricultural TV programmes**

Area	From	To
<b>Format</b>	Monologue	Debate
<b>Invited Experts</b>	Only public sector	More diversified (public, private, academia, CSO and NGOs)
	Research and Extension	All stakeholders in agriculture including those providing services related to credit, marketing, , value addition, testing, certification and standards, etc.
<b>Content</b>	Production focus	Value chain focusing on production, pest and disease management, marketing (surplus/deficit), trade, quality standards, value addition. climate change impacting agriculture, policy environment)
	Success stories	More balanced discussing both pros and cons, including the challenges, and how these are addressed as well as the risks  This may include pest and disease prevalence in crops and livestock, drought/flood occurrence, surplus/deficit production of specific commodity for market operators to act upon, and so on.
<b>Auditing for technical correctness and research evidence</b>	Almost nil	Scrutiny of technical content before telecasting (more evidence-based)

## Professionalising the production of agricultural programmes

A number of institutions in Bangladesh offer formal training in media. These include:

- National Institute of Mass Communication under the Ministry of Information;
- Mass Communication and Journalism of University of Dhaka;
- The Department of Mass Communication and Journalism (MCJ) of Rajshahi University;
- Journalism and Media Studies, Jahangir Nagar University;
- Department of Mass Communication and Journalism, Jagannath University;
- Bangladesh Cinema and Television Institute under the Ministry of Information.

Many of the young staff in the television industry are graduates of these institutions and they have advanced knowledge as well as the skills needed by the media industry. But there are only few professionals having a background in agriculture as well as media. Considering the importance of agricultural extension to accelerate the process of adoption of new knowledge by farmers, it is important to establish either faculty specialized in agricultural media production under extension education in the agricultural universities or develop collaborative programmes by the Agricultural Universities with some of the above mentioned institutions that specialize in media.

## IMPACT ON FARMER BEHAVIOUR

There are several cases of TV programmes influencing farmers to adopt new practices. The programmes are also inspiring several youngsters and new entrepreneurs to invest in farming and other allied enterprises including animal rearing, culture fisheries, value addition, processing, etc. The programmes are also attracting youth to return to the villages and invest in their own lands instead of seeking jobs in the cities which are becoming more crowded and polluted. Overall, the programmes relating to farming in Bangladesh and abroad has changed the perception of agriculture as a poor or uneducated man's occupation. With advances in agro-meteorology, weather forecasts have become more accurate. Collaboration between officials of Agriculture

and Meteorology has improved recently. Considering the wide diversity of production environments in the country, TV channels should get more involved with farm advisory services with predicted values of weather parameters in specific locations or regions.

However, there is need for more research on the impact of television programmes on changes in farmer behaviour. Currently only very few empirical studies are available in this area. Alam and Haque (2014) noted that *Mati O Manush* agricultural programmes broadcasted by BTV were preferred by the majority of respondents in their survey. The study found the following programmes as preferred by farmers which are given here.

1. *Mati O Manush* (BTV);
2. *Krishi Dibanishi* broadcasted by BTV and Channel I;
3. *Desh O Jonopoder Khobor, Hridoye Mati O Manusher Dak, Hridoye Mati o Manush* broadcasted by BTV, Channel I (equal preference for all three).

Variations in the contents of programmes and fulfilling the expectations of farmers could be reasons for the highest preference towards these programmes. The study conducted by Chaudhury et al. (2020) showed that farmers have a moderately favourable attitude towards agricultural programmes and there is need for telecasting relevant information by TV channels if the attitude of farmers towards agricultural programmes are to be boosted.

## IMPACT ON POLICY ACTORS

Some of the agricultural programmes on television are also informing the policy makers on the magnitude of some of the field problems and the importance of taking urgent action. These include aspects related to risks to existing crops due to pest attack or natural disasters, embankment failure in the river flood plains, salinity ingress in the coastal tidal zone, declining groundwater as a result of over exploitation, environmental degradation affecting production, loss of biodiversity as a result of mono cropping, food safety, nutrition and food habits, declining profit margins from agriculture, etc.



## END NOTE

To enhance the contribution of agricultural TV programmes to Bangladesh's agriculture, firstly, we need to have more empirical studies on their impact on farmer behavior, farm practice and also viewer preferences.

Secondly, we also need to broaden the scope of agricultural programmes in television beyond crop production technologies. The programmes should lay equal emphasis on other diversified rural sectors and enterprises involving a wide range of experts from the public, private, CSOs, educationist, and NGO sectors.

Thirdly, there should be more public discussions on agriculture and allied sectors, including topics related to livelihood improvement, quality investment, enhancing human productivity, small farm mechanization, farm income, food safety, nutrition, impact of trade

regimes, supporting adaptation to climate change, etc. To do justice to these topics, the programmes should invite people with different views and expertise on these themes.

Fourthly, the agricultural universities are hub of knowledge and farm technologies which often remain under-utilized due to lesser linkage with extension mechanism. TV programs may take advantage of the farm solutions for users. There should be more education and training opportunities to develop professionals with both agriculture and media expertise. It is high time that we start specific programmes in agricultural universities in this area.

Finally, there needs to be a mechanism to review the contents of television programmes in agriculture, and also to guide and provide public support for the development of quality programmes as discussed in the blog.

## ACKNOWLEDGEMENT

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# 22

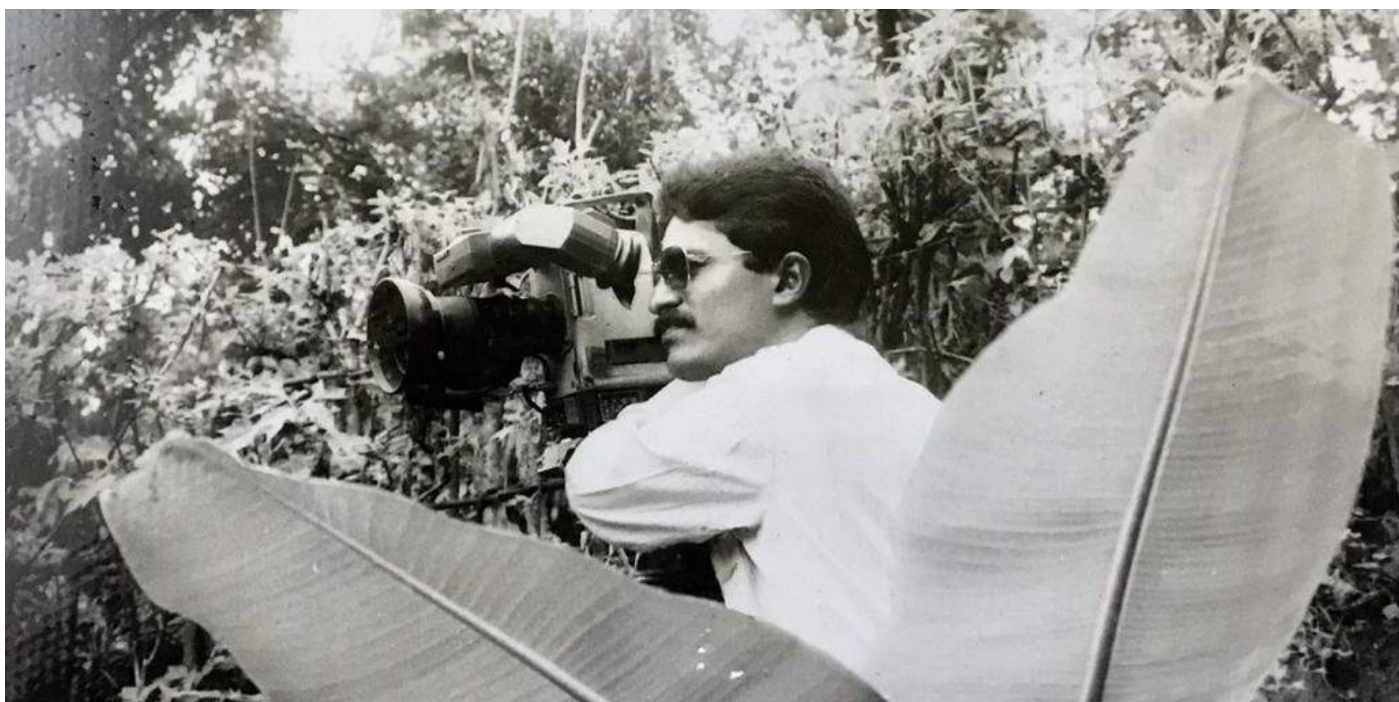
## DOORDARSHAN AMONG THE FARMERS

In this blog, **G Sajan** recollects his personal experiences apropos a few experiments which were conducted by Doordarshan to make some small changes in re-designing the concept of public service broadcasting.

When I joined Doordarshan in the early 1980s, television was in its infancy in India. I was doing my post-graduation in Agriculture Extension at the Kerala Agricultural University when the national broadcaster – Doordarshan – invited agriculture graduates to be a part of the emerging visual language creation in the country. I found this to be an interesting opportunity to work in a new and emerging field of communication. Those were exciting times for any agriculture extension personnel joining television since the creation of the massive infrastructure for terrestrial television transmission was justified in the name of farmers and others in rural India, and to strengthen the concept called 'development communication'.

In 1985, the year in which regional television commenced telecasting, Kerala had a unique history and practice of agriculture communication through various media channels. Daily programmes in All India Radio titled 'Vayalum Veedum' (Field and House) was very popular and close to the hearts of farmers. Along with that, major Malayalam dailies set apart a page for Agricultural news and articles every week. Even reputed cultural magazines like 'Mathrubhumi' devoted some space for articles on agriculture. As pointed out by Mr R Haly, the doyen of agriculture communication in Kerala, there was no other state that has been publishing this much content to strengthen agriculture in the state. Along with that there were about 1000 Krishi Bhawans in the state, namely one Krishi Bhawan for each panchayat. Such an extensive extension system was quite unique in the country.

So when Doordarshan commenced telecast of agriculture programmes in 1985, we were forced to reconsider our options regarding the role of television in complementing the existing network of parallel extension services.



So when Doordarshan commenced telecast of agriculture programmes in 1985, we were forced to reconsider our options regarding the role of television in complementing the existing network of parallel extension services. We took tentative steps to make our presence felt in a simple but substantial manner. To start with, we went around the state meeting farmers in various eco geographical zones talking to them.

Yet this question made us think about the existing patterns of extension methodologies.

Agriculture in Kerala was quite unique as compared to other parts of the country. The farm economy was dominated by cash crops. The area under food crops, especially paddy, had declined considerably. Holdings were fragmented especially after the much acclaimed land reforms. There are diverse agro ecological zones in the coastal belt, western ghats and the midlands. Problems faced by the farmers included price crash of farm commodities, ever

increasing cost of cultivation, and various other socio economic and technological problems. The inability to compete in global markets for many export-oriented farm produce created more concerns.

Despite the wide network of extension systems, adoption of technologies was just 30 percent as shown by a study conducted by the Kerala Agricultural University. We thought that there was a need to revisit the concept of development communication. The existing extension system was top down, uni-directional and also technology driven. In most of the programmes the experts talked down to the farmers. Most of the discussions centred around technological solutions. The politics of farming was never discussed. The new paradigm had to ensure that the content and presentation has to undergo major changes. The new era of developmental communication has to have more respect for the viewer. It needed to be a two-way affair with a lot of give and take.



To start with we tried to reverse the existing top down mode of communication. As part of this, we initiated in 1988 a new series to introduce the most innovative farmers in the state in a programme titled 'Noorumeniyude Koythukkaar' which can be broadly translated as 'Harvesters of a Hundredfold' a term that was coined based on a popular Malayalam phrase. The show was anchored by Mr R Haly who, at that time, had just retired as the Director of the State Department of Agriculture. We identified 12 farmers representing different agro climatic zones and did a travelogue visiting their farms and interacting with them. Here instead of the experts talking, the farmers talked and the expert listened.

The ideas and opinions that emerged from these interactions were quite eye opening. Farmers narrated their experiences with regard to farming, problems of available technologies, and constraints in the markets. They described the various practices that they had developed in the field. These conversations brought out a lot of hitherto unknown facets of Kerala's agriculture.

The series also helped change the attention given towards the status of the farming community, and also the role of innovative individual farmers. The farmers were actually practising scientists and each day brought out a new find that could change the methods prevalent in daily farming. The programme was a tribute to the 'Farmer First' concept that was being evolved at that time by Robert Chambers in European universities.

The newfound attention towards individual farmers initiated a series of awards for the most innovative farmers in Kerala. Malayala Manorama, a prominent Malayalam daily, instituted a one lakh award for the best farmer titled 'Karshakashree'. The state government came up with a stream of awards for various types of innovative farmers. There was a time when the maximum money awarded was in the field of agriculture.

In another experiment we tried to bring the ecological debate into farm programmes. Kerala has a strong history of environment movements such as the Kerala Sasthra Sahithya Parishad, which spearheaded the movement against

the Silent Valley Hydroelectric Project. Due to better awareness about nature, development projects were being re-examined from the angle of environmental impact. The sustainability question in development discourse was coming up with diverse points of view. In the background of this debate, we introduced a series titled 'Mannum Manushyanum' ('Man and Earth' in 1991, which looked at various developmental issues from an ecological point of view. We tried to address issues of sand mining in rivers, problems created by brick kilns in paddy fields, water management, tribal settlements, etc. Looking back I feel happy that some of the present day ecological concerns were carefully analysed in the early nineties.

The media landscape changed substantially in the mid-1990s.

With the arrival of cable and satellite channels visual culture leaned towards more commercial tastes – critically submerging the developmental and public service demands in communication. Commercial television was mostly entertainment driven and it had fascinated millions of viewers. Doordarshan found some time to regain the trust of viewers and to redesign its oeuvre to better suit the livelihood needs of society.



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New programme designs came up in commercial television. In the early 2000s reality shows were the in thing. There were reality shows to select the best singers, dancers, chefs, and even brides! We then came up with

a challenging idea of a new genre called a Social Reality show, which was an innovative interpretation of a popular commercial genre for developmental communication.



We proposed to have a reality show titled 'Green Kerala Express' to select the best panchayat in Kerala. Kerala which had about 1000 Local Self Governments including Grama Panchayaths, Municipalities and City Corporations, had unleashed a new scheme called the Peoples' Plan in the late 1990s by earmarking about 36 percent of the total plan

fund for the three tier Panchayat system. This decentralisation campaign strengthened local democracy and created a lot of innovative ideas in various developmental fields. We wanted to encourage these panchayats, and thus bring into focus some of the interesting projects that they had implemented.



About 250 Local Self Governments (LSGs) responded to our advertisements and they were asked to present a few unique developmental models on any field which they had implemented in their panchayats. Short films were made on these ideas which were presented to the jury in a studio, and a team from each LSG interacted with the jury based on which they were given marks. The jury consisted of experts in the field of sustainable development, economics, farming and women's empowerment. The best panchayat would get one crore rupees as the prize money. This unique show was produced by Doordarshan, CDIT (Centre for Development of Imaging Technology) and The State

Sanitation Mission. The programme got the Prime Minister's award for innovative media experiments. This was in 2010.

A similar show titled 'Ini Njangal Parayaam' (Now we will speak') was organised to select the best block level unit of Kudumbashree, which is the largest network of women cooperatives in Kerala in 2013. Both these programmes are partially available on YouTube. Social reality shows attracted a lot of national and international attention. Green Kerala Express was unique in that it redesigned a very popular television genre for development and social communication.

This was also an attempt at a paradigm shift, not just in reversing the existing top-down communication model, but also in interpreting the mode of governance. It was a media experiment in which developmental models are socially audited on a media platform. There were also elements of peer learning and

showcasing of replicable models and good practices. Most of the panchayats presented sustainable development models and the ensuing debates opened up fresh debates on climate change, sustainability, and locally adaptable technologies that mostly use renewable energy.



In 2018 while working with the DD Kisan channel I produced a farm reality show to select the best woman farmer in India. The show was titled 'Mahila Kisan Awards 2019'. The show can be accessed on YouTube if you search for Mahila Kisan Puraskar by Doordarshan.

and related activities have to be integral to the rural development process. These shows were quite helpful in offering a different perspective.

At a time when the private media channels were full of negative stories, Kerala started hearing about people who work at the grassroots level trying to make small but consequential changes in the life of ordinary people. It was an alternative narrative raising the voices of silent people, bringing out unnoticed local initiatives, thus kindling hope about the future.



The principle of subsidiarity is an integral part of the decentralisation experiment which states that whatever possible at each level be done at that level itself. In many development sectors such as water and land management, sanitation, environment, health, energy, education, and social welfare this principle can play an important role. In the unique case of Kudumbashree which is the largest women's self-help network in Asia that has taken up major projects to improve food security and women empowerment, this is an important principle.

I have just narrated a few experiments on developmental communication which has made some perceptible changes in the rural scenario of Kerala. I have not gone into the details. But I feel that these experiments could trigger some further thinking on the need for redesigning our information framework for developmental needs in the changing media landscape of India. It should also be helpful for understanding public service broadcasting in a better light. It may also help in creating regulatory guidelines so that private media channels ensure some amount of mandatory public service content in their overall programming.

Doordarshan programmes helped to create a better understanding on the process of rethinking about governance. In Kerala, which is extremely fragile in ecological terms, farming

# 23

## COMMUNITY RADIO: BUILDING TRUST DURING AND POST- COVID-19 WAVES

This blog, in the backdrop of World Radio Day, highlights the instrumental role Community Radio Alfaz-e-Mewat FM 107.8 played during the COVID-19 pandemic. In a country as vast and diverse as India, inclusion can only be achieved by strengthening communication that serves the people at the bottom of the pyramid, says **Pooja Oberoi Murada** and **Arti Manchanda Grover**.

In a country as vast and diverse as India, inclusion can only be achieved by strengthening communication that serves the people on the lowest rungs of the pyramid. It is often said that two Indias exist within the same country, reflecting the large gap between the prosperous and the poor. Measures and actions need to be taken to bridge the ever-increasing gap to help the poor. Information sharing and awareness creation are the fundamental building blocks for achieving this, and community radio (CR) is one of the proven tools to accomplish this (Box 1).

### Box 1: Community Radio in India

Discussions about CR in India began in the 1960s, beginning with the Chanda Committee Report 1966, which initiated the debate to end the monopoly of All India Radio (AIR). Then came the historic judgment of the Supreme Court in 1995, calling upon the government to draw up regulations for granting licenses to private broadcasters and establishing an autonomous and independent authority responsible for supervising all operational aspects of broadcasting. The Pastapur Initiative on Community Radio Broadcasting of 2000 urged the government to recognize community broadcasting as the third tier of broadcasting services, distinct from public and commercial broadcasting. Starting with the emergence of radio clubs to having a national broadcaster, from AM band to FM band, and opening it to different sectors, all these developments paved the way for the birth of community radio in India. CR stations serve as the sole source of information in many areas — especially in the media-dark areas and aspirational districts of the country. UNESCO sees community radio as a medium that gives voice to the voiceless, serves as the mouthpiece of the marginalized, and is at the heart of communication and democratic processes within societies.



## WORLD RADIO DAY

First proclaimed in 2011 by the member states of UNESCO, and adopted by the United Nations General Assembly in 2012 as an International Day, February 13 became World Radio Day (WRD).

Radio celebrates humanity in all its diversity and constitutes a platform for democratic discourse. Globally also, radio remains the most widely consumed medium. Radio stations across the globe serve diverse communities, offer a wide variety of programs, viewpoints, and content, and reflect the diversity of audiences. Radio continues to be one of the most trusted and used media in the world, according to international reports. Radio has proven to be an effective medium that emerged as a savior during tough times. Trust in the medium grew further during the COVID-19 pandemic in early 2020 as radio served as an information lifeline in rural areas. The theme of the 2022 edition of World Radio Day is thus devoted to 'Radio and Trust'.

When the entire world stood challenged, local community radio stations came to the rescue and continued their broadcasts to keep people informed and connected local authorities with the community. These community radios became the bridge between medical departments, administration, and the local people.

During such times of crisis community radios helped connect the local community to the government authorities and initiated information exchange. In this manner trust developed in the villagers to take informed choices to safeguard themselves. Radio broadcasters are trained on the principles of:

- Be first: as emergencies are time-sensitive, and information must be shared quickly;
- Be right: emphasizing accuracy of the shared information;
- Be credible: ensuring that a level of honesty and credibility is supreme at all times;
- Express empathy: which trains broadcasters to be courteous, kind, and responsive to all listeners and their calls;
- Promote action: which helps restore order, reach out to line departments with

information and restore a sense of control; and

- Show respect: because respectful communication is particularly important when people feel vulnerable.

Abiding with these principles during times of disaster and emergencies help build rapport and trust of listeners in their community radio.

## THE ROLE PLAYED BY CR DURING PANDEMIC

### The case of Alfaz-e-Mewat

Community radio Alfaz-e-Mewat FM 107.8 – established by SM Sehgal Foundation, a rural development NGO – has five key programs: water management, agriculture development, local participation and sustainability, Transform Lives one school at a time, and Outreach for Development. It was at the forefront of the community right from the onset of the pandemic.

The station, located in district Nuh, Haryana, has been on air since 2012, bringing relevant information to the people. Nuh is one of most backward districts even though it is in close proximity to the national capital and the millennium city of Gurugram. The area is largely inhabited by an ethnic tribe, Meo Muslims, which is characterized by some of India's lowest socioeconomic development indices.

In order to address the pandemic, Alfaz-e-Mewat's first broadcast started in February 2020 and was the sole source of information for the people during lockdown. The station is led by a group of community reporters and it broadcasts to cover local developments in the local language. Interviews featured doctors and people from the health department, who talked not only about the spread of the virus but also made regular announcements about government ration schemes. The station covered all relevant aspects of the pandemic. The trust and credibility portrayed in the medium stemmed from mapping the community's needs and identifying the most vulnerable of the groups. The radio helped people access the various government entitlements extended during lockdown, such as monetary help in bank accounts, dry rations, etc.



Alfaz-e-Mewat produced short audio capsules on mental health and positive thinking through its program 21 din 21 baatein during the 21-day lockdown. The program, Aaj ka hero (today's hero), addressed the reluctant population (some of them elderly) by profiling community members to narrate their personal accounts of how they are staying indoors and protecting themselves and their families. Through this the radio station highlighted that it was okay to be afraid of falling ill and so staying indoors during prayers. In keeping with the recommended use of minimal staff during the pandemic, the radio station ensured that only one person ran the show each day on a rotational basis, with equipment properly sanitized.

To counter false information on social media, the station started Savdhan (Alert!). These programs and initiatives during COVID helped make the fight against the pandemic everybody's fight. In the midst of this challenging time, when people were averse to social distancing, getting tested on symptoms, and getting vaccinated, the station, using positive deviance inquiry, identified locals who set themselves up as examples by going against all the odds. These positive examples came from community members who came forward to be vaccinated themselves and shared their experiences with other listeners, thereby addressing any misconceptions about the safety of vaccines, including such concerns as that these were developed in haste, can change our DNA, or can be fatal, etc.



**Broadcasting at Radio FM 107.8 Alfaz-e-Mewat**

Radio broadcasts provided critical information to listeners in the coverage area of 225 villages. Rural schoolchildren tuned in to the radio for education amid the pandemic with Radio School. The Radio School program, created by community radio Alfaz-e-Mewat, was the only source of information for a number of children in the villages of this district. The program episodes covered the subjects of Maths, English, and Science for primary and secondary classes. Government school teachers also made recordings as part of a campaign facilitated by the State Education Department, along with educational content from Sesame Street, NCERT, and contributions made by volunteers and interns.

The station's Radio School program served as a lifeline for rural kids. The station reporters even used the content for their kids, and several callers revealed that children were benefiting from the curriculum broadcasts of NCERT.



**Farm women listening to radio during work**

## CONCLUSION

Community Radios represented a potent force that helped to deal with the difficulties arising from this pandemic; and they continue to act and evolve from providing relief to building resilience. The present focus of Alfaz-e-Mewat is to move to a 'new normal', preparing communities for the long battle ahead, and sustaining the safety of people.

Community radio's role and importance has long been discounted but just as 'When the going gets tough, the tough get going', CRs have played an instrumental role during the pandemic, and remain positioned uniquely to reimagine communication that serves the people at the bottom of the pyramid. This became evident when community radio

representatives were invited by the Health Ministry, Government of India, to get updates on the pandemic situation and to disseminate important messages regarding COVID-appropriate behavior and importance of vaccination to prevent spread of the disease. Alfaz-e-Mewat's experiences are representative of the critical contributions community radios have made in the time of the pandemic.

To scale up radio's reach, the government can invite applications and expedite the licensing and frequency allocation process so that each district in India has at least one community radio. Furthermore, CR can get the status of media so that it can be included in IEC planning of different campaigns that support the sustenance of Community Radios.

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# 24

## PLANTWISEPLUS: HELPING FARMERS FACE PLANT HEALTH CHALLENGES

CABI's PlantwisePlus programme is delivering digital advisory tools that boost sustainable agriculture. In this blog, **Laura Hollis** and **Malvika Chaudhary** discuss how the programme is working to improve the capacity of public and private actors who are supporting smallholder farmers in Bangladesh to diagnose crop health problems and recommend sustainable solutions.

Nearly two-thirds of Bangladesh's population work in agriculture, with 80% depending on it for their livelihood. However, pests have a devastating effect on smallholder yields. In Bangladesh, 25% of all crops are lost to pests. Climate change – which Bangladeshi farmers are particularly vulnerable to – is worsening plant health threats. Climate shocks, such as erratic rainfall, temperature extremes and drought, increase the risk posed by crop pests and diseases causing problems to flare up without warning. Lacking proper pest monitoring and prediction mechanisms, outbreaks can catch farmers unawares. Effective, sustainable solutions require both knowledge and resources.

Access to reliable information on sustainable best practices in agriculture is still limited, and as a result, farmers often resort to chemical pesticides. An estimated 49,000 tonnes of pesticides are used in Bangladesh each year. The indiscriminate use of highly toxic plant protection products is affecting human, livestock and environmental health as well as product efficacy. This, in turn, decreases the resilience of agricultural systems to shocks, such as new pest invasions.

### PLANTWISE

The Plantwise programme (Box 1) plays a significant role in supporting smallholder agriculture and provides farmers with information on the use of more sustainable farming methods. However, the number of professionally trained advisors is insufficient, and farmers often turn to agro-input dealers and others in their community for plant health advice. Over the next 10 years, PlantwisePlus is seeking to address these challenges and enable countries to confidently face plant health threats in a changing climate. Through a digitally-enabled approach the programme is helping countries predict, prevent and prepare for plant health threats thereby reducing crop losses and producing more and safer food.

## Box 1: Plantwise

Since its launch in 2011, CABI's Plantwise programme has worked to increase food security and improve rural livelihoods by reducing crop losses. Through its sustainable networks of local plant clinics, run by trained plant doctors, Plantwise provided farmers with practical plant health advice. Working with over 170 in-country partners, Plantwise strengthened national plant health systems from within, enabling countries to provide farmers with the knowledge they need to lose less of what they grow.

Building on lessons learned from Plantwise, CABI's new programme PlantwisePlus will support low and lower-middle income countries to predict, prepare themselves for, and prevent plant health threats in a changing climate, thereby reducing crop losses and empowering farmers to increase income, food security and food safety by producing more and higher quality food.

## DIGITAL APPROACH TO PLANT HEALTH

CABI Academy is one of the new digital tools developed through the PlantwisePlus programme to address plant health challenges. The digital learning platform provides a range of courses to support extension workers. The courses include interactive exercises and other resources to help participants grow their knowledge, so they can deliver the best possible advice to farmers.

The materials work equally well for self-study, as they provide all the information and context required. There are currently two interactive courses available for free in Bangladesh – Crop Pest Diagnosis and Crop Pest Management. Together, they provide a comprehensive methodology to diagnose and proactively control pests and diseases.



Another tool helping to tackle threats to plant health is CABI's BioProtection Portal. Now available to users in Bangladesh, this groundbreaking online bio protection resource helps growers and pest management advisors identify, source, and correctly apply biocontrol and biopesticide products for their specific crop-pest problems.

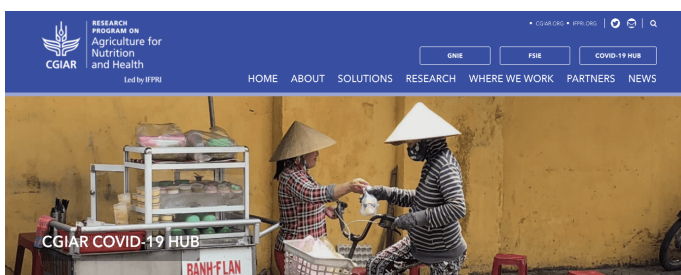
The portal, which is predicted to become the go-to resource for identifying and sourcing biocontrol and biopesticide products, is particularly beneficial for growers in Bangladesh

looking to replace chemical pesticides with biological products to meet market or export standards, satisfy consumer demands for healthier and safer food, and reduce pressure on the environment.

Detecting and responding to pest threats is one of the key areas of PlantwisePlus. The programme is working hard to create effective pest monitoring systems so that farmers can stay one step ahead of potential crop threats. This builds on the work of the Plantwise programme.



Through the Plantwise programme, CABI has been working with CGIAR to support national crop monitoring. Set up at the onset of the pandemic, the [CGIAR COVID-19 Hub](#) provides a coordinated research response to the global pandemic, health and food systems worldwide, as well as supporting Sustainable Development Goals. The Hub focuses on supporting national response and recovery work across CGIAR research themes, harnessing knowledge for emergency response, recovery, and resilience.

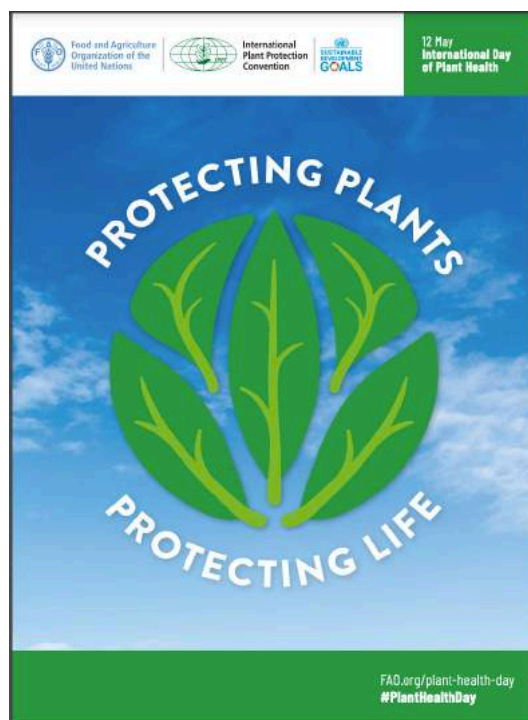


Plantwise has been identified as a national crop health monitor and will be integrated into the platform along with other monitoring systems, such as fisheries, livestock and even human health. The Hub will support the Bangladesh Government's initiatives to promote homestead cropping. Under this project, different activities are being implemented across a number of Bangladesh districts in coordination with DAE-CIMMYT-CABI to strengthen crop pest management.

Through PlantwisePlus, CABI is building on its scientific and publishing background to create digital tools that can strengthen the agricultural advice given to farmers in Bangladesh. With the right knowledge pests can be identified earlier, their spread controlled, and the best treatments recommended so as to prevent significant yield damage.

Tools, such as CABI Academy, BioProtection Portal and [CGIAR Covid-19 Hub](#) can strengthen advisory services by making this knowledge accessible to those who need it most.

The United Nations designated 12 May the International Day of Plant Health (IDPH) to raise global awareness on how protecting plant health can help end hunger, reduce poverty, protect biodiversity and the environment, and boost economic development. This Day is a key legacy of the International Year of Plant Health 2020.



### Find out more about CABI's new global PlantwisePlus Programme

CABI gratefully acknowledges the financial support of the [Directorate General for International Cooperation](#) (DGIS, Netherlands), [the European Commission Directorate General for International Partnerships](#) (INTPA, EU), [the UK Foreign, Commonwealth & Development Office](#) (FCDO), [the Swiss Agency for Development and Cooperation](#) (SDC), for the PlantwisePlus programme.

# 25

## SURVIVAL OF SRI LANKAN PUBLIC RADIO IN THE AGE OF CONVERGENCE

In this article written to commemorate World Radio Day observed on 13 February, **M.C. Rasmin** traces the history of Sri Lankan Public Radio and what could be done to make it more relevant to the changing demands and preferences of listeners today. It discusses some of the key challenges faced by a 'public broadcaster' in Sri Lanka, in an era of rapidly growing technology that demands constant changes and adaptation within the larger media ecosystem.

## RADIO NOSTALGIA

It is certainly no surprise that Public Radio has survived almost 100 years in Sri Lanka. During these long years, it was locally and internationally known as a people's medium, a rural medium (Timalsina and Pradhan 2019), an intimate medium (Barnard 2000), an adaptable medium (Fleming 2002), a sound medium (Crisell 1994), and a resilient medium (Starkey 2017). Moreover, it was identified as a speedy information and news disseminator (McLeish 1996) that can speak to millions (Coldevin 2003) at once.

Since regular broadcasting started in 1924, this Radio had played a significant role in shaping day-to-day life of millions of Sri Lankans. While the enactment of the Ceylon Broadcasting Corporation Act No. 37 of 1966 was detrimental to overall independent broadcasting, it created space for public interest broadcasting in Sri Lanka.

After Ceylon Broadcasting Corporation (CBS) became Sri Lanka Broadcasting Corporation (SLBC), in 1972, Radio played a significant role in enriching public life – nurturing local languages, literature (poetry, drama), folklore, culture, music, social life, and so on. Many of the renowned poets, musicians, lyricists, writers and novelists – both in Sinhala and Tamil – began their creative careers with SLBC.



The Education Service of SLBC was instrumental not only in offering exam-based formal educational programs, but also producing Non-Formal Education Programmes (NFEP),

from 1994, dealing with a variety of subjects such as human rights, ethnicity, sociology, legal and medical issues, arts and culture, politics, current affairs, the environment, behavioral science, history, archaeology, literature, drama, women's rights, etc.

Similarly, a specific time was allocated for religious broadcasting catering to Buddhists, Hindus, Christians and Muslims. Such programs were aired not only in Sinhala, English and Tamil, but also in other languages such as Malay, Urdu, etc. Several early programs and

producers are still in the minds of listeners. Radio Ceylon and the SLBC produced some of the finest announcers and presenters in the world. Among them are Livy Wijemanne, Vernon Corea, Pearl Ondaatje, Greg Roskowski, Tim Horshington, Claude Selveratnam, Jimmy Bharucha, Thevis Guruge, Chitrananda Abeysekera, AW Dharmapala, Karunaratne Abeysekera, HM Gunasekera, SP Mylvaganam, VA Gaffoor, Nihal Bhareti, Leon Belleth, B.H. Abdul Hameed and Vijaya Corea. There could be many more.



**Vijaya Corea and B H Abdul Hameed, Veteran Broadcasters of SLBC**

Broadcasters, such as V.A Gaffoor, were exceptionally talented as he could read Tamil news live, just by looking at the English news bulletin. BH Abdul Hameed became internationally popular as a Tamil broadcaster who travelled across the world presenting programs that had roots at SLBC and relevance to the latest trends. Former All India Radio broadcaster Sajan Venniyoor always used to say that several Indian broadcasters had deep nostalgia for Sri Lankan Radio given its remarkable programs. Colombo International Radio (CIR) and SLBC Asian Service were very popular with the Indian audience. These stations gained a huge popularity among the Indian listener. Indian commercials were broadcasted through these services. (Sinha, 2019).

The 30 years from 1960-1990 was the golden era of broadcasting. Millions of listeners tuned into the radio. Radio drama was one of the most popular programs aired in Sinhala and Tamil. "Muwanpalassa" – a Sinhala radio drama was widely known for representing the beauty of rural life. It was also known as the longest running Radio drama in the history of radio in Asia. Mudalinayaka Somaratne was the brainchild behind Muwanpalassa. Radio drama producers such as Shana (Shanmuganathan), George Chandrasekaran, M. H. Kuddoos, M. Ashroff Khan, became very popular radio drama producers amongst several others for their remarkable story productions on various community issues. The dramas written and produced by M. Ashroff Khan became highly influential and popular in the Tamil - Muslim

communities. He used radio drama as a powerful medium to advocate gender equality, predominantly to highlight the educational rights of women.

Broadcasting extended to farmers, fishers, and included all other segments through regional

broadcasting in the early 1980s. SLBC Tamil service used comedy, storytelling and drama to create awareness of agricultural issues. R. Yogarajan, was very much known using comedy as medium in his radio storytelling to discuss various issues including agricultural development, education, etc.



**M. Ashroff Khan (Third from left), Veteran Radio Drama Producer of SLBC with fellow artists**

It must be mentioned that these are accurate facts. Many studies have been carried out on these and several experts have documented this nostalgic journey of the state broadcaster. However, given the present state of SLBC broadcasting, one can only say that these are all just feel-good stories. Today SLBC is unable to comprehend contemporary trends and developments in broadcasting and thus sustain its audience or ensure its own marketability. Looking closely at SLBC's current programs, they are found to be largely extensions of its initial formats.

## CHALLENGES

At least five core issues could be identified among the many problems affecting the strength of SLBC. Firstly, after the 1990s, SLBC started severely compromising on its public mandates. At present the public broadcaster is an institution that is completely owned,

administered and controlled by the state with 'public money', and is therefore a media that is largely incapable of upholding public interest or standing firm against the political interests of the state.

Secondly, the state broadcaster is severely politicized. The interference of politics had already weakened the quality of SLBC programs and the entire institution as a whole. Due to lack of quality, SLBC is unable to demonstrate its marketability and reachability. Broadcasting experience and capacity to guide SLBC as a profitable entity hasn't been entirely seen as a necessity when appointing members to its board. In the late 1980s, private stations in Sri Lanka started penetrating rural villages and from there on built their momentum. Several private radios followed the path of the state broadcaster, but they convinced and converted the loyal listeners of the state broadcaster into their charge.



Thirdly, SLBC has been unable to win the minds of the young audience and to accommodate their interests while formulating programs. While private channels target the younger generation, most of the commercial channels of SLBC still cater to the older generation even during prime time.

Fourthly, the state broadcaster is in urgent need to adapt to new technology so as to enhance its programs by understanding how radio should be positioned for convergence. SLBC introduced a mobile app. Most of its channels use social media to engage the audience. However, technology is hardly used to make programs with multi-media features and in multiple formats for different platforms. The concept of co-creation is not in existence. Audience engagement is often limited to requesting songs and writing micro- opinions.

Fifthly, for all these reasons, listening to SLBC frequencies has become a cumbersome

experience, due to lack of clarity. SLBC needs urgent study and strategic revision for plotting a better way forward in this era of media convergence.

It is worth quoting from the study produced by the National Secretariate for Media Reform (2019):

*“This was the time for SLBC to review its programming, social responsibility, management and fund-raising endeavors and introduce internal and external reforms. However, it failed to do so. Fully confident about itself and its acceptance in society, SLBC was unprepared to face the realities of the day. As a result, towards the end of the 1990’s SLBC saw its media workers migrate to privately owned radio and television stations which offered better wages, prospects and benefits. With funding issues and political interference, SLBC failed to come up with a productive plan to attract high quality media workers to it and the quality of its news and other programs, creativity and appeal took a hit (p. 33).*



**SLBC Old Recording Studio**

## WHAT IS CONVERGENCE?

This article does not intend to discuss all the problems mentioned above, rather, it only tries to understand the fourth problem: how can the state broadcaster comprehend convergence and shape its business accordingly.

Convergence is the new buzzword in media research. In a technological sense, media convergence is all about integration and interoperability – the coming together of computing networks, information and communication technologies, together with

digital forms of information that are inherently adaptable, delivered via ‘intelligent’ platforms, applications and devices (Holliman 2010).

In convergence different types of media – Print Media, Broadcast Media, New Media and the Internet – are delivered through a single digital platform but in multiple formats. In this context, where the state broadcaster is unable to prove its marketability, fulfill its public service mandate, or proactively cater to the rural population and younger generation, it is important to understand how traditional broadcasting could be re-visited. Presumably,

in traditional broadcasting, convergence is involved at five different levels.

**1. Technological Level:** This refers to a variety of digital tools available to enrich the production, programming, dissemination, audience engagement and evaluation of broadcasting. New and highly sophisticated tools have been introduced in the market to help audio visual storage, archiving, recording, editing, sharing, filming and other features. When it comes to programming, the technology makes it easy to host external live broadcasting, rural production, and storytelling which was a cumbersome process a decade ago. A technology-enabled radio production process is a shared exercise. In our time co-creation has become a revolution.

**2. Program Level:** Convergence demands non-conventional programs that can attract the audience's attention and captivate them emotionally and rationally, offering them a strong blend of information and entertainment. In a world where internet floods us with information, news and entertainment cheaply, with highest accessibility, radio cannot continue to offer such content in its older formats. Due to too much choice available on the internet, young listeners are spoilt for choice and know where to get what they specifically want. When broadcasting programs do not offer the anticipated substance, young people can easily shift to a different platform for less money. Some clever private stations have repurposed their contents digitally for different platforms or shared them visually in different formats. Convergence also demands that radio broadcasting highlights news, emerging issues such as local migration, climate change, health, education, agriculture, etc. Even older versions of broadcasting programs are required to be digital friendly too.

**3. Audience Level:** Technology not only enriches the radio medium, but also empowers the audience. Radio listeners get an opportunity to migrate to online platforms and listen to radio through multiple devices. Most of the young audience spend a lot of time in cyber space. They find their own community there, even beyond physical boundaries and religious, faith, ethnic differences. Individuals

have become not just listeners but content producers, disseminators, reporters, advocates, active-self-communicators, etc. Simply put, in the convergent environment audiences are not just listeners, they are active contributors.

**4. Contents and Distribution Level:** Radio is no longer just an audio medium. It reaches the audience in several forms – pictures, video, graphics, cartoons, etc. A radio station produces its contents through radio, social media channels, and other new media platforms. At some point Radio was said to be a medium of 'writing poems in the air'. This means, once something went up on radio, it's just dead. However, today's technology allows broadcasters to live forever; heavy programs files are saved in micro-chips and timely contents shared among larger networks.

**5. Platform Level:** Radio in convergence offers a multi-platform experience. In convergence television, radio, social media, mobile phones, and the web are no longer separate and distinct media. They complement each other; they enrich each other, and they are interconnected through different pathways that ultimately lead to a larger pool of information. Therefore, it is time for traditional broadcasters to think differently while formatting their programs for multiple platforms.

## WHAT DOES CONVERGENCE MEAN TO RADIO?

Convergence requires the broadcasters to believe in 'technology', amalgamation of 'platforms and potential of the 'young audience' to take the radio to the rural population. Broadcasting should be taken to the villages and people should be kept in the loop. Multi-media proficiency is vital for broadcasters to ensure that the radio reaches the audience through different platforms other than just the radio. Broadcasters should engage the audience to co-create content. In France, Emilie Mazoyer, host of a youth-oriented programme co-created a music playlist, Tweet-Liste, together with her listeners and followers on Twitter, in 2011. When and if the space is given, the audience can produce content through Facebook, Twitter, Instagram, WhatsApp, Signal, Telegram etc. This will, on one hand, sustain

the audience, and on the other, extend the ownership of radio to rural folk.

Convergence requires that radio programs be delivered in more than one format and form. It must be kept in mind that listeners do not have to rely on radio for entertainment, songs and cinema, etc., as they did in the past. With this reality in place, Radio can no longer just be a medium for songs. SLBC has a remarkable history on rural production, and catering for farmers. For the last one-year farmers in Sri Lanka have been facing a lethal situation without even an adequate harvest due to various practical challenges. The voice of farmers are often not adequately represented on radio, despite them being the larger segment of the audience. Technology in Radio should be made available to not only discuss the issues faced by farmers but also to discuss potential solutions for their crisis.

SLBC broadcasting is accessible through a mobile app. Listeners can request their songs through social media. Some social media is used to generate public opinions. However, SLBC social media often works as though it is within a time bubble – it's the same loyal audience that stays there forever. Use of both new media and social media should elevate listeners from 'listeners' to 'contributors' and 'owners' of the radio. While the FM or digital radio audience, measured through traditional audience rating systems, constitutes the economic capital of the station, the social media audience represents its true social capital – one that is very 'tangible' and visible. (Tiziano Bonini, 2020). Very simple tools such as Survey Monkey or Google Forms can be used for collecting feedback and opinions. In addition, Poll Everywhere, Slido.com, mentimeter.com can be used to play games with audience through stations website or social media page. Broadcasting should no longer wait for the presenter to deliver content on request. Broadcasting contents and programs should be digitally available on the web platform for consumption at any time for individuals. The SLBC library has a wealth of resources that can be made available digitally. SLBC's continuity studio should work as a multimedia delivery point. Audience should be able to connect through visual means.

Previously Radio broadcasting was presenter-centered. However, now it should become audience- and technology-centered. The audience should have a clear space to decide what they want. There are hundreds of creative pool-tools to identify what the listeners would need. Previously Radio possessed some kind of power – all the productions were made in-house; broadcasting was done by a privileged segment. Earlier the assumption was that audience can only listen to radio programs. However, the best broadcasting company in the convergence should be able to empower its audience as broadcasters, producers, contributors, and virtually invite them to feel ownership and discover their potential.

Finally, it is clear that the colorless medium incorporates various interactive and visual materials. This does not mean technology has started killing the older radio, rather, the older medium is expected to transform its nature in this new environment. Convergence has forced the radio to survive in a competitive news and information ecosystem. According to the study done by International Media Support (2020) Radio in Sri Lanka still remains the second most popular media for news –55% of the people consume news, during turbulent times. So, Radio needs to transform into a multimedia tool.



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# 26

## THE CONTINUING RELEVANCE OF ALL INDIA RADIO AND AGRICULTURAL DEVELOPMENT IN THE DIGITAL ERA

As we celebrate World Radio Day on 13 February, **Pulugurta Chandra Sekhar** traces the history of agricultural broadcasting in India and argues why the Radio is still relevant for agricultural development in India.

Agriculture has gone through a series of revolutions that has made it more efficient, productive, and profitable. Market predictions for the next ten years say the next significant change will be a digital agricultural revolution'. It will help agriculture meet the future needs of the world's growing population. 'Digital ecosystems' – resources, skills, and networks – tend to be more robust in urban areas than in rural ones. There is a chance that digitization will make the differences between rural and urban areas worse, especially when it is combined with global urbanization trends and the movement of middle class and wealthy people to urban centres. To ensure that everyone can participate in the emerging digital society, All India Radio is dedicated to assisting governments and partners in bridging such multi-disciplinary digital divides. Moreover, India has embarked on a massive programme to connect six lakh villages through optical fibre cable laying and internet connectivity. The mission is essentially to lay an information superhighway to extend broadband connectivity to Gram Panchayats.

### BRIDGING THE DIGITAL DIVIDE

Radio is one of the most crucial forms of communication that can effectively close the knowledge gaps in the agricultural community. Radio broadcasting is especially effective for farmers who are illiterate and therefore unable to learn about new farming techniques and practices worldwide. Consequently radio is turning traditional farmers into more forward thinking and creative ones as they use these scientific, innovative, and easier ways to grow crops. The radio has changed from a one-way medium to a two-way platform where experienced farmers can give their peers advice and share new ideas.



©Mahesh Chander

**Recording of Radio Talk Series by ICAR-IVRI scientists for “Farm School on Air” at AIR, Rampur**

All India Radio (AIR), a public broadcaster that informs, educates, and entertains, has been actively playing a unique role in bridging the digital divide and supporting agricultural extension programmes in India.

**THE GENESIS OF FARM RADIO BROADCAST IN INDIA**

The experiment in 1952-53 was none other than ‘An Indian Experiment in Farm Radio Forums’ at Poona (now Pune). The goal of this experiment was to create a two-way channel of interaction between the people listening in villages and the radio station’s programmers; it was based on the Canadian Model. The original purpose of farm forums and village listening clubs was to facilitate better listening and to gather content for radio and television programmes. To this end, AIR placed rural supervisors in charge of specific broadcasting locations. When the chance arose in 1955-56 to test out farm forums modelled after those in Canada, these clubs were already up and running, albeit mechanically. It involved carefully orchestrated broadcasts, the organization of listening and discussion groups, and a rigorous scientific evaluation of audience responses.

**Format**

News, market rates, and weather reports; informative talks and discussions of interest to rural listeners; plays, skits, and features; music, mostly folk music; and items of particular interest to women and children made up the bulk of the rural programme’s primary content. A typical day’s worth of the show lasted between 45 and 60 minutes. Successful specials included discussions with agricultural experts known as Krishi pandits, broadcasts from model villages, and even the occasional quiz show. Traditional forms of rural entertainment, such as folk music and rural plays, were exceptionally well-received.

**Chupal (Village Club)**

Over time, a tried and true method of presenting programming has emerged: a chupal (village club) of four or five elders led by someone who speaks the standard regional language (which may or may not be the same for everyone). Throughout an hour of lighthearted entertainment and informative performances, these persons would drop nuggets of advice and guidance into their casual conversation.

**Stock Characters**

Several stations have developed ‘stock characters’ to inject some informality into the

broadcast, which is fine in theory but leaves room for improvement in practice. One of them is a charismatic former soldier with a quirky personality. An excellent case in point is Loha Singh, the protagonist of a radio play by the same name produced and broadcast by All India Radio, Patna, since 2009.

### **Broadcast Schedules**

The 20 episodes aired as part of the daily rural hour programme from February 19 to April 26 1956, (twice weekly, on Sundays and Thursdays) lasted for 30 minutes, from 6:30 pm to 7 pm. Poona Station was required to air regular rural programming throughout this period, so the regular rural hour was broadcast on other days.

It was possible to experiment with various approaches within the bounds of the overall pattern. Features on village pests and hygiene were produced in the traditional folk drama style and radio play formats, respectively. Folk songs, bhajans (devotional songs), and light music were often interspersed with or followed certain features. Several shows used humour to highlight the differences between traditional and modern ways of living. Originally called 'Farm Forum', the name was changed to 'Radio Rural Forum' when it was picked up on a national scale to reflect the show's expanded focus beyond agriculture.

### **Farm & Home Units**

In 1965 it was decided to establish Farm & Home Units in ten AIR Stations in order to take intensive Agricultural District Programmes and Intensive Agricultural Area Programmes to the farming community. This was done so as to offer farmers in small, homogeneous areas with similar agro-climatic conditions with timely, problem-oriented technical information.

In 1966, with the arrival of new 'wonder' seeds – the high-yielding varieties – the Farm and Home Units of Akashvani were established. The ADT-27 rice strain was one such example. The Indian Government announced a new initiative for the next decade called the High Yielding Varieties Programme. Outside Broadcast (OB) vans were given to 30 stations that were intensive agricultural areas where agricultural district programmes were active.

By March 1985, there were 64 Farm and Home Units in place. Now a Farm and Home Unit exists at all AIR stations. Research shows that semi-educated farmers listen to the Farm and Home Broadcasts for the agricultural advice they provide, thereby increasing their productivity and income. A further innovative programme broadcast by AIR was intensive nutrition programmes in coordination with District Health Services.

### **Box 1: Radio Rice**

'Radio rice' in the Tanjavur district of the southern Indian state of Tamil Nadu is a well-known instance of agricultural intervention in South India. All India Radio played a catalytic role in disseminating new farming techniques and accelerated their adoption by farmers. Radio broadcast formats evolved out of social reality. They unveiled characters that stirred the souls of listeners and potential adopters, so much so that AIR Tanjavur's much-promoted rice variety became known as 'Radio Rice'. This fantastic turnaround began when scientists at the agriculture research station in Adutharai, not far from Tiruchirapalli, developed a new variety of paddy called ADT-27. This new variety increased yields from 20 to 40 bags per acre. The grain at the field level accelerated the process of widespread adoption, and in the final analysis, the importance of radio was emphasized. Known initially as ADT-27, this crop was renamed 'Radio Nel' in Tamil after farmers began referring to it as 'Radio Paddy'.

### **Farm School on Air**

Farm School on Air was another breakthrough in rural radio that was introduced in the year 1973. With this farmers' interest in and willingness to learn modern farming methods increased. The invention of the transistor altered listening habits in rural and urban centres. Whoever couldn't afford to have such a set to provide all the information necessary to run a farm and get the best out of what he has was considered to be a poor landowner.

Listeners of 'Radio Krishi Shiksha' are also avid consumers of the 'Krishi Jagat' programme, which needs to be noted. It teaches us not to ignore tried-and-true elements of our programmes in favour of shiny new things when implementing change.

## Non-Formal Education

Non-formal education is exemplified by AIR's substantial output of farm broadcasting and by another innovation from the 1970s aimed at rural listeners. Non-formal education broadcasts for rural youth groups between the ages of 15 and 25 have begun on AIR's five stations in Srinagar, Nagpur, Tiruchi, Simla, and Jaipur.

Additionally, it is distinct from AIR's standard Farm and Home Programme in both approach and focus; the former is targeted and needs-based, the latter is geographically specific, covering a particular agro-climatic zone and concentrating on field-based activities. Ninety per cent of the programs are captured on location, in the field, rather than having farmers and experts take part in these Programs. This show is available in every major language and dialect spoken in the country.

## Local Radio Stations

All India Radio brought Local Radio Stations (LRSs) and FM radio channels in the third tier in 96 operational cities. LRS is a new theory in broadcasting in India introduced in 1980. LRS differs from the regional network due to its down-to-earth, intimate, uninhibited approach and area-specific programmes. They are flexible and spontaneous, enabling the station to function as the mouthpiece of the local community. It demolished the division

between the broadcaster and the audience. Local authorities, police, emergency services, adult educationists, schools, transporters, farm scientists, and entertainers look to local radio for sustained community service. Another innovative method is a two-way communication system between the listeners and Extension Agencies of various Government Departments. Flexibility in programming is the main characteristic of field-based programmes.

## Narrowcasting

AIR recently took a step to get closer to the people, even though it already had a segment called 'Farm and Home' in its regular terrestrial broadcasts. This was especially necessary for the farming community, which was reached through Narrowcasting, another innovative method.

The buzzword in broadcasting right now is 'narrowcasting'. It means covering smaller areas with programmes that are tailored specifically to those areas. It makes the relationship between the medium and the people stronger. Narrowcasting is a catch-all term for radio and TV signals that can only be heard or seen by 'subscription customers'. Broadcasts are sent out to the public, and anyone with a receiver that can pick up the signal can listen to them. Community radio is another type of narrowcasting. Thus began the story of Kisanvani.



Recording of a radio programme ©CRISP



## Kisanvani – Another Innovative Programme

All India Radio has always been committed to helping farmers. Still, on February 15, 2004, it started a new project called narrowcasting to turn its hard-core agriculture programme into 'The Voice of Farmers', or 'Kisvanvani'. Now, the Kisanvani Programme is being played on all of AIR's LRS stations and some primary

stations all over the country. The main goal of the Kisanvani Program is to teach farmers about things like 'diffusion of innovation', 'Lab to land', 'knowledge and skill of modern and scientific techniques of agricultural practises', 'horticulture', 'animal husbandry', 'poultry farming', 'fishery', 'rural banking and self-employment schemes', and allied activities.



Recording of Kisan Vani Programme - © AIR, Kannur

### Box 2: Format of the Kisan Vani Programme

Agriculture News Bulletin: To give daily updates on what's happening in Agriculture and related fields. Market Prices of Agricultural Commodities in the Different Mandis (Market Places), The Agriculture News Bulletin of 5 minutes.

AIR's Kisan Vani Stations broadcasts quickies made by the Agriculture Department on topics such as 'Seed treatment', 'Precautions when buying seeds', 'Intercropping', 'Precautions when buying pesticides', 'Integrated Pest Management', 'Fertilizer Management', and 'National Food Security Mission on Paddy and pulses' by making good use of Free commercial time to help farmers learn about new technologies that can help them make more and better crops.

Kisanvani has a wide range of formats, including Aaj Ki Khabrein (the news of the day), Aaj ka Bazar (the market of the day), Aaj Ka Mausam (weather information), Aaj Ki Batein (the special news of the day), Aaj Ke Kisan (an interview with the farmer of the day), and Desh Videsh (news from the country and abroad).

The country is heading for a digital revolution in the agricultural sector in the coming years. From the Indian Finance Minister's speech about the 2023 budget, it's clear that India wants to focus on green agriculture, millet production (since the UN has declared 2023 as the International

Year of Millet), a green transition in the energy sector with the use of ethanol and biofuel, and adding value through the circular economy. All these require people's participation. Systematic campaigns through Radio media with all its digital modes will be a great catalyst. However,

it should be noted that, while radio stations enjoyed relative independence for decades, the ongoing media convergence has put them in direct conflict with other media outlets. In this digital age, Radio faces tough competition from private television channels in farm broadcasting.

## CONTINUING RELEVANCE OF RADIO IN TODAY'S DIGITAL ERA

After the internet, radio is one of India's fastest-growing industries today. It's free of charge, unlike cable or satellite TV, and it's also locally focused and interactive. Radio is a powerful and appealing medium since it can go everywhere, costs very little, reaches a large audience, and requires minimal effort from its audience. Moreover, AIR's terrestrial signal reaches 99.20% of the population across 92% of the country.

Radio's distinct qualities are its portability and accessibility. It is the primary source of news and information in many rural areas of India. It's still the cheapest and most convenient option. In today's digital age, radios are even available on mobile phones and you can easily bring one to the farm without worrying about it being too bulky. With the decreasing size of radio sets, the portability of radio receivers has increased throughout the years, contributing to radio's growing significance as a complementary medium. This means that most radio listening takes place in the context of another activity, such as farming, cooking, cleaning, or driving. Over the years the radio broadcasts evolved in various forms, including tales, articles, interviews, and audio dramas. During natural disasters such as floods and earthquakes, the All India Radio has also provided invaluable services.

## CONCLUSION

During the course of AIR's 87 years it has become an indispensable resource for farmers across the subcontinent. Several farmers and farm communities have benefited from its efforts to alter agricultural practices across the country. This proves that radio can be an effective tool for agricultural progress and expansion if used correctly. With the advancement of technology, the largest radio network in the world, All India Radio, has switched to narrow broadcasting from broadcasting to better serve the farming community through a more collaborative method of reaching out to individuals in rural areas.

All India Radio has made a significant impact in the field of agricultural extension. It has persisted in its pursuit of improvement, adapting and modernizing as necessary to incorporate new and better presentation and communication formats and contents to achieve its goal.

Most significantly, radio allows listeners to make the experience their own by challenging them to use their imagination while trying to make sense of what's happening. "TV gives everyone an image, but radio gives birth to a million images in a million brains," wrote American author Margaret 'Peggy' Noonan. Her lines capture the essence of Radio's enormous adaptability and continuous relevance in an era that places a premium on personalized media.



A shop owner listening to Radio ©Alagu Niranjan

# 27

## ADDRESSING THE GENDER DIVIDE TO HELP WOMEN BENEFIT FROM DIGITAL TECHNOLOGIES

While greater access to digital services has opened up many opportunities for gaining knowledge, accessing services and enhancing employability, women are yet to equally benefit from these. Based on BAIF's work on promoting digital services with rural communities, **Rajashree Joshi** and **Santarpana Choudhury** illustrate and underline the importance of designing digital interventions keeping in view the gender digital divide.

India's digital landscape is undergoing a rapid transformation. With a proliferation in the number of Internet Service Providers and the concomitant decrease in cost of services, coupled with a favorable policy environment, digital services have been on an upward trajectory. However, the digital divide remains an area of concern as the rate of digital penetration in rural and tribal areas continues to lag behind that in urban areas.

### GENDER DIGITAL DIVIDE

This digital divide is also gendered as women are less likely than their male counterparts to own a mobile device and even less likely to use internet services. Though women have had improved mobile ownership in terms of access and internet services over the years, men have an upper hand irrespective of rural or urban India (OXFAM India 2022; Carboni et al. 2021; NFHS 2019-2021). For instance, the GSMA survey 2021 reported that in India, men had the highest mobile ownership (79%) and internet service utility (45%) compared to women (67% and 30%, respectively) (Carboni et al. 2021). Similarly, the National Family Health Survey 2019-2021 reported the improved status of mobile ownership by women from 45.9% to 54% since 2016-17. It also highlighted the urban-rural gender digital divide indicating that urban men (72.5%) and women (51.8%) had the highest internet service utility compared to rural men (48.7%) and women (24.6%). Though gender inequality is observed in this urban-rural digital divide, it is the rural women who evidently had limited digital access and internet service utility.

The digital divide is among the many obstacles faced by women in their everyday lives that inhibit their capabilities. These obstacles can be at the individual, familial or larger socio-cultural level.

Among the widely acknowledged challenges are the preference for a son, fewer educational opportunities, poor nutrition and social taboos that have been frequently written about. In addition, there are biases and stereotypes against women that do not allow them to take up certain jobs or perform certain activities. For instance, women are assumed to be inept at operating machinery or using digital technology. The latter coupled with lower literacy levels allows this digital divide to persist.

In the recent past, Indian agriculture has shown a trend towards feminization. As agriculture grows less remunerative, more men migrate out in search of work, while women stay behind to take care of agriculture. However, women are seldom recognized as farmers. Their contribution in agriculture tends to get sidelined and they are perceived as performing supporting roles in agriculture. Therefore, any kind of digital intervention for agriculture is targeted towards men in agriculture. This is corroborated by findings from a project (see Box 1) implemented by BAIF Development Research Foundation (BAIF) [www.baif.org.in](http://www.baif.org.in) and Borlaug Institute for South Asia (BISA) across three states of India.

### Box 1: Reaching women with weather-based agro-advisories

The project interventions included the dissemination of weather-based agro-advisories over mobile phones for building resilience to climate change. In some of the locations, when women participants were asked for their phone numbers, they could only provide their husband's or children's phone numbers. This made it difficult for the project implementation team to accurately target the recipients of agro-advisories, since the men and children were often found to be residing in urban areas nearby. Hence, there was scant or no impact of the advisories on these smallholder women farmers' vulnerability to the effects of climate change.



## INNOVATION AND TECHNOLOGY FOR GENDER EQUALITY

#IWD2023



**“DigitALL: Innovation and technology for gender equality.” Is the theme for 2023 International Women’s Day celebrated on 8th March**

Though an unprecedented expansion in digital infrastructure across the country has led to connecting hitherto unconnected parts of the country with urban areas, certain lacunae exist in tribal areas, and several villages still remain at the periphery of this web of connectivity. Some of the major challenges limiting connectivity are the nonavailability of fiber optic cables, supply side constraints like the reluctance of Internet Service Providers to enter rural areas due to

low average revenue per unit (ARPU), lack of digital awareness limiting demand, intermittent availability of electricity, etc. Moreover, tribal populations face multiple layers of deprivation whose overlapping nature compounds their adversities: poor status of health and nutrition, particularly among women; few opportunities for educational attainment; and meager earnings from limited sources of livelihood that confine them to a vicious cycle of poverty.

## eDost

Responding to the need for digital services in remote tribal villages and the potential for building the capacities of young women to earn their own livelihoods, the 'eDost' program was created. The program was jointly implemented by BAIF and Association for Progressive Communications (APC). eDost is a cadre of trained young women who are equipped by BAIF Development Research Foundation with knowledge, hardware and attitude to provide last-mile digital and financial services at the doorstep of tribal households (Ramaprasad and Pooja, 2020; APC 2021). This allows the young women to be partially employed and earn an income, while still being engaged on their farms. The eDost program bears testimony to how digital technology can be harnessed to earn livelihoods in remote, unconnected areas (see Box 2).

### Box 2: Impact of eDost

This program was started with a few eDosts in tribal regions of Palghar district in Maharashtra. Today it has spread across tribal regions in the three more states namely Maharashtra, Odisha and Madhya Pradesh covering nearly 150+ villages, being served by 150 eDosts. With training, the women learnt to operate mobile phones and the internet. This enabled them to provide cash withdrawal, money transfer, mobile and DTH recharge and bill payment services in their respective areas. With growing demand from the community, eDost has started providing more services for Aadhaar cards, PAN cards, Job cards, printing and lamination services and ticket booking.

The community thus saves money, time and effort due to reduced frequency of travel to the nearest town to access these services. There are now more than 200 young women providing Aadhaar-enabled payment services in five different locations in Maharashtra. This has aided in providing access to a variety of services as developed by the Government for those in need.

A survey conducted by BAIF in 2021 studied the outcomes of the program with over 50 participants. It emerged that an eDost earns an income ranging between Rs 3000 and Rs 6000 per month. This income proved indispensable,

as it was found that almost 30% of the eDosts had family members who had lost their means of livelihood during the Covid-19 pandemic.

Moreover, 57% of the respondents indicated that their family income was less than what it had been before the pandemic. Further, the program has greater intangible social impacts. The women feel a sense of dignity, earn respect within the family and community, and are empowered from their newly acquired financial autonomy. This trained cadre of women can also be used to raise awareness as they are the last mile service providers, as was demonstrated during the pandemic.

### END NOTE

The eDost program clearly illustrates how empowering women can generate benefits for not only themselves and their families, but also the community. It is a perfect case in point of how women can quickly adapt to new challenges, even in unfamiliar domains like digital technology, when provided with an enabling environment.

The two cases cited go to show that simply providing means to access digital technology is not a sufficient condition for women's empowerment. It is equally critical to address the gender divide. Thus, digital interventions should be designed appropriately for gender equality and empowerment of women.



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# 28

## THE ChatGPT REVOLUTION: WILL IT COMPLEMENT OR COMPLICATE AGRICULTURAL EXTENSION?

ChatGPT has taken the internet by storm over the last three months, with exciting as well as extreme reactions ranging from calling it an alternative to Google search to advocating its ban. In this blog, **Aditya Sinha, Birendra Kumar** and **Debabrata Basu** discuss the debate around this platform, its potential and its application in agricultural extension.

In November 2022, the trending topic in the technology sphere was ChatGPT, launched as a testing model by the artificial intelligence (A.I.) research company, OpenAI. The topic is still viral, with new updates and advancements appearing in the field each day.

ChatGPT is a natural language interface that acts like a chatbot and interacts with its users (Williamson et al., 2023). It comes under the array of OpenAI applications popularly known as Large Language Models (LLMs) that can generate "human-like" content by processing a large quantity of information available on the web (Rettberg, 2022). Since the release of ChatGPT, there have been increasing debates worldwide on the disruption it may cause, with both positive and negative connotations. However, several users struggle to get across the platform because of acute pressure on the server. An estimate says that more than one million users have been trying to explore ChatGPT since its launch (Shankland, 2023).

The decade from 2020-2029 will be impacted mainly by LLMs. Since ChatGPT is currently behind in terms of access restrictions and server load issues, there are a few alternatives (Table 1) such as Sphere, Bloom, PaLM, etc., which could be of great use in education (Devansh, 2022).

### MAJOR DEBATES AROUND OPENAI AND LLM

The effect of OpenAI on education is a hot topic of debate. Some believe that it may lead to the loss of creativity among students by being able to generate assignment articles, codes and solving numerical problems. It was well documented recently that ChatGPT cleared the final examination for MBA at Wharton School in the United States. It was also successful in clearing the Google Coding Interview for Level 3 engineers. Although, it failed to clear



**Table 1: A list of applications/ alternatives to ChatGPT.**

Tool	Parent company	Striking features
PaLM (Pathways Language Model)	Google	Better distinction between cause and effect, conceptual combination suited to the context
Sphere	Meta	Verifies citations, suggests alternatives in a better way
Bloom	BigScience	Promotes free research, amalgamation of same-context research
Galactica	Meta	Explains math formulae, helps write papers, creates Latex
Open Pretrained Transformer, or OPT	ArXiv	Energy efficient, detects hate speech more efficiently.

the Civil Services examination conducted by the Union Public Service Commission (UPSC) in India and the examination designed for sixth graders in Singapore (Bordoloi, 2023). This underlines the grave threat to trust issues while using such platforms in education.

Secondly, it is difficult to detect plagiarism in automated text generated through ChatGPT. Most educators believe that they will have to struggle with plagiarism in assignments since major software fails to detect it. Also, some educators believe that the way students are taught should be changed, so that there is no recourse to shortcuts like ChatGPT.

Another group of thinkers believe that ChatGPT has the potential to enhance creativity since humans can only perform tasks that machines cannot. This will lead to the exploration of the

full human potential in the true sense. The proponent of this theory strongly believes that the force behind platforms such as ChatGPT, called "Generative A.I." (Generative Artificial Intelligence), is nothing but an artificial brain fed with loads of data. It can generate novel content using iterations. However, the flip side lies in the fact that the content produced is not always correct since the platform cannot apply human-like understanding or intelligence (Holeiciuc, 2023), which is why it cannot replace humans but can help them perform better.

Lastly, a group of organizations and researchers wants governments worldwide to ban all such technology altogether. Though a blanket ban requires legislation and complex procedures, it was seen that many tech companies had to withdraw similar applications because of criticism from different sections of society.



An example is Galactica (parent company Meta/ Facebook) which survived online only for three days. It was an LLM built as a large model for science trained on over 48 million articles, websites, textbooks and lecture notes. The company claimed that it had the potential to summarize academic papers, solve mathematical problems, assist in coding and so on. Soon after the launch, scientists started pointing out the application's flaws and incorrect results, leading the company to recall the same (Heaven, 2022). The recall from such a large tech company in just three days points to bitter competition between the companies to launch the product to gain the first mover advantage. Companies are skeptical that other companies may launch a similar product if they are late to the game. No wonder, earlier in 2021, Google had already proposed a similar chatbot that could enhance accessibility of information among students (Williamson, 2021).

## POTENTIAL OF ChatGPT

The immense potential of ChatGPT can be judged by its ability to adapt to a conversation in progress and respond to specific messages (Analytics Insight, 2022). Over time, as the system continues to interact with the user, the messages become better to a greater degree. In addition, it has immense potential to offer better customer service by answering customer queries more effectively. Information Technology professionals are using ChatGPT in writing code, product descriptions, translation, etc. Another significant scope of the application is in content creation by writing social media posts, designing promotional texts, video scripts, among others (Visagie, 2023). Hence ChatGPT and similar tools are powerful language models with the potential to revolutionize how people interact with machines.

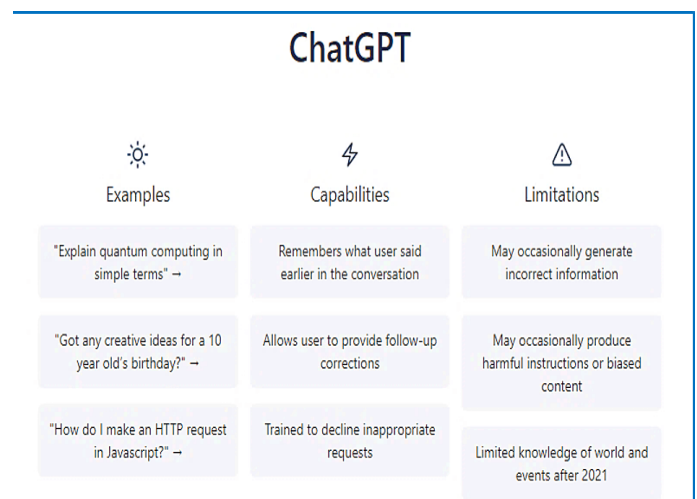
## APPLICATION OF ChatGPT IN AGRICULTURAL EXTENSION

ChatGPT is useful in agricultural extension through the creation of chatbots for solving farmers' problems concerning crop production, marketing, disease management, etc. It also has the potential to provide customized recommendations to farmers for better

decision-making. Farmers can also be assisted by capturing pictures of disease infestation in plants and getting responses on the go. A virtual assistant can also be created for providing stepwise information to farmers on a wide range of topics on farming practices. In addition, ChatGPT can be used to support agricultural extension by developing specific educational content that is a mix of articles, videos and graphics (Enablers of Change, 2023). Apart from this, it could be useful in precision agriculture through the collection and analysis of data from various sources on crop monitoring. Monitoring livestock and crops can also be easily carried out using this tool, enabling the detection of early signs of disease and the taking of precautionary measures. Furthermore, automation of manual tasks in the field, such as planting, harvesting and irrigation management could also be successfully practised (Janzen, 2023).

## DEMONSTRATION OF ChatGPT IN AGRICULTURAL EXTENSION

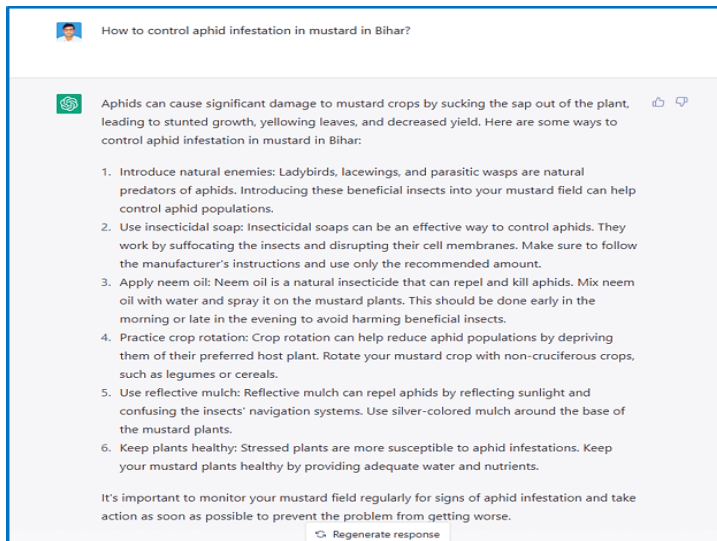
The user interface of ChatGPT makes sure that the user goes through the examples, capabilities and limitations of the platform before posing a question. As far as agriculture is concerned, the tool looks quite promising in areas where it is fed with good training data. However, it is not intelligent enough to replace human beings, particularly in advisory services and extension outreach. An exciting feature of ChatGPT is that it remembers the previous chat thread and can provide follow-up corrections, as mentioned in Fig. 1.



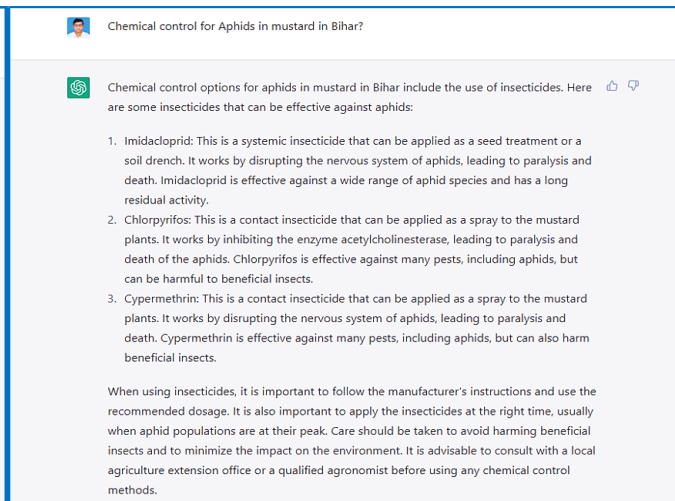
**Figure 1: Example of ChatGPT's user interface with its capabilities and limitations**  
<https://chat.openai.com/chat>

On trying to chat with the bot with a simple question, "How to control aphid infestation in mustard in Bihar?", the responses mentioned (Fig. 2) were quite generic, with a focus on cultural methods of control like the introduction to natural enemies, use of insecticidal soap, application of neem oil, etc. Nevertheless, the responses are appreciable from the point of view of the environment and nature. A follow-up question was asked: "Chemical control

for aphids in mustard in Bihar?". Again, the responses were generic with little information on the exact dosage of the chemicals (Fig. 3). Also, it is worth mentioning that the tool advised to consult an extension officer or qualified agronomist before applying the chemical control. Due to space constraints, it is not possible to mention the other follow-up questions, but the reliance on extension agents was found to be a major limitation.



**Figure 2: Question and answer interface of ChatGPT (personal conversation on agricultural advisory).**



**Figure 3. Follow-up question to check specific advisory on ChatGPT.**

### Chat GPT: Concerns in agricultural extension:

Agricultural research centers and state agricultural universities play an important role in updating scientific information on the cloud, through online sources like websites, web portals, databases, advisories through geolocation tagging for reliable advisory services to farmers. This will lead ChatGPT to provide more reliable advisories when sought by farmers or other stakeholders. Given that Indian institutions are not prudent in uploading useful/scientific information, initiatives such as the e-gyankosh <https://egyankosh.ac.in/>, krishiprabha, etc., which are national digital repositories, can address this issue. ChatGPT can provide a solution sourced from millions of repositories and materials available online. However, its efficiency depends on the quality of the repository too, which is uploaded by humans. So there must be checks and balances in the uploading process. Extension advisories are very much dependent on customized information. In this context, extension professionals will need to put effort

into understanding agriculture's dynamic nature before referring the ChatGPT solutions to farmers. The role of extension professionals will therefore involve adding the human dimension to advisories, which such technology platforms cannot.

### LIMITATIONS OF CHATGPT

The knowledge of ChatGPT is limited to 2021 data. It can't exclusively obtain information from a specialized source since the data is churned from the cloud. Its beauty lies in the ability to churn data from different sources and produce mostly unique replies (paraphrased) to the same question. If we rely on ChatGPT to gather information from a specific source, it is no better than any expert system or mobile application with limited information. While it can fill the gap of limited staff by providing a comprehensive source of information to users, it is left to the discretion of the user to harness the potential of this technology in the best possible way and exercise caution before putting the knowledge to use.

## CONCLUSION AND INSIGHTS FROM RECENT DEVELOPMENTS

The popularity of ChatGPT is evident from the current hype around it. In agriculture, it is a blessing for farmers to get valuable real-time insights on crops without having to depend on extension agents for minor issues. However, a significant limitation of such models is the inability to understand cause-and-effect relationships, leading to the dependence on human-generated information. Thus, it is crucial for farmers not to solely rely on technological solutions suggested by ChatGPT but instead use their understanding and cognitive knowledge and take the help of a human expert before rushing to decision-making. It will also facilitate the creation of draft content for different agricultural websites, portals, blogs, wiki, etc., and in developing cues for creating improved apps in agriculture too, with less cost, time and limited human intervention.

Agricultural research centers and state agricultural universities throughout the country should strive to upload more advisories for farmers and data generated from the field online tagging the coordinates. It will enrich the credible knowledge pool on the cloud on which ChatGPT can work with more accuracy. This will help produce more reliable information through such technology platforms. The role of extension workers in the changing landscape will be to add a human dimension to validate such information to gain the trust of stakeholders. The ideal scenario would be specialized versions of ChatGPT in agriculture focusing on different agro-climatic zones of the country to make it more reliable and trustworthy in the long run. The coming years will see several iterations of the technology in agriculture, potentially disrupting how farming is practiced currently.

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# **Gender, Youth & Entrepreneurship**

# 04

# 29

## NAHEP: BUILDING ENTREPRENEURSHIP CAPABILITIES AND CREATING IMPACT

National Agricultural Higher Education Project (NAHEP) is designed to strengthen the National Agricultural Education system in India with the overall objective of providing more relevant and high-quality education to agriculture university students. In this blog, **Hema Tripathi and RC Agrawal** discuss the key features of NAHEP and reflect on its progress.

In India, the demand for a skilled workforce with industry orientation has increased significantly in both public and private sectors. Building and inculcating relevant skill sets in agriculture university graduates through higher education that is imbued with superior quality has always been a major challenge at the global level, including in India. In this context, most of the agriculture-dominated countries are making constant efforts to enhance quality, standards, and earn recognition for their agricultural higher education system. Several countries, including China, Japan, Korea, Germany, Taiwan, and Russia have made these changes in their systems of agricultural education. It is, therefore, imperative for India as well to prepare the ICAR-Agriculture University (AU) system to face challenges posed by the changing agricultural and economic environment and respond appropriately so as to take full advantage of advances in frontier sciences and technologies. The National Agricultural Higher Education Programme (NAHEP) implemented by ICAR (Box 1) with a total project cost of USD<sup>1</sup> 65 Million (INR 1100 Cr approximately) , on a 50:50 cost sharing basis between Government of India (GoI) and World Bank (WB), is an attempt in this direction. The financial details are presented in Box 2.

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<sup>1</sup>USD = INR 64.47 as on June 1, 2017

### Box 1: National Agricultural Higher Education Project (NAHEP)

This programme aims to promote efficiency and competitiveness through changes in the working mechanisms of agricultural universities, raising the teaching and research standards through improved research and teaching infrastructure along with enhanced faculty competency and commitment, thus making agricultural education more attractive to talented students. It is envisaged that improved Agricultural University (AU) performance through quality enhancement, better employment and entrepreneurship opportunities created for agriculture graduates, non-accredited AUs attaining ICAR accreditation, and institutional reforms implemented in Education Division of ICAR and AUs shall contribute to the achievement of the overall programme objective. NAHEP was approved in October 2017, and subsequently the loan agreement was signed in the same month. The project commenced operation effectively from November 2017. As the Project Appraisal Document (PAD) of the National Agricultural Higher Education Project (NAHEP), World Bank (2017), clearly states, "The needs of the agricultural sector resonate with other sectors, i.e., highly trained workforce and relevant cutting-edge research. Two World Bank Global Practices – Agriculture and Education – are collaborating on the proposed NAHEP to ensure that the AU reform process benefits from innovations in both sectors across India and internationally. Through strategic priority interventions at the Central and State levels, NAHEP would have far-reaching and long-term impacts on agricultural higher education in India." As the project is jointly financed by the World Bank and ICAR, timely strategic inputs for effective implementation of projects are continuously being provided by both the funding partners.

### Box 2: Project Cost and financing pattern (in USD Million)

Name of the component	Total	Share of Budget by component
<b>1. Support to Agricultural Universities</b>	<b>146.4</b>	<b>89%</b>
1a. Institutional Development Plans	69.4	42%
1b. Centres for Advanced Agricultural Science and Technology	46.2	28%
1c. Innovation Grants	30.8	19%
<b>2. Investment in ICAR in Agricultural Higher Education</b>	<b>10.4</b>	<b>6%</b>
<b>3. Project Management and Learning</b>	<b>8</b>	<b>5%</b>
Front-end Fee	0.2	-
<b>Total</b>	<b>165</b>	<b>100%</b>



Students participating in an International Training under NAHEP



## PROJECT IMPLEMENTATION: GOVERNANCE MECHANISM

During the inception stage, several key documents like Project Implementation Plan, Expenditure Finance Committee (EFC) document, Procurement Plan and Guidelines, Financial Management Software (FMS) manual,

and other project relevant documents were developed. The Education Division of ICAR is implementing NAHEP. The governing structure of NAHEP (Box 3) is comprised of National Steering Committee (NSC), Project Management Committee (PMC), Agricultural Higher Education Programme Committee (AHEPC) and Project Implementation Unit (PIU).

### Box 3: NAHEP Governance Structure

Stakeholders	Roles and responsibility
<b>National Steering Committee (NSC)</b>	<ul style="list-style-type: none"> <li>The Steering Committee headed by the Director General, ICAR, is the apex body of NAHEP, providing strategic and policy guidance to the project.</li> </ul>
<b>Project Management Committee (PMC)</b>	<ul style="list-style-type: none"> <li>The Director General, ICAR, chairs the PMC and has direct executive responsibilities for sanctioning/endorsing the proposed sub-projects and overseeing the effective and efficient implementation of the entire project, resource management and usage, and M&amp;E activities.</li> </ul>
<b>Agricultural Higher Education Programme Committee (AHEPC)</b>	<ul style="list-style-type: none"> <li>The members of the AHEPC are being proposed by the Project Implementation Unit (PIU) and approved by the PMC. This committee is responsible for awarding sub-projects and their effective and efficient implementation. Totally 58 projects viz., 18 under Institutional Development Plan (IDP), 16 under Centre for Advanced Agricultural Science and Technology (CAAST), and 24 under Innovation Grants (IG), have been approved and awarded till date.</li> </ul>
<b>Project Implementation Unit (PIU)</b>	<ul style="list-style-type: none"> <li>The Project Implementation Unit (PIU) is responsible for overall project implementation, coordination and facilitation under the guidance and supervision of the Project Management Committee (PMC). The PIU has been established within the Education Division of ICAR and is led by the National Director (ND).</li> </ul>
<b>Partner AUs</b>	<ul style="list-style-type: none"> <li>Partner AUs are awarded with the NAHEP sub-project, and governance at AU level is responsible for implementing the sub-project at AU level. National Coordinators of the different components are responsible for providing guidance to these partner AUs in effective implementation process.</li> </ul>

## WHAT AND HOW NAHEP INTENDS TO ACHIEVE PROJECT DEVELOPMENT OBJECTIVE (PDO)?

The programme logic or the theory of change (ToC) of NAHEP is presented in Figure 1.

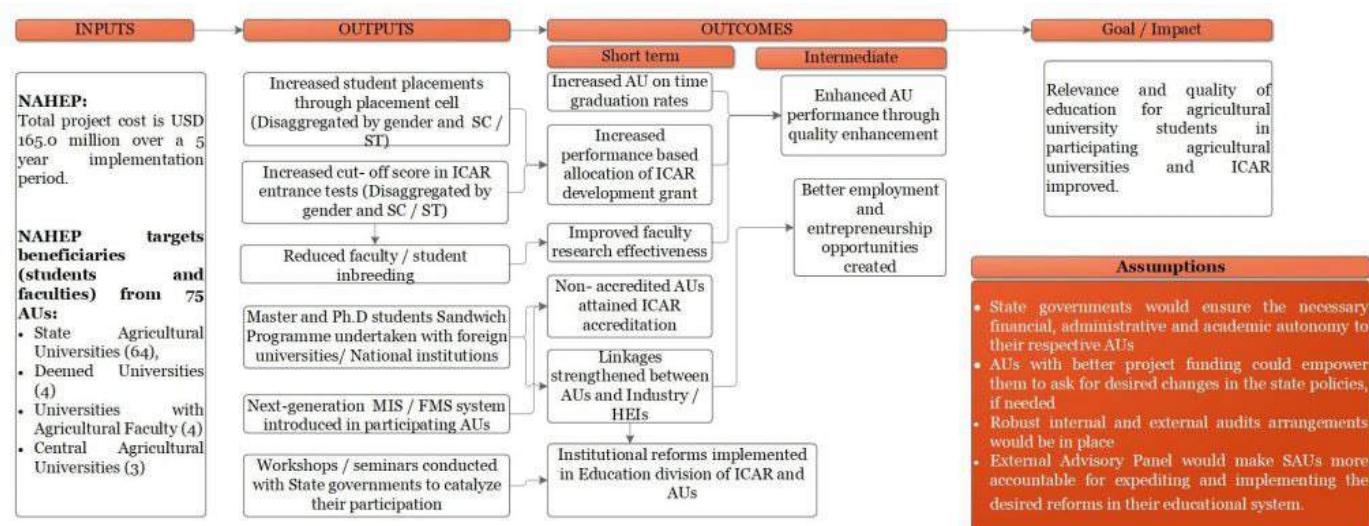


Figure 1: Representation of Theory of Change (ToC) for NAHEP; Source: NAHEP (2019-20)

## SELECT ACHIEVEMENTS AGAINST THE PDO (Till date)

### NAHEP led to:

- Setting up of 16 Centres for Advanced Agricultural Science and Technology around different thematic areas;
- Transfer of 127 technologies to industry / private sector/ national/ international organizations;
- 144 – the number of industry-sponsored projects and positions in cutting edge areas received by partner AUs;
- More than 100 new facilitative units have been established to enable academic and research infrastructure (IIIC - Industry Institution Interaction Cell/ start up cell/ incubation cell/ experiential learning unit/ placement cell, etc.);
- 125 MoUs signed with industry for knowledge exchange programmes/ internships/ short term training programmes by partner AUs.

Due to such a large number of establishments under the project, partner AUs have been able to improve the quality of education, enhance the learning outcomes of students, upgrade the skill sets of faculties, and also provide modern technologies to farmers. Over and above all this, due to continuous adoption of digital technologies and ICT tools it has become very convenient to disseminate information to the beneficiaries very effectively and in a timely way. In due course of time, outcome and impact of the project will become more evident and learnings from such project would motivate other AUs to adopt similar initiatives so as to improve the quality and relevance of agricultural higher education.

The impact of NAHEP on Agricultural Education is also contributing to the achievement of several Sustainable Development Goals (SDGs) promoted by the United Nations (Table 1).

**Table 1: Contribution of NAHEP towards SDGs**

SDG	Activity	Output	Action Plan
<b>Quality Education (SDG 4)</b>	Organised over 2,000 skill development trainings on vocational, entrepreneurship, technical themes in agriculture, communication, etc.	<ul style="list-style-type: none"> <li>• 2 students from Junagadh Agriculture University (JAU), Junagadh, have established their own start-up;</li> <li>• 2 students of Assam Agriculture University (AAU), Jorhat, made a profit of INR 12,000 from breeding Magur fish.</li> </ul>	ICAR-Agricultural Education Division (AED) initiative to attract young talents: Organising 'Agricultural Education Fair' to attract Higher Secondary Education (HSE) students under the aegis of NAHEP partner AUs.
<b>Decent Work &amp; Economic Growth (SDG 8)</b>	Programmes organized mainly under NAHEP enabled students to become entrepreneurs. It supports current market needs and enables students to become 'Job Creators' rather than 'Job Seekers'.	<ul style="list-style-type: none"> <li>• 3 students of JAU, Junagadh, placed in Amnex Infotech Pvt. Ltd;</li> <li>• Outcome-focused trainings conducted under NAHEP – IDP helped students to get employed after graduation.</li> </ul>	NAHEP will continuously improve the issues of unemployment, particularly for rural youth by improving employment opportunities and through entrepreneurship capabilities programmes.
<b>Industry Innovation &amp; Infrastructure (SDG 9)</b>	<ul style="list-style-type: none"> <li>• Established 3D printing lab at TANUVAS, Chennai, to demonstrate the anatomy of animals/birds;</li> <li>• Established AI lab at JAU, Junagadh, to get students acquainted with advanced technologies.</li> </ul>	The key outputs envisaged through establishment of such facilitative Centres: increase in student placement rates, increase in timely graduation rates, improvement in research effectiveness of faculty.	Establishing new facilitative Centres with a focus on emerging areas of agriculture and allied sectors ultimately helps to improve academic excellence.

<b>Climate Action (SDG 13)</b>	Bidhan Chandra Krishi Viswavidyalaya (BCKV), West Bengal, under NAHEP has developed solar-operated irrigation system. The technology is currently being used in high value crops with zero use of electricity and ensures high water use efficiency (WUE).	This innovation promotes the conservation of energy and supports achievement under the SDG indicator 7.2 – ‘Increase substantially the share of renewable energy in the global energy mix’.	To ensure affordable, reliable and sustainable energy, NAHEP is promoting AUs to focus on such thematic areas for development of research and academic excellence.
<b>Affordable and Clean Energy (SDG 7)</b>	Bidhan Chandra Krishi Viswavidyalaya (BCKV), West Bengal, under NAHEP has developed solar-operated irrigation system. The technology is currently being used in high value crops with zero use of electricity and ensures high water use efficiency (WUE).	This innovation promotes the conservation of energy and supports achievement under the SDG indicator 7.2 - Increase substantially the share of renewable energy in the global energy mix’.	To ensure affordable, reliable and sustainable energy, NAHEP is promoting AUS to focus on such thematic areas for development of research and academic excellence.

## INITIATIVES TO PROMOTE ENTREPRENEURSHIP THROUGH NAHEP

### International Trainings

Since inception, NAHEP has been encouraging and supporting students and faculties of partner AUs to visit the international HEIs (Higher Education Institutes), learn the emerging areas of science and technologies in agriculture, and share the rich experiences gained during the training for betterment of the Indian agricultural ecosystem. So far, eight partner AUs have established linkages with 28 HEIs such as Western Sydney University, Australia; Oklahoma State University, USA; International Training Center on pig husbandry, Philippines; and others, across 11 countries and supported 282 students for international training on entrepreneurship capacity development.

### Creation of Facilitative Units and Capacity Building Initiatives

Project awarded AUs have established fully equipped facilitative centres to improve the academic, research and teaching effectiveness of faculties and students. These facilitative centres support by encouraging students to develop entrepreneurship / intrapreneurship / project management skills by organising entrepreneurship development programmes, expert guest lectures from international faculties, alumni meets, industry exposure visits, and in-plant trainings. In addition, establishment of Industry-Institute-Interaction Cells, Placement cells and Incubation cells helped to promote employability and entrepreneurship skills among students.

#### Box 4: Two students of JAU, Junagadh, established their own start-up during final year of under graduation

In addition to national level trainings and seminars, visits to foreign universities under NAHEP have been organized for students with the aim of providing exposure in innovative areas of science and technologies. One of the key outcomes envisaged through these trainings is to build the entrepreneurial spirit among students around innovative and cutting-edge technologies in agriculture. Moreover, industry visits and skill development programmes have also been extensively organized to understand the current market needs and make the students ready as Job Creators rather than Job Seekers.

*“Through our regular course work, we have gained domain knowledge on apiculture but the art of running a business came to us only through various training programmes conducted at the University through IDP-NAHEP.”*

**-Entrepreneur, (Madhav Organic Honey) and alumni of JAU, Junagadh**

## Box 5: Trainings of NAHEP helped AU students to qualify for the entrance exams of higher education

Acharya NG Ranga Agriculture University (ANGRAU), Guntur, received the NAHEP project in 2018 and multiple activities have been conducted by IDP-ANGRAU so far. Activities such as skill development programmes, international trainings, workshops and advanced methods of teaching have encouraged students to make significant achievements in the ICAR-AIEEA entrance exam conducted for Masters' programme, JRF, SRF and NET in the agricultural education field. Some of the successes helped ANGRAU, Guntur, to get recognition in the ICAR All India Entrance Examination for Admission (AIEEA).

University has received ICAR's AIEEA-PG-2018 award on 31 January 2019. This award is the result of students' efforts, especially those attained through the facilities created and trainings imparted under ICAR-NAHEP.

### Digital Initiatives

The aim of these initiatives is to widen the reach of the teaching faculty so that they can provide global level scholarship to their students. This improves the quality of education and helps the students to develop their skill sets in order to meet the needs of new age industries. Solutions, such as developing digital infrastructure, mobile and web-based applications, Academic Management System, Alumni Portal, e-Courses etc., around emerging areas of agriculture have been playing an instrumental role in promoting entrepreneurship capabilities in agriculture and allied sectors through NAHEP. Significant digital initiatives worth noticing from NAHEP are as follows:

- Digitization of classrooms and improved teaching methods using digital aids, and e-modules to enhance teaching and learning outcomes;
- Establishing Virtual / Augmented Reality facilities to provide simulated experience of real world happenings to students;

- Established Artificial Intelligence lab / promoted IoT based sub projects with the objective of building future-ready entrepreneurs in areas such as AI, robotics, drones, agricultural sensors, CAD designing & simulation, and precision agriculture;
- Developed ~20 mobile applications and eight web-based applications in emerging areas of agriculture and allied sectors.

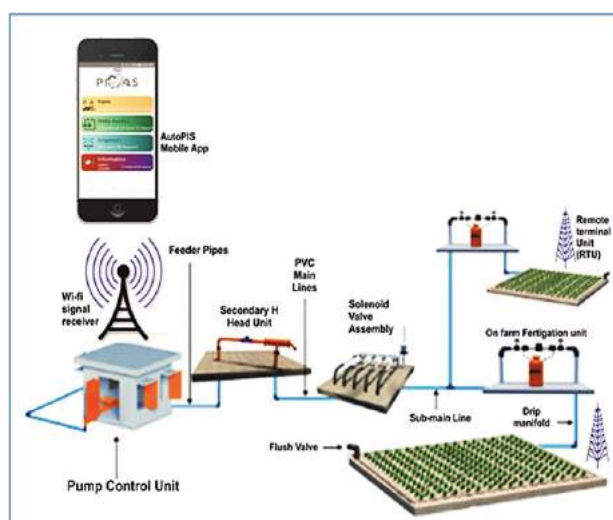


**Virtual Reality facility established by TANUVAS, Chennai, under NAHEP.**

## Box 6: Auto Phule Irrigation Scheduler (Auto PIS) developed by MPKV, Rahuri, focusing on Climate Smart Agriculture

In order to determine the exact water requirement of a specified crop, the 'Phule Irrigation Scheduler (PIS)' mobile application was developed to estimate the water requirement of a specified crop grown on a specified soil by simulating crop growth parameters, such as crop coefficient that takes into consideration the crop characteristics influencing the crop water requirement. Furthermore, by integrating other information on soil, location of farm, irrigation system, the precise irrigation water requirement and time of application for which the pump is to be operated is estimated.

After adoption of Auto PIS technology farmers can apply precise amounts of water in their fields, which saves on electricity, water and labour costs. This ultimately increases crop productivity and contributes to better soil health.



## MONITORING AND EVALUATION (M&E)

The PIU-NAHEP appointed PricewaterhouseCoopers Pvt Ltd. (PwCPL) as M&E consultant to plan and execute day-to-day M&E activities, leading to an organized and objective implementation of different components and sub-components. The contracting and onboarding of the M&E consultant was completed by October 2018, followed by development of framework and design of the M&E system of NAHEP.

This was achieved through primary interactions, secondary research through detailed analysis, and review of internal documents. The major activities and achievements under this included M&E initiation activities, baseline finalization activities, Project Monitoring and Tracking System (PMTS) and Project Monitoring and Evaluation (PME) related activities. Documentation of NAHEP learnings and other need-based technical support to PIU were also made available under the M&E component of NAHEP.

After formulation of indicators of NAHEP Results Framework, the M&E team developed a web-based application - Project Monitoring and Tracking System (PMTS) - a mode to monitor and track the progress on these indicators on the basis of predefined frequency for each indicator. This online application is giving support by collecting the information in time through partner AUs. Due to this, the Project Implementation Unit (PIU) of NAHEP has been

able to report good progress to the World Bank and other stakeholders as and when required.

## CHALLENGES AND LEARNINGS

During the commencement of this project, there were a lot of hurdles with regard to procurement and finance related aspects. Over a period a seamless mechanism developed by the PIU has been followed and all sub-projects are being effectively implemented across the country. Since the beginning of the project, challenges at each stakeholder level are being addressed in a timely manner, particularly during the nationwide lockdown. Timely review meetings, capacity building activities, handholding webinars, M&E clinic, along with well-timed internal reviews and communication with partner AUs played a significant role in effective implementation of the project. Apart from this there has been continuous follow-ups with partner AUs in expediting overall progress at desired / targeted levels. Since the project is still in the implementing phase and trying to effectively manage under the guidance of various advisory and external expert committees, the lessons learnt will be more evident in due course of time.

## FOCUSSED AREAS PLANNED UNDER NAHEP FOR 2021-22

PIU has outlined the key focus or target areas under different components of NAHEP, which form the basis for outcome-focused achievements during FY21-22 (Figure 2).

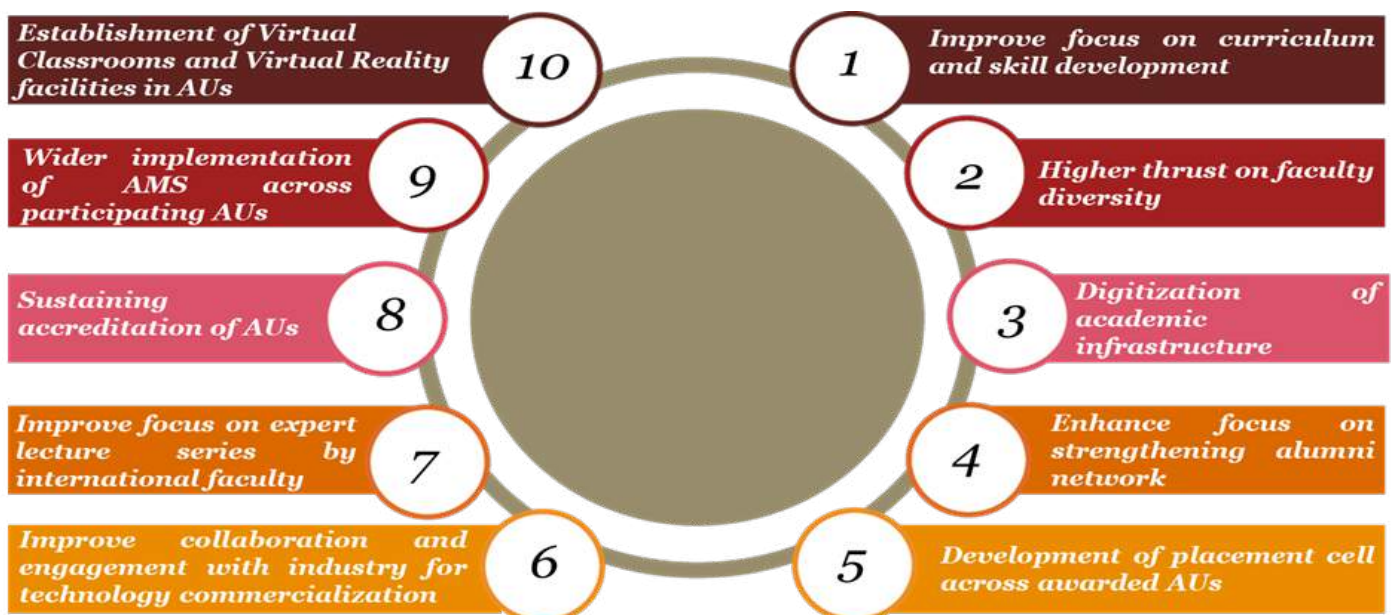


Figure 2: Focus or target areas of NAHEP for Current FY 2021-22

## CONCLUSION

NAHEP is implemented across 58 AUs from the ICAR-AU System to improve the quality and relevance of higher education in agriculture. It is anticipated that improvement in education would enhance the skills of students and create better job opportunities for them whereas upgradation of faculties would bring more

relevance into the agricultural education and research system. Ultimately better skills can definitely enhance the overall productivity of agriculture and allied sectors. It is further envisaged that NAHEP interventions and outcome-focused activities will evolve, scale up and bring more entrepreneurial minds into the ICAR-AU system with a sustainable vision.

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# 30

## SOCIAL CONSTRUCTION OF GENDER AND DIALOGUES WITH YOUTH

In this blog, **Arpita Sharma and Anaisha Sharma** reflect on how gender is socially constructed and how we can tweak these through dialogues within and outside the family.

The theme of this year's United Nations World Oceans Day is 'Life and Livelihoods'. In this context, the importance of oceans for every species is very well known, so I will skip that discussion and jump to an interesting documentary film named Seaspiracy which many of us have seen. All who have watched this documentary film must be wondering what the social accountability of this sector is, and if the journey of food produced from different water bodies has been responsible enough.

Well, personally speaking, I saw this documentary with my teenaged daughter and son. We appreciated the way it was made. But my daughter commented, "Where are the women in this sector, why are they not shown and why is that so?" I tried to explain that women are present everywhere – pre-harvest, harvest and post-harvest.

Based on her understanding, she gave her review about this documentary and said, "I am going to raise this topic for a moderated caucus in my next Model United Nations conference". There she wanted to have a dialogue with the delegates from various countries and hoped to create a draft resolution and get it approved and passed by the committee. She began to gather her thoughts so as to have a discussion with her friends.

My son had his share of advice for both of us and said no one should be prisoners of their own biology. He further stated a pertinent point that there are more differences within a gender than between the genders.

To this I agreed – the truth about gender is that there are more differences within gender than between gender! Men and women are more similar than different, but we are trained to focus on and develop the differences. So gender is not binary but a continuous category. A person can be more or less feminine or masculine.

# UNITED NATIONS WORLD OCEANS DAY

8 JUNE, 2021

## The Ocean: Life & Livelihoods

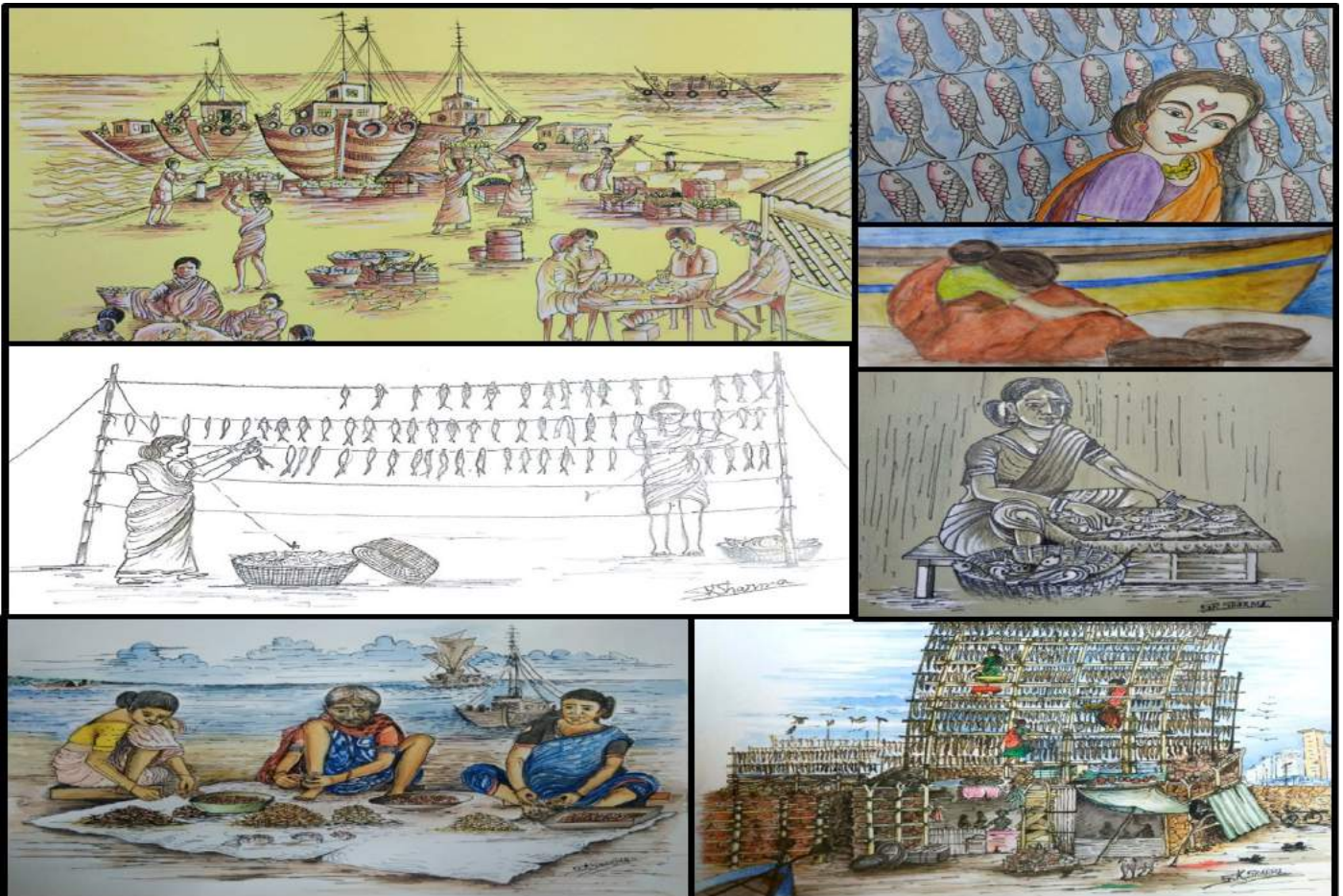
Well, based on the mother-daughter-son reflective discussions, I thought of penning this down. It was a coincidence or should I say icing on the cake, that I received an email from Dr Rasheed Sulaiman where he appreciated one of my webinar talks on social construction of gender and asked me to write a blog on it. So this is the background to the writing of this

blog, but I would like to first start with some clarity of terms such as 'sex' and 'gender' first.

Based on my theoretical and practical understanding, I realise that 'gender' is socially constructed and 'sex' is a biological construct (Box 1).

### Box 1: Sex and Gender

'Sex' refers to a set of biological attributes in humans and animals and is primarily associated with physical and physiological features including chromosomes, gene expression, hormone levels and function, and reproductive/sexual anatomy. So 'sex' is usually categorized as female or male. Whereas, 'gender' refers to the socially constructed roles, behaviours, expressions and identities of girls, women, boys, men and gender diverse people. It influences how people perceive themselves and each other, how they act and interact, and the distribution of power and resources in society.





During my conversations, I have realised that explaining biological construct is always relatively easier by simply mentioning that as soon as a child is born it is granted a physical sex label, i.e., female or male.

The difficult part to be understood is when it is said that the newborn is immediately and forever 'gendered' through social interactions. This includes norms, behaviours and roles associated with being a woman, man, girl or boy, as well as relationships with each other.

But during talks, I usually get a reaction that this social construct can differ from country, state and even from family to family. Yes, this is right as this social construct may vary from society to society and can change over time.

Coming back to the discussions with my daughter, I thought of bringing up the topic again during lunch time. So while drinking water, I turned the discussion towards ownership of open water bodies, especially the discussion that water is for everyone.



As expected I got a reaction about why I am making it look as if water itself is discriminatory. Water does not discriminate between anyone, so in that sense water has always been gender neutral. So then why do we need a discussion on this?

Well, I tended to disagree to this and placed a counter question – if this is so then why is the relationship of people and water not gender-neutral?

Even though I had said it, I felt this was not easy to explain. All the same I took this opportunity to address this question by moving the discussion onto the social construction of gender. So I took the role of a teacher which I usually do when I teach the course on 'Gender, Livelihood and Development' for Master's students of Fisheries Science at ICAR-CIFE, Mumbai.

So here in this blog, I want to explain how the social construction of gender happens.

## SOCIAL CONSTRUCTION OF GENDER

When I say social construction of gender what I mean in short is that 'social beliefs' create 'norms' which lead to 'gender roles' and 'sexual division of labour' with productive jobs for men and reproductive jobs for women leading to 'different activities and tasks' for men and women. This creates 'differential access to and control' over resources and 'differential decision making and power'. However, an understanding of the social construction of gender – in detail – is necessary for the readers of this blog.

So let us start with social belief. Social beliefs are the beliefs by which groups in a community identify themselves.

These social beliefs create norms. Norms are accepted standards, or a way of behaving or doing things that most people agree with. Different gender norms are defined which govern the behaviour of men and women in society (e.g., men can express themselves, men can be articulate, women must not express themselves or be articulate).

Different gender norms define different gender roles for men and women (for example, men must be breadwinners; women must be carers/nurturers).

This leads to sexual division of labour with productive jobs for men (jobs which earn incomes/wages) and reproductive jobs for

women (caring, nurturing, social reproduction) and community/formal leadership for men (e.g., Sarpanch) and informal leadership without public or formal recognition for women (e.g., dai, wise woman).

Sexual division of labour leads to different activities and tasks for men and women (women's tasks are undervalued and invisible, e.g., cooking, cleaning, women's work is fragmented; so public domain for men, private for women).

This leads to the 'differential access to and control over' resources (resources such as money, land, technology, knowledge, self-esteem, time, space).

This further leads to differential decision making and power.

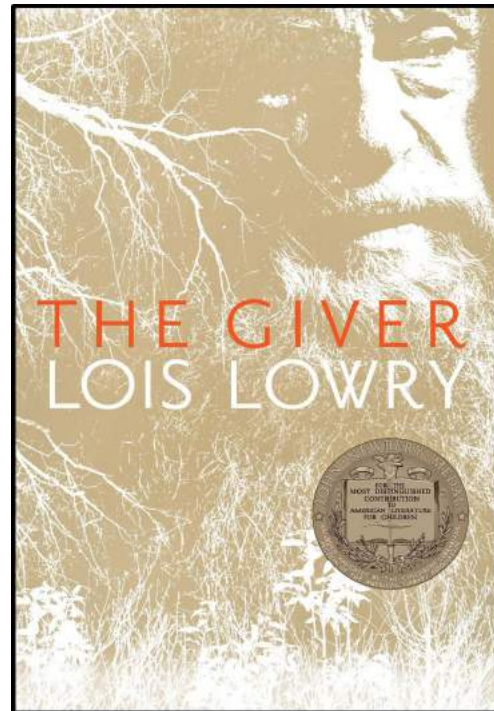
### SO WHAT IS THE PROBLEM?

One may tend to ask what the problem in social construction of gender is. Every society will have some sort of construction and we cannot have a completely utopian or a dystopian fictional community or society, can we?

Talking about fictional community or society, I remember a novel which was there in my daughter's school curriculum in Grade 7. She recommended that I read the novel and what a great novel it was! The novel called *The Giver* is written by Lois Lowry. I found it paradoxical in that it has won critical acclaim on one hand but has also been banned in certain countries. The book starts with a society which appears to be utopian through sameness – with the community lacking colour, memory, climate, etc., in an effort to acquire a sense of equality. But as the novel progresses it reveals how this society is constructed to be dystopian by its very sameness. The book set me thinking about who makes these decisions.

The real problem in social construction of gender is that those who make decisions and have power are the ones who influence social beliefs and gender norms on behaviour, sexual division of labour, and access to and control over resources. (I also need to say here that if done with fairness this same problem can be a

strength too.) Thus, this is a system which feeds on its subsystems and perpetuates itself.



The beauty of the system is that it can be broken anywhere, either by changing social beliefs, or by changing norms for behaviour of men and women, or by changing the work that men and women are supposed to do, or in the allocation of resources. Thus, the gender constructs can be changed over time, over space, and over contexts.

It is necessary to understand that social construction of gender does not happen in one day. It is a continuous process in which both individual and wider society plays a part and goes on from one generation to another. This construction is not something that we do not know of, and this is not fiction. It is what each one of us sees and lives on a daily basis.

Now the question is: If this social construction of gender has not been beneficial for one gender how has it survived for so long? Isn't it intriguing, therefore, that this social construction of gender has survived from one generation to the next!

In this context, I would say that it has amazing survivability behaviour. Despite there having been many men and women who have tried to break this social construction of gender, it has survived. This has survived so long due to the fact that it keeps updating, adapting,

reinventing and even modernising from time to time, generation to generation. There are many examples when this construction has been challenged and gains have been made and will continue to be made. However, these changes are small and yet to become revolutionary and transformative in nature.



### WHAT SHOULD WE DO?

Now, the important point to note and accept is that social construction of gender has the ability to update, adapt, reinvent, and

modernise. So what should be done? It is necessary for us to update, adapt, reinvent, modernise and keep challenging the traditional social construction of gender and play a major role in stopping its perpetuation.

One way is to have these discussions and debates with family, friends, students, and colleagues even when our beliefs are conflicting, because it is only through conversations that we can ignite minds. As social scientists we go to places, we travel all over the world, we talk to people, we read and we write but are we witnessing any radical changes. Not really.

This is because social construction is shaped by the interests of certain groups. If a voice is raised some change will be done whether in 'social beliefs' or 'norms' or 'gender roles' or 'sexual division of labour' or 'differential access to and control' or 'differential decision making and power'. In every generation this construction will be tweaked a certain bit and it will appear as flexible. But in the guise of some misinterpreted value system the social construction of gender will be shown as rational and legitimate. That is the reason change within our current gender system is difficult and slow, but not impossible.

After a discussion with my daughter, son, and many young students, I am cautiously optimistic and I believe that society can, and will, change. So continuous engagements are critically needed.

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## SEED ENTREPRENEURSHIP – A CASE OF EMERGING BUSINESS OPPORTUNITY FOR RURAL YOUTH

In this blog, **Mosharaf Hossain and Swati Nayak** argue how farmers' seed security can be enhanced through the promotion of a youth-led seed entrepreneurship model in Eastern India. They also highlight seed economics, and set forth the model's scaling pathways.

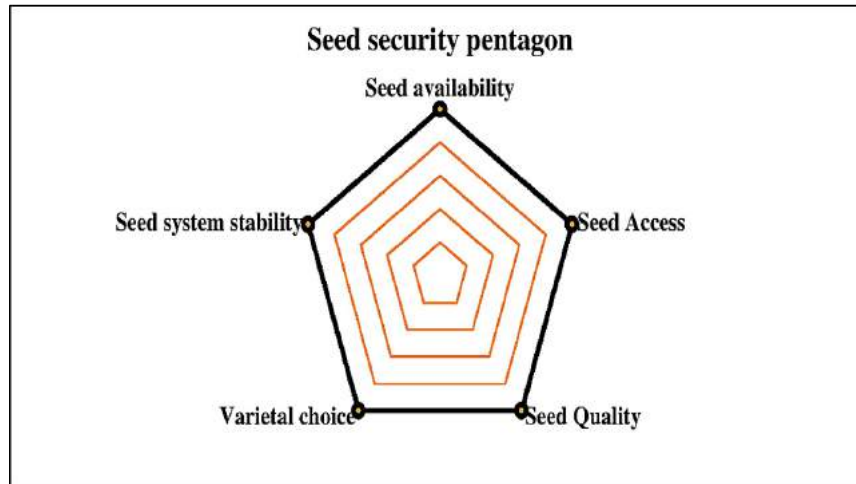
The low productivity of Indian agriculture is a chronic issue but can effectively be addressed through, inter-alia, enhanced access to quality seeds of the best-fit varieties. Given the enormous economic and social significance of rice in the Indian state of Odisha, the low productivity of this principal staple remains a policy concern for the government. In the development discourse, farmers' seed security (Box 1) is widely recognized as a tool for farm prosperity.

### RICE IN ODISHA

Even though Odisha contributes 7% to the nation's rice production, its productivity remains low at 2.1 tons per hectare against the national average of 2.7 tons per ha, and compares poorly vis-à-vis other agriculturally progressive states such as Punjab, Haryana, and Tamil Nadu. In Odisha rice is majorly a Kharif (wet season) crop grown in about 3.5 million hectares, requiring seeds of approximately 1.8 million quintals. However, rice being a self-pollinated crop, 33% seed replacement rate is the minimum prerequisite where seed sourced with assured qualities can be reproduced and grown for three subsequent years. This implies the state is in need of 6 lakh quintal certified or TL seeds every wet season. This is a humongous task and Odisha State Seed Corporation (OSSC) — the largest seed producer and distributor – cannot meet the demand singlehandedly. Approximately 3 lakh quintal quality certified seeds are produced and sold to farmers by OSSC every year, serving merely 50% of the total requirement. Noticeably, 5-6 varieties dominate this production and seed sale by OSSC. The remaining quantity is largely met through farm-kept seeds and private agencies. Since rice seed is a high-volume low-cost product, seed companies take less business interest in it; instead, they invest more resources towards breeding and marketing hybrid rice seeds that fetch them more revenue.

## Box 1: Seed security

Seed security essentially encompasses five major inter-connected response areas — physical availability of seeds, farmers' access, assured quality of the seeds, enough varietal choice for the farmers, and resilience of the seed system to ensure seed supply in the event of any socio-economic shocks (FAO 2015). Dimensions and importance of seed security can be better conceptualized through the diagram below:



An ideal scenario, where full attainment of these dimensions exists, is always desired so as to augment the gain from all other improved farm technologies.

FAO and EU (2015). "Household seed security concepts and indicators" Discussion paper, [https://www.fao.org/fileadmin/user\\_upload/food-security-capacity-building/docs/Seeds/SSCF/Seed\\_security\\_concepts\\_and\\_indicators\\_FINAL.pdf](https://www.fao.org/fileadmin/user_upload/food-security-capacity-building/docs/Seeds/SSCF/Seed_security_concepts_and_indicators_FINAL.pdf)



**Mahendra Sahu, a seed entrepreneur showing new rice varieties to visitors in his field.**

While on one hand, availability of quality seeds is not fully ensured, on the other, with fragile fragmented variety promotional activities, farmers' choice of appropriate varieties is limited. Markedly, seed extension activities and seed sales are executed by different agencies without much convergence and integration leading to little scope for varietal

knowledge and insight for farmers (Figure 1). Such shortcomings defeat the very purpose of boosting the adoption of well-researched rice varieties in the state. In such a situation, the tenets of seed entrepreneurship are unquestionably acknowledged, and strongly pursued in several seed-centric agricultural development programs.

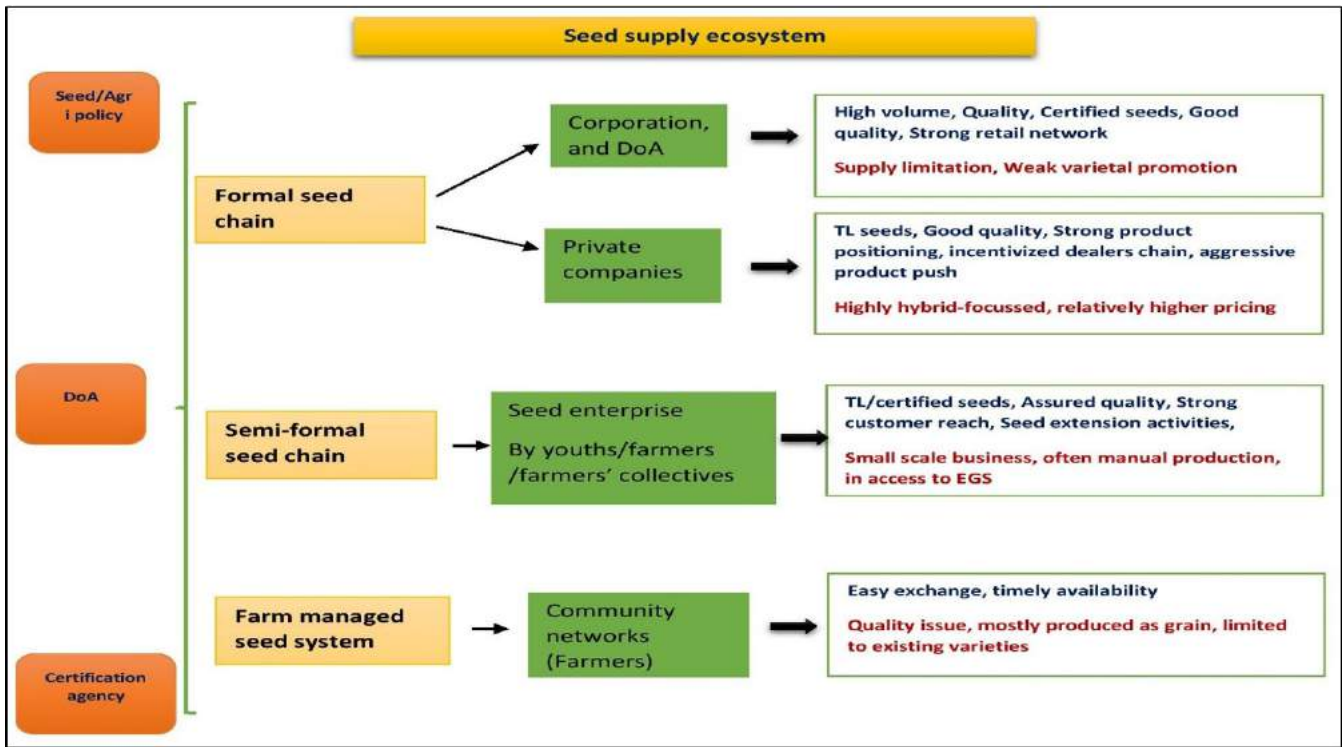


Figure 1: The current seed supply ecosystem

### BASICS OF SEED ENTREPRENEURSHIP DEVELOPMENT

Promoting seed entrepreneurship is important primarily for two reasons. Firstly, it enhances the capacity of the formal seed sector. Secondly, it contributes to livelihood augmentation of seed growers. Local growers, when incentivized and supported, can take up seed business to cater to the unmet seed needs of the locality. This initiative will be even more rewarding when rural youths are encouraged and supported to start such seed businesses. The interested youths or farmers thus can be supported to be seed entrepreneurs. At the same time, it must be borne in mind that not all the youth or farmers should be targeted for seed entrepreneurship development, rather, a few from a locality with strong seed business

interest can be carefully selected and assisted with all possible seed production support (Figure 2).

The COVID period showed us how fragile the livelihood options are for rural youth. India witnessed several cases of reverse migration and people struggling for a stable income source. At a time when the interest of youth in agriculture is on the wane but agriculture still remains the livelihood source for millions, it is very important to draw accord between interest, aspiration and available options. From a business point of view, such a venture – when properly run – is highly remunerative. A triangulation of business information from such manual enterprises suggests at least 50% profit margin on the invested amount.

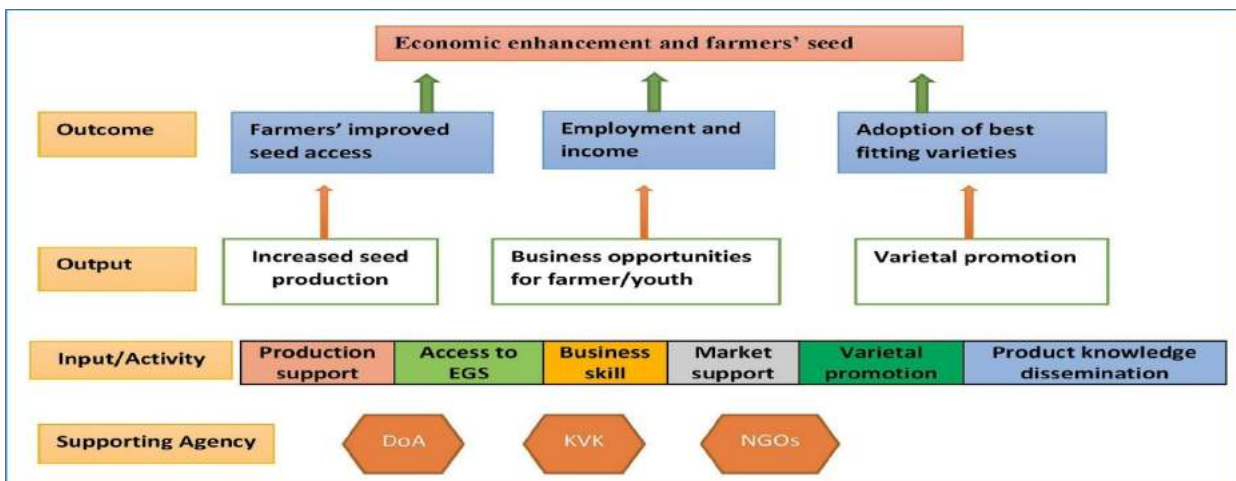


Figure 2: Seed entrepreneurship impact pathway

## Box 2: Scope for seed entrepreneurship in Odisha's rice sector

In the Odisha context, promoting seed entrepreneurship assumes more socio-economic relevance, since there always exists a high demand for quality rice seeds and the presence of private companies (selling inbred seeds) is thin. Presently, the state government supplies seeds at a subsidized price of approx. Rs 22/kg, whereas the price is Rs 30-35 if procured from other sources. However, farmers are well-acquainted with the worth of seeds and they do not hesitate to pay a little more if the seed quality is better. Moreover, on average, a farmer requires to spend merely 4-5% of the total cost in seeds for inbred varieties. Thus the demand for good seeds always exists as farmers are constantly seeking quality seeds of better varieties.

### IRRI'S SUPPORT TO INCUBATING SMALL SEED ENTERPRISES

IRRI's varietal advancement, seed out-scaling, capacity development initiatives in Odisha have created awareness and bridged the knowledge gap that earlier existed among many client groups.

The story of budding seed entrepreneur, Mahendra Sahu, illustrates how IRRI is incubating small seed enterprises in Odisha. Remarkably, the 30-year old entrepreneur Mr Sahu (Box 3) did not just remain an insignificant recipient of knowledge and skill, but he rather went on to become a successful seed entrepreneur.

### Box 3: Mahendra Sahu

Educated till higher secondary school, Mahendra lives with his parents at a small village in Bheden block of Odisha's Bargarh district — one of the largest rice-producing districts in the state. His family owns five hectares of land with fairly assured irrigation facility. Mahendra, while being aware of various factors limiting the returns from farming, steadfastly believed that seed as a critical input can not only amend farming but could also be a source of decent earnings. With his strong zeal for seed and its advantages in farm profitability, he envisioned seed business as a career option. But he lacked three important ingredients to realize his dream: varietal knowledge and access; technical know-how for seed production; and market linkage.

IRRI with its mandate of strengthening the seed system, has been rigorously working with state functionaries, community based organizations (CBOs), and farmers at Bargarh for quite a few years now. It was the wet season of 2018 when Mahendra participated in seed program activities and it kindled his latent urge for seed production and seed enterprise development. That year, IRRI enlisted him as a host farmer

for their on farm trials, where climate-resilient and high-yielding varieties such as BRRI dhan 69, MTU 1156, BINAdhan 17, Swarna Shreya, DRR dhan 50, BINA dhan 11, were validated and advanced in a farmer-centric participatory framework.

"For the very first time, I got to see and test so many of the newest varieties in one single season. The superiority of these varieties and the assessment process employed by IRRI was indeed stimulating for me and helped me pick up some of the promising and viable products to start my seed business," said Sahu in an interaction with IRRI staff.

In the next year, based on farmers' preferences, ecological suitability, and duration fitment, he chose BRRI dhan 69, BINA dhan 11, and BRRI 75 to begin his journey as a seed entrepreneur. He kept seeds from his demonstration plots carefully to be used for seed multiplication in the next season.

The quality seed production program of IRRI was a huge support where Mahendra earned critical technical skills to maintain the quality standards of the produced seeds. In his own words, "The season-long systematic demonstration of production technology and elaborate focus on seed quality has greatly helped me to master the art of seed production. Before such exposure, I had no scientific idea about seed quality, but by now I have attended five IRRI-conducted QSP training to refresh and fine-tune my skills."

In addition to conventional training, IRRI encouraged and supported him with varietal information, access to pure seeds for multiplication, low-cost seed storage materials, such as IRRI super bags, and also helped build market linkages with large seed producers to scale up his business.

## Scale of business

In 2019, building on all these technical aids of IRRI and his strong seed-passion, he produced about 10 ton seeds of varieties such as BINA dhan 11, BINA dhan 17, and BRR1 75. These are newer varieties and best evaluated by farmers at IRRI trials, thus demand for the seed has sharply risen in the past two years. "There is huge demand for these varieties, I could meet only 10 percent of their demand," Mahendra said. Farmers of 8-10 neighbouring villages are his current customers who often visit his village to procure the seeds. Against the market rate of Rs. 35-40 a kg for other commonly grown rice varieties, Mahendra sells his seeds at Rs. 55-60/kg because of high demand. Since his current production is not mechanized, he has to manually perform several operations — quality checks, grading, cleaning and drying.

In the following year, that is 2020, defying several operational challenges posed by the nationwide lockdown, he was able to produce 12 tons of seeds, and this time he added another IRRI-demonstrated variety, namely, BRR1 dhan 69, which is the result of a cross border agreement catalysed by IRRI (developed originally in Bangladesh and later also released and notified in India) and has huge demand among farmers of the Bargarh region. With this quantity of sale, he served the seed needs of about 400 farmers who are predominantly marginal and small peasants with limited access to new varieties. With business at the core, Mahendra strives to offer farmers much help in terms of variety selection and quality seed procurement. Unlike many other seed sellers, Mahendra shares varietal information, and the key points of crop management with his farmer-customers.

## The business model and benefits to farmers

On the production front, even though Mahendra has no mechanized setup yet for seed production, quality maintenance is the top focus of his business. He oversees and supervises all seed-to-seed operations so as to maintain quality standards. Moreover, his arduous exploration of new varieties gives him a competitive edge over others in product range and quality. For product promotion, he invites customer-farmers to his smaller demonstration and seed production plots letting them observe,

assess the products, thus stimulating buyers' purchasing decisions and the upshot is a growing customer relationship.

Another unique approach he is trying to embed in his business model is selling seeds with varietal insight. Unlike other traditional retailers, when farmers buy from him, he shares all varietal details, important management practices, etc. Quite understandably, all these qualities he has enhanced through his intensive engagement in IRRI activities for the last three years.

## His seed economics

Mahendra has estimated the economics of seed production quite prudently and consistently making efforts to optimize cost for profit maximization. His business economics is straightforward arithmetic. If he grows rice as grain, it will get him a maximum margin of Rs 40,000 from a hectare, but if seeds are produced with a little extra effort, investment, and commitment meeting marketable quality standards, this profit margin can be at least thrice higher. "The essential practices like regular field inspection, eliminating seed mixtures, crop roughing, clean harvest, scientific harvest, and appropriate storage are all that make a huge difference to seed health," said Mahendra, on his take on seed production challenges.

## Imminent challenges

"I plan to produce more seeds of these varieties, but (I am) constrained with non-availability of pure seeds (early generation seeds), I must maintain the quality to make my customers happy," are Mahendra's words on being asked about his next year production planning. He has set an encouraging target to earn at least 5 lakhs per annum in the next 2-3 years with consistent improvement in production and marketing. However, the emergence and severity of diseases and pests pose a threat to a good seed harvest. The uncertainty in climate events (e.g., rain during harvest) also brings much misery to farmers in the area. Farmers need to be armed with the latest technologies so as to mitigate the impact of such weather shocks and increase farmers' adaptive capacity.





**Mahendra Sahu at a variety cafeteria event organised by IIRI at Bargarh, Odisha**



**Recognition of Mahendra Sahu as a seed entrepreneur**

### **Business enablers for Mahendra**

IRRI extended three critical aids to Mahendra.

(1) The participatory trials and demonstrations of new varieties – ranging from climate-resilient, high yielders, and green super rice – have created awareness for the entire farming community in the catchment, and it fostered his business with increased demand.

(2) Venturing into the seed business without technical skills is a risky affair. Nonetheless, IIRI organized the QSP capacity-building program, helped him gather all seed production skills, and moulded him into a skilled seed grower.

(3) IIRI's support with pure/early generation seeds, storage materials, and local market insights catalyzed his seed business in terms of production and marketing. However, seed business cannot be everybody's cup of tea, as, unlike the grain, seed production demands extra and precise care at all stages of crop production. A passion for seeds, entrepreneurial abilities, and unceasing devotion are the tricks of the trade and Mahendra has all these qualities.

The purpose and design of various IIRI demonstrations appealed to Mahendra and he found those are extremely catalytic to bridge the extension gaps in the transfer of technologies, like seeds. Interestingly, he is now replicating IIRI demonstration models such as varietal cafeteria, and cluster demonstration in his field to assess varietal performance. Interestingly, he is inviting farmers to visit his plots to get first-hand knowledge on several new varieties and to understand key

management practices. He deliberates with farmers about the fitment and potential of varieties being displayed in his demonstration plots. He said, "I encourage farmers to evaluate and validate the performance of a variety as a pre-production practice before growing seeds of a new variety; it will make the sale easy." In 2021, he included one more IIRI-bred variety — Swarna Samruddhi – in his production plan. This multi-stress tolerant, high yielder, with fitting grain quality will become a rage in that area, according to Mahendra. In this process, his exemplary efforts also manifested in creating mass awareness of new varieties among farmers.

In recognition of his impassioned entrepreneurial competencies for self-employment and meeting the seed need of farmers, AJKA, an NGO from Odisha, honoured and encouraged him with the Krushak Yodha (meaning 'Farmer Warrior') award. Dr Basant Kumar Mohanty, District Project Manager in the presence of the Chief District Agriculture Officer presented this award at an IIRI event organized at Bargarh in December 2021. IIRI, in the coming years, will encourage and support such entrepreneurs to advance the agenda of farmers' seed security and economic development of rural entrepreneurs.

### **IMPLICATIONS FOR SCALING**

#### **Production support**

This venture should initially be seen as a microenterprise with a clear vision of business modernization and expansion. Aspiring seed entrepreneurs should have comprehensive knowledge about rice ecosystems, varietal

demand, recommendations, access to early generation seeds, new varieties, etc. They must be well-trained on techniques of quality seed production, seed cleaning, processing, and storage.

In the initial years, the small entrepreneur can run the production manually in case of capital constraints; however, eventually, a mechanized production unit can be planned to optimize production cost for scaling the volume and maximizing profit. It requires a sizeable investment, thus subsidized financial support will be greatly helpful.

### **Business support**

Market scouting is a critical aspect of seed business since unsold seeds may need to be disposed of as grain at a much lower price. Pre-season assessment and agreement with the largest sellers are highly recommended to prepare production and marketing plans.

### **Seed quality**

The biggest driver for seed business in the Odisha context is the quality standards of the seed. Consumers (farmers) rarely care about seed certification if they are convinced of the quality as experienced in their field. In fact,

this quality aspect alone is crucial in building seed brand loyalty.

### **Expanded varietal choice**

In light of inadequate varietal choices, such seed entrepreneurs can increase the number of well-fit varieties and give farmers a wider choice to pick their preferred varieties. While doing so the purposes of seed business are augmented and it also enriches farmers' seed choice capabilities.

### **Varietal trials and seed extension activities**

This is a very important part of the rice seed business that is hardly emphasized. Budding seed entrepreneurs should be a little more pro-consumer in terms of creating varietal knowledge and insights. Small-scale demonstration of the on-farm performance of new and old varieties, and encouraging farmers to participate and evaluate varieties can help in product selection as well as in converting farmers into customers. Furthermore, during seed retailing, farmers-buyers should be provided with basic product knowledge along with standard management practices, maybe as verbal suggestions and a leaflet. Such initiatives will progressively help entrepreneurs expand their customer base and scale up the business.

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## SKILLING YOUTH FOR SUSTAINABLE FOOD SYSTEMS TRANSFORMATION

On the occasion of World Youth Skills Day, **Mahesh Chander** shares his thoughts on why it is important to skill today's youth for making farming remunerative.

In December 2019, while walking on the streets of Paro in Bhutan, I read this slogan at the youth training centre 'Get SKILLED and be SOMEBODY'. I liked it instantly, since it effectively conveys that without skills, we are just empty vessels! Over the last several years, I have been writing on issues pertaining to youth, including on youth and skills<sup>1</sup>. But most of these thoughts were before the COVID-19 pandemic, an unprecedented event in our living memory. The COVID era has taught us insightful lessons gained from living through it. Youth anywhere in the world were the worst victims of COVID as it caused a lot of uncertainty, anxiety, hopelessness, including worries and depression among them about their future. On this World Youth Skills Day (Box 1), yet again, I have additional thoughts to share.

### Box 1: World Youth Skills Day

To celebrate the strategic importance of equipping young people with skills for employment, decent work and entrepreneurship, in 2014 the United Nations General Assembly declared 15 July as World Youth Skills Day. Since then, World Youth Skills Day has provided a unique opportunity for dialogue between young people, technical and vocational education and training (TVET) institutions, firms, employers' and workers' organizations, policy-makers and development partners. The upskilling of youth has become increasingly important in light of the world's slow shift to sustainable development. A growing youth population, rising unemployment in many countries, changes in the labour market and in the national economy due to technological developments are just some of the reasons why we must provide future generations with the entrepreneurial skills and mindsets they need to cope with a changing world.

The celebrations of World Youth Skills Day 2022 will highlight the ongoing focus on the Transforming Education Summit (September 2022), and contribute to the work being done under its thematic action track Learning and skills for life, work, and sustainable development. Every passing World Youth Skills Day is expected to bring skills onto the centre stage of every development effort - the very purpose for which it was introduced in 2014.

Celebrating World Youth Skills Day on 15 July



You might have noticed small bicycle repair shops along the roads of small towns, where many young boys (hardly any girls) fix problems, including fixing punctured tyres and tubes. They survive because they have the skills to do these jobs. If rural youth don't have similar skills in many areas related to rural livelihoods they will have difficulty in earning their livelihoods. Whatever qualifications one may have, skills in certain areas are always helpful to live a meaningful life. The whole world is progressing towards mechanization, digitalization and automation to replace manpower. This requires new sets of skills to operate these new systems. If youth are not skilled in these areas, the pace of automation and mechanization would get slower. When we talk of smart agriculture or

smart food systems, we talk of skillful, efficient, safe and sustainable systems that ensure a comfortable environment. This calls for a high level of skills in those responsible for running and managing the agri-food systems. Much depend on the youth of any country where agri-food systems are to be smart.

## FOOD SYSTEMS AND YOUTH

The agricultural and food systems, being one of the biggest sectors in any country, offer huge employment opportunities anywhere in the world and more so in developing countries, youth can find even better opportunities where it is a fast emerging sector (Box 2).

### Box 2: Opportunities in the Agri-food Sector

The Committee on World Food Security (CFS)<sup>1</sup> acknowledged in its Multi-Year Programme of Work (MYPoW) for 2020-2023, that young people are one of the keys to achieving sustainable development, particularly in developing countries, where the vast majority of them reside, often in rural areas. Martin Cole, Chairperson, Steering Committee of the CFS HLPE<sup>2</sup>, remarked:

- Youth are on the front lines to build the food systems of the future, while also bearing significant risks from climate change, social and economic inequities, and political marginalization.
- Food systems provide a wide spectrum of opportunities for the engagement and employment of young people across diverse global contexts, but these jobs do not always provide decent and meaningful work or adequate livelihoods.
- In response, policies and initiatives to protect and strengthen youth engagement and employment in food systems need to be based on the pillars of rights, equity, agency and recognition. The redistribution of resources, knowledge, and opportunities for youth innovation and engagement in the development of context-specific employment and labour policies can not only contribute to creating jobs for youth but can also directly support transitions to sustainable food systems.

<sup>1</sup>The Committee on World Food Security is, at the global level, the foremost inclusive and evidence-based international and intergovernmental platform for food security and nutrition.

<sup>2</sup>HLPE. 2021. Promoting youth engagement and employment in agriculture and food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

## Why Skilling Youth Matters?

Food systems are the largest employer of young people, particularly in the developing countries, yet the work they do is often not wholesome and meaningful, and very often not even adequate for their livelihood. Frequently it does not maintain a balance between the needs and rights of different generations. Since agriculture and food systems are no longer confined to farm fields, but are inclusive of post-harvest, processing, value adding, marketing and trade, skills are needed in various aspects of agricultural production and supply chains. This is where the huge opportunities lie – when agriculture is not just a matter of primary production but of the entire value chain that includes processing, value addition and marketing. If we look at agricultural value chains and food systems there are a number of jobs requiring specific skills, which we currently find many youths are not skilled in. For instance, processing milk into many value added products such as ice-cream, flavoured milk, etc. Even clean milk production requires skills in which many youths are not skilled currently.

## What type of support does youth need?

Youth require support, including redistributive and mediated market policies, to access land, water, forests, labour, knowledge, information, agricultural extension, finance, credit, markets, technology and supporting institutions for sustainable food systems transformation. The land titles are often not in the names of these youths, they are not able to seek loans from the financial institutions for want of collaterals. This is one serious barrier impacting youth participation in innovative ventures. Efforts are on to overcome this by introducing several schemes. But this requires a bit more attention if youth participation is to be speeded up.

The Government of India recognises that the current youth glut is an abundant asset and offers immense leverage in terms of skilled labour, entrepreneurship, innovation and knowledge to accelerate the developmental needs of the country. Investments have been made on multiple fronts to generate employment, develop skills and foster entrepreneurship. In India, schemes such as Pradhan Mantri Kaushal Vikas Yojana (PMKVY), Deen Dayal Upadhyaya Grameen Kaushal

Yojana (DDU-GKY) and Skills India campaign have been expanded for better reach. New programmes such as the Entrepreneurship and Skill Development Programme, Prime Minister's Employment Generation Programme (PMEGP), Pradhan Mantri Mudra Yojana (PMMY) and Start-up India are expected to support the entrepreneurship ecosystem, and the National Career Service matches job seekers with employers.

The Government of India (GoI) has initiated efforts to engage youth through technology and has organised youth parliaments, youth conventions and festivals. Special programmes such as Youth for Development, National Youth Advisory Council, and the National Programme for Youth and Adolescent Development (NPYAD) have been launched to increase youth volunteering, motivate the youth and enable them to be strong leaders. Special programmes to skill youth in agriculture has also been initiated (Box 3). Often these well-intentioned programmes do not reach the targeted stakeholders, so for better outcome from these efforts it is necessary to popularize them.

### Box 3: Skilling Youth on Agriculture in India: Current Opportunities

Currently GoI is giving high priority to natural and organic farming, considering its export potential, especially for certified organic products, besides the growing interest of domestic consumers in high quality, safe and nutritious food products. These food systems are highly dependent on certain practices involving skills, for instance, making vermicompost, jeevamrit, beejamrit, biopesticides, biofertilizers, herbal animal health products, etc. It may be helpful if rural boys and girls are given skills in these areas of high priority in the national interest. Often the older generations don't show interest in learning new skills, while it could be rewarding to skill youth, as they will be the future farmers. Agriculture Skill Council of India (ASCI), a not-for-profit concern, working under the aegis of Ministry of Skill Development & Entrepreneurship (MSDE) works towards capacity building in emerging areas of agriculture by bridging gaps and upgrading skills of farmers, wage workers, self-employed and extension workers engaged in organized / unorganized segments of Agriculture & Allied Sectors. The Krishi Vigyan Kendras (KVKs) are other important institutions responsible for skilling youths in emerging areas of farm production. The spirit of collaboration, coordination, collective wisdom will go a long way in skilling youths in the emerging areas of smart agri-food systems.



**Capacity building training for youth in production of rooted pepper cuttings under ICAR-ARYA programme**

### **Role of Policies**

Context-specific employment and labour market policies at global, national and local levels not only can contribute to creating jobs for youth but can also directly support transitions to sustainable food systems by restoring the natural resource base, strengthening the social and physical infrastructure, and contributing to territorial markets and food security.

The GoI has prepared a new draft National Youth Policy (NYP) after reviewing the existing draft of National Youth Policy, 2014. The new draft NYP envisages a ten-year vision for youth development that India seeks to achieve by 2030. The new draft National Youth Policy (NYP) is aligned with the Sustainable Development Goals (SDGs) and serves to 'unlock the potential of the youth to advance India'. The new draft NYP seeks to catalyze widespread action on youth development across five priority areas, viz., education; employment & entrepreneurship; youth leadership & development; health, fitness & sports; and social justice. The Department of Youth Affairs had sought the comments/views/suggestions on the draft NYP from all stakeholders by 13 June 2022. Hopefully many youths have responded to this call for comments/suggestions and views so that the policy can become more meaningful. Often, the real stakeholders do not get information at the right time or many are reluctant to give suggestions, even if it concerns their own good.

Approaches and policies to strengthen youth engagement and employment in food systems need to be based on the pillars of rights, equity, agency and recognition. The GoI has implemented various measures to strengthen social justice and reinforce the principle of

unity in diversity. These steps have been taken to ensure equity, enhance the justice system, and increase knowledge and awareness among youth. Furthermore, legal literacy clubs have been set up in schools to raise legal awareness, and digital programmes were implemented to improve access to legal aid, such as Tele-law and Nyaya Bandhu. Social audits have been held in various states to elicit youth response on key topics, and six lakh youths have participated in neighborhood youth parliaments. One Stop Centres have been set up for women, and special helplines for the Scheduled Caste (SC) and Scheduled Tribe (ST) communities.

### **Supporting Youth-Centred Innovation for Sustainable Food Systems**

The startup eco-system in recent times has been supported in a big way by the government. Many institutions are now regularly inviting proposals under various schemes where youth have ample opportunities to participate and benefit with their creative and innovative ideas to develop agri-food systems. Schemes such as Rastriya Krishi Vikas Yojana (RKVY) are running in several institutions, viz., SAUs, ICAR institutes, MANAGE, etc.

For instance, at ICAR-Indian Veterinary Research Institute, Izatnagar, we are implementing Rashtriya Krishi Vikas Yojana - Remunerative Approaches For Agriculture and Allied Sector Rejuvenation (RKVY-RAFTAAR). This is an initiative of the Ministry of Agriculture and Farmers' Welfare, Govt. of India, to give thrust to Agripreneurship and startups. In a broader way, the scheme is implemented with the objectives of making farming a remunerative economic activity by strengthening farmers' efforts, risk mitigation and promoting innovation. Under this programme, NAVODAYA is an Agripreneurship Orientation Programme (AOP) of RKVY-RAFTAAR Agribusiness Incubation Scheme aimed at providing mentorship and funding opportunity to students, youth, Smart Farmers, women or anyone interested in venturing into agriculture and allied areas for transforming their innovative ideas to prototype/product. Likewise, many different Ministries and Departments concerned with agri-food systems are running schemes to develop and promote youth-centered innovations for food systems.

Youth centred innovations for sustainable food systems involves developing groups of old and new systems of knowledge and practice, with more democratic and inclusive governance and organizational models. Digital technologies have the potential to 'expand knowledge democracy', but ongoing digital divides must be overcome so that these benefits are not concentrated on only those youth with access to high levels of financial capital.

In February 2022, I visited three counties, viz., Sumter, Alachua and Osceola in Florida, USA, to get acquainted with field extension activities

being undertaken by the extension agents in these counties (Box 4).

We can draw parallels among UF/IFAS Extension and Krishi Vigyan Kendras (KVKs). I believe KVKs can get inspired from the work of extension agents working with counties in terms of activities, infrastructure and innovative approaches used to engage youth in particular. Likewise, we can get inspired and act locally from the experiences from various countries and institutions to meaningfully, creatively and productively engage youths in countries in the region, including India.

#### Box 4: Youth Training in USA

It was fascinating to know the innovative work being done by the counties to create awareness, impart knowledge and skilling of the local communities. Programs, such as landscape gardening, management of water resources, Master Gardner program, and use of drones in agriculture, were some of the unique ones I learnt about during my visits to these counties. When interacting with county agents, I found that 4-H is a very effective program for shaping the life of youth for national development. On my visits to agricultural fairs there, I saw many school children enthusiastically participating in 4-H activities, such as handicrafts, raising crops and livestock rearing, caring competitions, etc. 4-H used to be an integral part of the Land Grant patterned Agricultural Universities in the initial years to engage youth in innovative, skill-oriented agricultural activities, but we do not hear much about them now. I strongly believe that this is one good concept which we should revive to inculcate interest in agriculture among the younger generations of India. I was highly impressed to see the work the UF/IFAS Extension faculty was doing to improve the lives of Florida's residents.



**“Mentoring Rural Youth on Agricultural Entrepreneurship” organized by ICAR-IVRI**



**Training on Mushroom Waste Utilization and Income Generation for rural youth at ICAR-KVK Thrissur**

#### END NOTE

The world is changing in significant ways, and here lies the opportunity for India's youth to make the most of it. For this to happen, action needs to be catalysed if we are to address the barriers to youth development and prepare the youth for a world that is changing in significant ways. The onset of COVID-19, especially, has further accelerated automation, fast-tracked e-commerce, increased remote work, and reduced business travel with the integration

of technology in our everyday lives. However, the pandemic also highlighted the need for stronger protection for all youth, particularly the millions of young Indians who migrate from rural to urban areas to pursue better opportunities. Large-scale migration adversely affects the rural economy and imposes a resource burden on urban towns and cities. The policies and programmes which can help rural youth find meaningful occupations, in rural areas itself, would go a long way in productive youth engagement. Programmes, such as

Attracting and Retaining Youth in Agriculture (ARYA), need strengthening if they are to be impactful.

KVKs have been functioning as Knowledge and Resource Centres of agricultural technology supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district, and are linking the NAES with extension system and farmers. One, among the several activities of KVKs, happens to be capacity development of farmers and extension personnel to update their knowledge and skills on modern agricultural technologies. As such, it is expected that KVKs will play a proactive role in skilling the youth with respect to modernizing agri-food sector. Much depends on the performance of KVKs, especially in terms capacities of KVK staff to train youth in emerging areas. COVID-19 gave us an opportunity to use distance modes and online activities to train youths on skills. For instance,

we organized a Facebook live programme for making balance ration for livestock.

In certain areas, capacity building is urgently needed and it is gratifying to know that the Government of India is encouraging and facilitating use of drones for the convenience of the farmers, reducing the cost and increasing the income. For promoting use of Kisan Drones, the government is providing 50% or maximum Rs. 5 lakh subsidy to SC-ST, small and marginal, women and farmers of northeastern states to buy drones. For other farmers, financial assistance is to be given up to 40 percent or maximum Rs.4 lakh. Accordingly, the ICAR has asked all the KVKs to organize training on applications of Drones in agriculture and popularize their uses among the farmers. Appreciably, the National Institute of Agricultural Extension Management (MANAGE) is also taking note of such emerging needs like organizing trainings on use of Drones in Agriculture.

विश्व युवा कौशल दिवस  
**World Youth Skills Day**  
Get Skilled-Be Somebody  
Making BALANCE CONCENTRATE MIXTURE for Livestock Feeding  
15 July, 2020

ICAR- Indian Veterinary Research Institute  
Izatnagar-243 122 (UP) INDIA

worldskills

## ENDNOTES

- <sup>1</sup><https://ypard.net/resources/blog/world-youth-skills-day-time-for-collective-actions>  
<https://medium.com/@mchanderivri/youth-want-safe-spaces-can-we-assure-them-a7c7eb1a40cb>  
<https://ypard.net/resources/blog/make-agriculture>  
<https://ypard.net/resources/blog/youth-and-social-media-a-leverage-for-agripreneurship>  
<https://ypard.net/our-work/showcase/12820-the-extension-and-advisory-services-eas-shouldn-t-ignore-youth-anymore>  
<https://blog.gfar.net/2016/05/26/a-day-out-at-nikkis-farm-a-youth-agripreneur-in-action/>  
<https://ypard.net/our-work/showcase/12824-mentoring-rural-youth-to-make-agriculture-attractive>





फाईव्ह एलिमेंट्स

कृषक मित्र अ‍ॅग्री सर्व्हिसेस प्रा. लि.

# Private sector and Farmer collectives

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# 33

## PRIVATE SECTOR AGRICULTURAL EXTENSION IN SRI LANKA: BUSINESS COMMUNICATION OR FARMER SUPPORT?

While private sector extension contributes significantly to agricultural development in Sri Lanka, their business communication approach focusing on enhanced input use has resulted in confusion among farmers. Government needs to intervene to help farmers distinguish between propaganda and genuine advisory, argues **Tharaka Jayasinghe** in this blog.

The Sri Lankan agriculture industry is facing a number of challenges such as slow rate of farm mechanization, low unit land productivity, continuous reduction of labor supply and high cost of production. These drawbacks of the industry have been creating additional pressure on the existing extension system (private, public and NGO) to bring sustainable solutions. Public extension systems even today are fairly centralized and provide only top down blanket solutions and they have a poor understanding of the farmers (Babu and Glendenning 2019). According to Sivayoganathan (2020), lack of a comprehensive national agricultural extension policy, limited recognition of agricultural extension services at all levels, poor linkages among research, extension, and other agri-support services, shortage of competent extension professionals, and inadequate research in extension have further intensified pressure put on the public extension system in Sri Lanka. However, private sector extension services are emerging following a market-oriented approach and integrating their activities into commercial operations such as the sales of farm inputs (Wanigasundara, 2015).

There are three main players in the agricultural extension system of Sri Lanka. These individual units have their own objectives and orientation (Fig 1 and 2). For sustainable development of the agricultural sector, these three sectors must work simultaneously without disturbing each other's individual objectives. These three sectors can be categorized as follows:

1. Public Sector - Extension + Service;
2. Private Sector - Extension + Profit;
3. NGO Sector - Extension + Empowerment/Environment.

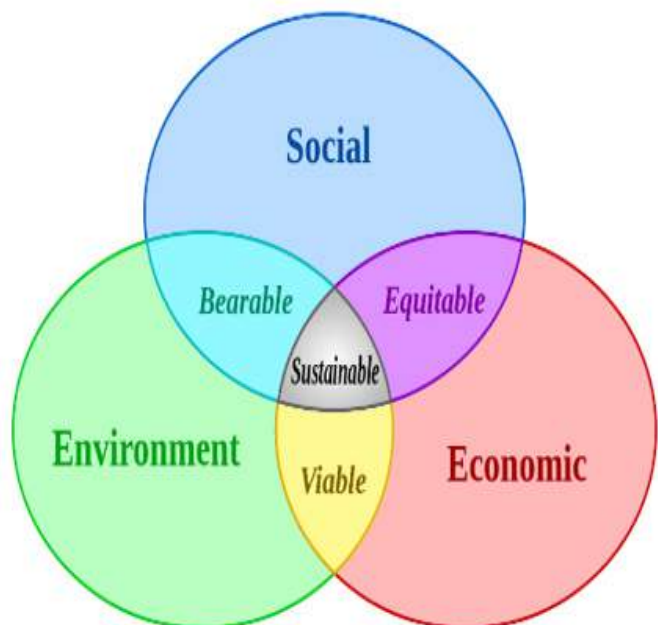


Figure 1: Sustainable approach of agricultural extension



Figure 2: Objectives of the different sectors of extension



Extension Officer explaining about Fall armyworm trap

### TYPES OF PRIVATE SECTOR ENGAGEMENT

The private sector involves in agricultural extension as a social service marketing tool with an orientation towards profit. Therefore, they have modified the existing extension approach as per their business model. The companies deal with the agricultural supply chain directly

or indirectly for fertilizers, seeds, agro-chemicals, machinery, equipment, distribution, marketing, certification, financing, value addition, and Export using advisory and extension tools that are modified according to their own requirements.

These modifications can be categorized in to three main approaches:

1. Business to Business Extension Service (B2B approach);
2. Business to Customer Extension Service (B2C approach);
3. Business to Industry Extension Service (B2I approach).

### The B2B Approach

The service of extension is directly given in to one business to other business. As example

from fertilizer company sales their product directly to other businesses like Tea factories, main distributors or main dealers. So therefore, fertilizer company is given their advisory service directly to customers of the tea factories, distributors or main dealer. Target customers may be end user of fertilizer or may not end user of fertilizer. The main objective of the fertilizer company is to satisfy their immediate customer not end user of the products.



**Extension Officer explaining about fertilizer application in coconut**

### The B2C Approach

The extension service is directly given in to the end user of the product or service. The extension officers of the private company directly visit farmer, estate owner or any of the end users of their product and provide service and advice, conduct training programs, or any other extension activity on farming, agri-business. Also, extension officers give product and service information on their products and services.

use of agri-inputs for their farming. The prime objective of this approach is to give service to the entire industry. But it also helps the firm to increase brand awareness and brand recognition in their end users.

These three main approaches can be further discussed based on the specific modifications carried out by the individual private firms.

## RATIONALE FOR PRIVATE SECTOR INVOLVEMENT

### Brand Awareness

The 'Brand Name' is one of the main intangible assets held by private sector firms. A well-known and reputed brand name always helps the firm to charge additional value for the same product that is available with other competitors.

### The B2I Approach

The service of extension is given to any stakeholder in the company supply chain without considering business objectives of the company. For example extension officers of the company work with certification agencies such as Rainforest Alliance to promote sustainable

It also helps a firm to acquire higher profit margins as well as create a higher value for itself. Therefore, some agri-input companies in Sri Lanka are having agricultural extension teams to deal with farmer or other stakeholders in their supply chain with the prime objective of raising brand awareness or brand promotion. Extension officers of these companies go to the field to meet farmers and other stakeholders. They share best quality and latest information with the farmers. Via this strategy, the company expects to indirectly sway farmers towards their product or brand name. The expenses of the extension service will be recovered indirectly by creating brand value and using that to create a premium price for their products or services.



**Extension officer visits to grape field**

### **Propaganda Tool**

Propaganda is one type of marketing communication with customers. Some companies use agricultural extension as a propaganda tool. The extension officers of such companies follow the hybrid communication approach.

One example: first they help farmers to identify a pest or disease in their crops and then they strongly recommend their own product or solution to farmers. This works like a personal selling option while dealing with a farmer. The extension officers meet potential clients/ farmers/estate owners for the purpose of transacting a sale.

*"Propaganda is the dissemination of information—facts, arguments, rumors, half-truths, or lies—to influence public opinion. Deliberateness and a relatively heavy emphasis on manipulation distinguish propaganda from casual conversation or the free and easy exchange of ideas"* (<https://www.britannica.com>).

The expenses of the advisory will be recouped indirectly by motivating farmers to buy their product or service.

### **Buyback System**

A buyback is also known as a share repurchase system. The company signs an agreement with a farmer to supply all agri-inputs, including advisory service, wherein the farmer must supply labor and/or land for crop cultivation. Then the company will buy their harvest at a pre-agreed market price or current market price.

In the buyback system, advisory and extension service is considered as a main input where extension officers will visit a farmer and give advice on agronomic practice throughout the cropping season.

Farmers must fully follow their advice. The extension services are charged from the farmers at the time of pricing of the product as per the agreement.

### **Supply chain management**

Most supermarkets in Sri Lanka are trying to maintain the quality of their produce, especially fruits and vegetables. Al so, they use that quality and standard of agronomic practice as a competitive advantage to win more customers. The supermarkets have their own registered farmers, their own farming lands, their own collection centers (e.g., for vegetables/fruits). The extension officers of the supermarket supply chain visit their registered farmers or unregistered supplier and advise them about Good Agricultural Practices (GAP), Good Handling Practices (GHP), Good Hygienic Practices (GHyP), Good Transport Practices (GTP), and Good Packaging Practices (GPP). Such advice helps them to maintain product quality all the way up to end customers; these practices also help in minimizing post-harvest losses. The costs of the extension and advisory service and post-harvest losses will be covered by the premium prices charged at the supermarket.

### **Quality Certification**

Some companies need quality certificates to export their product to foreign markets. For this they must maintain quality standards of the

input supplier. So they use their advisory team to deal with farmers. The advisory team goes to the field and puts up awareness programs for the farmers on quality standards and certification requirements. Most of the quality certificates – Organic, GAP, Rainforest Alliance Certificate – have to be renewed annually, therefore extension officers are always kept busy with maintaining the quality requirements for particular certificates of these companies. The prime objective of the extension team is to communicate and motivate farmers on quality standards.



**Method demonstration on fertilizer application in coconut**

### **Maintaining input quality standards**

The main role of extension officers while dealing with this kind of approach is to maintain the input quality of their manufacturing process. One example is of black tea manufacturing in Sri Lanka. Main input for black tea manufacturing is fresh green immature tea leaves. If the quality of the green leaves is poor it will lead to the manufacture of poor-quality black tea. Therefore, tea factories have their own extension team that visits tea smallholders, estates and plantations to advise them about green leaf quality. Also, extension officers will help in coordinating with other input suppliers who have a direct impact on the quality of green leaves.

### **Strategic Business Tool**

Some multinational companies in the agricultural value chain are always trying to integrate – horizontally or vertically – through their supply chain. Also, some companies want to show they are investing in the development of the local industry. Therefore, they use agricultural advisory services to achieve their strategic objectives. Most of time they use this

extension tool to minimize public resistance to their main business.

### **Advertising Platform**

Some communication and mobile service supplying companies have their own advisory and extension teams. The main objective of such teams is to attract more numbers of stakeholders to their platform to find solutions related to agriculture. They have developed mobile Apps, websites or other digital solutions for agriculture extension. Farmers will subscribe or login to these platforms to find a solution for their problems. The communication companies will use these platforms to advertise many products and services. Sometimes they will also charge subscribers on a monthly basis.

### **Customer retention and motivation**

This approach is being followed by companies providing local financial assistance. These companies support small and medium enterprises dealing in agribusiness. Most of the time they give loan or micro finance facilities to farmers or investors. The extension officers of those firms visit the farm or business and give advice related to agribusiness development as well as financial management. That approach guarantees bank repayment of their loans. Also, extension officers give positive and negative feedback to the bank on their performance.

There are many other types of modification being used by different private sector companies to achieve their business objective while developing their suppliers or farmers through the use of agricultural extension as a business tool of communication.

### **Agricultural Consultancy Service**

Individual private practitioners as well as private companies are giving advisory service as a form of consultancy service. Most of the time small and medium scale agri-entrepreneurs, medium and large- scale farmers, farmer groups, and farmer societies are using consultancy services. Furthermore individual consultancy service providers are working as visiting agents – they visit every week, or once a month as part of a routine system to the farm and give advice to the farmer or business owner. They are paid a monthly allowance or pre-agreed amount per visit. The consulting companies provide a range

of services according to the requirements of the farmer/estate owner/business unit. Most of the time consulting companies come to an agreement with large-scale farmers or estate or agri- business unit and they pre-agree on a system of payment.

## CONCLUSION AND RECOMMENDATION

The companies that are practicing agricultural extension have their own model and objectives. Effectiveness and efficiency of their operations vary according to the model and situation. But most of them have achieved their business objectives very well. However, due to their use of agricultural extension as a tool for marketing, many are unable to demarcate business propaganda and genuine extension support. Some firms have also used agricultural

extension to unethically and aggressively promote their products or service. In the long run, this will be unhelpful, and therefore, those engaged in private sector extension should follow some discipline to use extension in ethical ways.

While private sector investment in extension will help the Sri Lankan Government to reduce or rationalize public sector funding in extension, it should intervene, advise and regulate private sector extension in order to maintain and protect the sustainability of its agricultural systems. Also, we must reform the agricultural extension system by developing demand driven and market oriented advisory services and develop new funding mechanisms to achieve greater impact on farmers.

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## TOWARDS ECOSYSTEM SUPPORT FOR STRENGTHENING FARMER PRODUCER ORGANISATIONS

Farmer Producer Organisations (FPOs) need support not only at the FPO level, but also at the promotion and ecosystem level. In this blog, **Aneesha Bali** reflects on the challenges FPOs face and the role of the National Association for Farmer Producer Organizations (NAFPO) in addressing some of these challenges.

Unlocking the potential of smallholder farmers, who constitute more than 85% of all farmers in India, is one of the primary national goals for farmer welfare. This is the pivot on which Farmer Producer Organizations (FPOs) function as a vehicle to augment farmer income. So far, many farmers have come together to form more than 10,000 FPOs, and another 10,000 are on the horizon for promotion in the upcoming years. State level federations organised in Gujarat, Madhya Pradesh and Maharashtra have yielded encouraging results – particularly in organising seed production, establishing linkages with processors, and initiating procurement at Minimum Support Price (MSP). In recent years, FPOs have moved beyond just providing farmers with inputs and have started to add value through aggregation and primary processing before sale of commodities. There have been multiple case studies where FPOs are the focal point of supply-chains in agribusinesses, some have also used their network and partnered to set up procurement centres with corporates as well.

### STRENGTHENING FPOS

Although aggregating raw produce at a cluster with several hundred or even a few thousand farmers seems to be a necessity, it is not enough to deal with market players. More often than not, local level intermediaries are replaced with regional/state level intermediaries, with more or less unsatisfactory outcomes in terms of price realization and terms of trade. The ability to influence this value chain in a significant manner remains far-fetched for the majority of FPOs.

FPOs currently face some of these major challenges:

### Access to finance/working capital

The Government of India through Public Sector Banks (PSB) has made available several schemes/mechanisms for FPOs to avail credit. However, banks and finance institutions inherently lack trust in FPOs because of which banks impose stringent conditions for FPOs to avail credit. FPOs are left to borrow from Non-Banking Financial Companies (NBFCs) at a higher interest rate that further hurts the profitability of FPOs. This situation thrusts FPOs into a vortex of high interest rate debts, thus making it harder for FPOs to turn profitable and avail further credit.

### Access to market linkage

In the absence of proper linkages and hand holding, FPOs are exposed to substantial market-based risks. Organized players and institutional buyers have been hesitant to engage with FPOs as the required quality, quantity and other terms and conditions which a network of market players in the mandi offers, is unable to be met by an FPO. This is primarily due to the lack of sorting & grading, storage and transport facilities at the FPO level, which puts farmers and FPOs at great inconvenience and price risks.

### Access to professional human resources for management support and technology adoption

Talent constraints have a ripple effect on the operability of FPOs as the talent they can usually afford do not have the expertise to access credit facilities, lack awareness of government schemes, have poor statutory compliances/

bookkeeping ability, lack managerial skills required in mobilising farmers and developing access to markets. This generally jeopardises the FPO business model and sets FPOs up for failure rather than success.

There is an increasing awareness and collective agreement on the need for ecosystem support for promoting robust FPOs to achieve scale and sustainability.

FPOs have been given a major task and are expected to take up many responsibilities on their weak shoulders. So, they need support at several levels. These include:

#### 1. FPO level

Facilitation of support to enable access to working capital, markets, professional human resource, infrastructure, and technology in a timely manner;

#### 2. Promotion level

Facilitation to support FPOs in building governance standards, awareness of schemes, and overall management; and

#### 3. Ecosystem level

Facilitation in integrating services on one platform, policy advocacy and knowledge exchange.

The National Association for Farmer Producer Organisations (NAFPO) was thus formed in August, 2017, to create an enabling ecosystem for FPOs (Box 1).

### Box 1: National Association for Farmer Producer Organizations (NAFPO)

NAFPO (<https://www.nafpo.in/>) is a stakeholder-driven institutional consolidation of FPO mobilization efforts and works towards creating a support structure for FPOs to identify a pathway towards scale and sustainability. The main objective is to facilitate FPOs to function as collectives, promote the interest of their members while addressing larger challenges such as sustainable agriculture for livelihoods, resource conservation and regeneration, and to promote an equitable and inclusive model of rural economic growth.





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## STRENGTHENING THE FPO ECOSYSTEM: THE 4 PILLARS OF NAFPO WORK

### 1. Integrating services

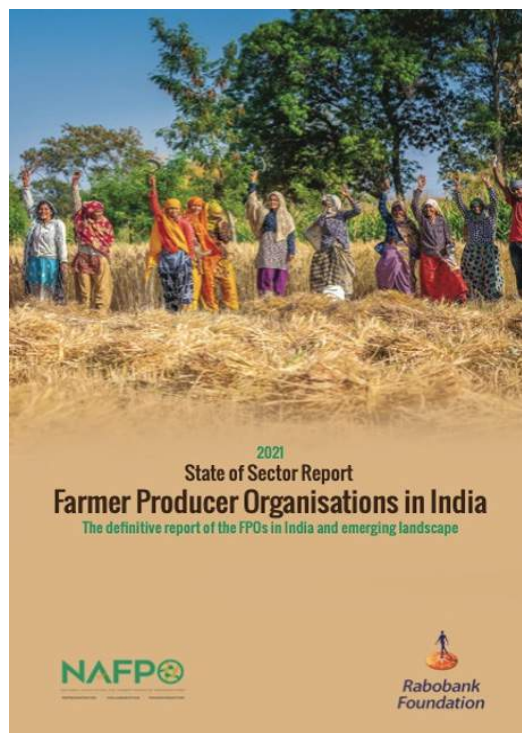
Numerous scattered efforts do exist to address challenges and gaps for promoting FPOs, however, there are very few for stabilizing business and supporting growth. The initiative to integrate services, such as business incubation, statutory compliance support, linkages with financial institutions and buyers on one platform, has been well-received.

### 2. Digital ecosystem for FPOs

With growing interest in the FPO model and the benefits that can be transferred to farmers, a lot of organizations have invested in supporting FPOs. The network of stakeholders - external and internal - is becoming more fluid with transitory structures based on alliances, partnerships, and collaborations. There is a need to develop a digital infrastructure that will benefit FPOs by dynamically aggregating services, exchanging knowledge, finding partnerships, and boosting innovation. The following initiatives have been taken to create such an ecosystem.

- Database consolidation - In a drive to bring awareness of the massive opportunity that FPOs demonstrate in transforming agriculture, NAFPO has consolidated a database of 9100+ registered Farmer Producer Companies across the country, out of which 8500+ are in active status. We have touched base and updated information of 1000+ FPOs with data on major commodities grown, area covered, contact details and business activities, which may be used for market linkage. The intention is to get a landscape overview of the FPOs across India.
- Online HR marketplace - This finder portal ([www.hr.nafpo.in](http://www.hr.nafpo.in)) aims to solve the issue of access to, and availability of, talent and professional support which is critical in enabling FPOs/Agribusinesses to achieve self-reliance and sustainability. The FPO HR marketplace brings recruiters and job seekers onto a single platform to ensure easy access to a variety of talents and opportunities for both Agribusinesses and professionals.

- E- Learning Management System - With the growing number of FPOs in the country, there is a felt need for a Learning Management System for FPOs to reach their potential to becoming viable business entities. In response, a comprehensive digital Learning Management System (<https://play.google.com/store/apps/details?id=com.dhwaniris.nafpo>) was developed to help FPOs by dynamically aggregating quality learning material, that can enhance their capabilities and augment farmers' income. The goal is for everyone in the FPO ecosystem to have access to quality learning material. The tool is being used and referred to by Cluster Based Business Organisations (CBBOs) selected for the promotion of ten thousand FPOs.



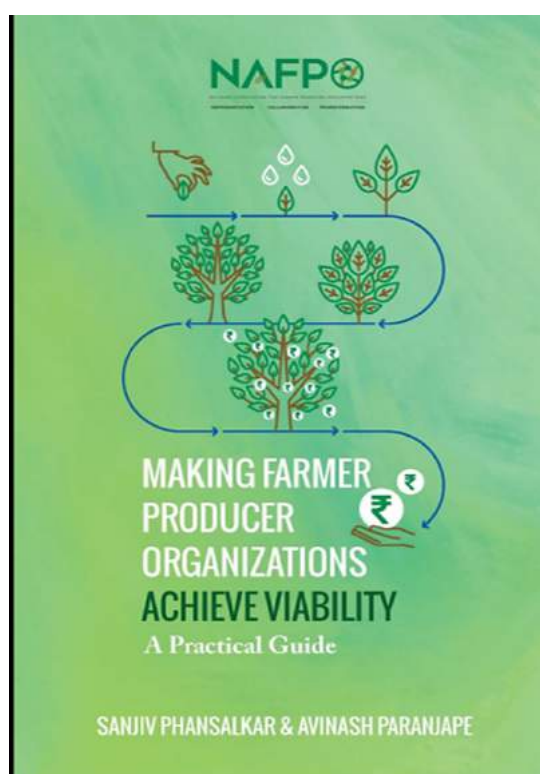
- Capacity building - While training and capacity building for FPO staff, Directors and CBBO/promoting organization has been echoed by many and is evident, a similar focus for industry and private sector is also needed. Therefore, in order to enable collaborations between private enterprises and collectives to develop mutually profitable business models, sectoral capacity building of private sector to promote perspectives among those who promote the FPOs is also organised.

### 3. Policy advocacy

NAFPO organizes multiple surveys, webinars, and consultations to represent the voice of FPOs. The recommendations made during these events are followed up and shared with authorities such as Niti Aayog, NABARD, SFAC, state governments and several ministries. The focus of the recent national and regional discussions was on the AtmaNirbhar Bharat Package, agriculture reforms, and marketing opportunities. NAFPO has also secured a place on the Advisory Committee of both NABARD and SFAC.

- Independent Director Initiative - NAFPO will empanel Independent Directors who will play a critical role in improving governance within FPCs/FPOs, and add to the credibility of the institution. This will have a direct impact on the management, availability of credit/finance to FPOs, and market access and linkages.

- Knowledge exchange - NAFPO has taken the initiative to develop a comprehensive State of FPOs (SoFPO) Report to document best practices, successful case studies, and to integrate government schemes and policies that could benefit FPOs in creating a robust ecosystem to support FPOs to reach their potential. This can contribute towards overall farmer welfare. Along with this, NAFPO has published another book, Making farmer producer organisations achieve viability: A practical guide, authored by Prof. Sanjiv Phansalkar and Prof. Avinash Paranjape.





#### 4. Partnerships

To leverage the network developed by NAFPO, multiple partnerships have been established to facilitate linkages to provide ecosystem support to FPOs. These partnerships cater to challenges faced by FPOs such as access to finance, professional human resource, governance standards, compliance support, technology transfer, customised products like insurance, price risk management and business development support.

skilled human resource support. Therefore, investing in capacity building is of prime importance for the FPO;

- Considering that an FPO is a start-up, it is inevitable that some FPOs will fail and some will succeed;
- Participation of women in decision making and market related activities is too low (Box 2).

#### LESSONS SO FAR

The key lessons learnt so far include the following:

- The business logic for farmers to come together as a Farmer Producer Company is the most essential ingredient for success;
- Leadership at the FPO plays a key role in determining factors for achieving scale, sustainability and growth of the FPO. Usually, professional human resource from the local area adds value in terms of longevity of their work with the FPO;
- Even though there are multiple schemes and support available for the smallholder farmer and FPO, there is a gap in accessing those resources and opportunities due to lack of

#### Box 2: Gender Equitable Transformation of FPOs

Even though the role of women is significant in agriculture and allied activities, their representation in policy making has remained inconspicuous. In the Operating Guidelines for promotion of 10,000 FPOs also, there has only been a token representation of women. They lack access to information, resources, land, extension services, credit, technology and local institutions compared to men, further restricting their agency and thus impacting the overall economy through productivity losses and reduced workforce participation. Due to these factors, their participation in decision making and market-related activities are low. There is a need to promote 'women only' FPOs to ensure better participation of women, enhance access to resources and services, and sustain better income.



## CONCLUSION

With the number of FPOs already promoted, it is important to learn from the mistakes made in the previous decade to develop a new clique of FPOs. While we continue to support the emergence of these organisations, new institutional innovations are required in the search for sustained market access for farmers. Dynamic new markets, far-reaching technological and institutional innovations, and rising aspirations of farming families characterize the fast-changing agricultural landscape.

More investments, partnerships and collaborations with private sector companies and continued exchange of aggregated knowledge is paramount.

There is also a need to acknowledge the role of organisations that provide comprehensive support. The newly appointed Cluster Based Business Organisations (CBBOs) have the technical expertise but need support and direction for promoting FPOs. This would help in creating a robust support ecosystem for FPOs enabling them to reach their potential, and thus contributing to farmer welfare.

# 35

## HOW TO NOT PROMOTE FARMER PRODUCER ORGANISATIONS: LEARNING FROM THE COCONUT SECTOR

While mobilizing farmers into Farmer Producer Organisations (FPOs) is an important strategy to double farmers' income, promoting this approach widely without sound planning can lead to exactly the opposite. **Thamban C**, in this blog, offers several lessons on how not to promote FPOs by drawing experiences with coconut FPOs in Kerala.

Worldwide, farmers are often exposed to economic risks and uncertainties owing to price crashes and a high degree of price fluctuations in farm produce. Same is the case with coconut growers in India. Coconut is cultivated predominantly in small and marginal holdings in India. Many of these farmers often find it difficult to effectively utilize technologies for realizing higher productivity and income from their tiny holdings. But when mobilised as Farmer Producer Organisations (FPOs) these small and marginal coconut farmers are able to address their resource limitations and this has been amply demonstrated by various agencies including the ICAR-Central Plantation Crops Research Institute (ICAR-CPCRI). The Coconut Development Board (CDB) has been promoting the formation of FPOs in the coconut sector so as to improve productivity and promote value addition through product diversification and marketing for enhancing the profitability of coconut farming.

The coconut inflorescence sap, namely neera, is a value-added product with huge potential to be promoted as a health drink. Technologies for extracting neera from coconut palms were developed by various research institutions, including ICAR-CPCRI (Hebbar et al. 2015). Even though neera is a 'zero alcohol' drink, its production and marketing were restricted due to the provisions of the Abkari Act governing the production and marketing of alcoholic beverages prevailing in the major coconut producing states. However, due to the concerted efforts of CDB and coconut growers' associations, the Government of Kerala amended the Abkari Act and created a congenial policy environment for the production and marketing of neera. Encouraged by the favourable policy environment and incentives, many coconut FPOs established neera production units

in their respective jurisdictions and started its marketing. However, a substantial number of neera units managed by these FPOs have been discontinued due to various problems.

## PROMOTION OF FPOS BY THE COCONUT DEVELOPMENT BOARD

Organizing the unorganized coconut sector through farmers' collectives was one of the important activities of CDB during the Twelfth Five-Year Plan (2012-2017). Since then, CDB has been facilitating the formation and handholding of FPOs in the coconut sector. The three-tiered FPO structure facilitated by the Board has coconut farmers organized into small neighbourhood informal groups at grassroots level as Coconut Producer Societies (CPSs), which are small scale FPOs formed by an association of 40-100 coconut growers in a contiguous area with a consolidated minimum of 4000-5000 palms.

The farmer member contributes equity in the organization and undertakes activities aimed at productivity improvement, cost reduction, collective marketing, processing and product diversification. The CPS forms the basic unit of the FPO framework in the sector. The next hierarchical tier, the CPF, is formed by

combining about 8-10 CPSs. The FPOs formed are provided legal status through registration under the Charitable Societies Act and are also registered with CDB. An aggregation of 8-10 CPFs would form a Coconut Producer Company (CPC). A CPC will have around 10 lakh coconut palms under its management. So far, 9736 CPSs, 743 CPFs and 67 CPCs have been registered in the country. The progress of CPS, CPF, and CPC formation so far is summarised in Table 1.



**Table 1: Progress of Coconut Producers' Society, Federation and Company formation**

No.	States	No. of CPS	No. of CPF	No. of CPC
1	Kerala	7226	467	29
2	Tamil Nadu	665	69	17
3	Karnataka	400	125	13
4	Andhra Pradesh	1148	82	8
5	West Bengal	216	-	-
6	Odisha	39	-	-
7	Assam	27	-	-
8	Gujarat	14	-	-
9	Maharashtra	01	-	-
	<b>TOTAL</b>	<b>9736</b>	<b>743</b>	<b>67</b>

Source: Coconut Development Board <https://www.coconutboard.gov.in/ProducerSocieties.aspx>





**In India, coconut is grown in an area of 1.90 million hectares with Kerala accounting for 7.81 lakh hectares, covering 38 per cent of the net cropped areas of the State.**

Development of technologies for production of neera from coconut palms, awareness about its potential as a health drink and economic benefits led to widespread discussion at the policy level on creating an enabling

environment to support coconut growers in order to utilize the potential of neera, who were otherwise struggling due to low market price of coconut (Box 1).

### **Box 1: Policy changes to support promotion of Neera**

Due to the efforts of CDB and various farmer organizations, the Government of Kerala amended the Abkari Act to enable coconut growers to take up enterprises for production and marketing of neera for enhancing income from coconut farming. Meanwhile, efforts of the State Government to save the traditional toddy sector which was going through a crisis also indirectly contributed to the evolution of a congenial policy environment to support coconut growers for neera production and marketing.

The government accepted the recommendations of the expert committee constituted to study and report strategies to revive the traditional toddy sector, and for the first time granted permission to CPSs/ CPFs facilitated by CDB and five other agencies for production and marketing of neera. Subsequently amendments were made to the existing Abkari Act of 1931 and rules (Kerala Sweet Toddy [Neera] Rules 2014) were framed for issuing licenses for the production and marketing of neera.

The Toddy-Neera Board was also established for implementing suitable interventions to make coconut farming more remunerative and to promote marketing of neera as a health drink within the state and other parts of the country. The Government of Kerala also took many steps – providing subsidy for training of neera technicians, support for CPCs for the installation of plant and machinery for neera production, and providing equity support to the coconut FPO – to promote neera production as an important measure to solve the problems of the coconut sector.

A 2016 study indicated that a total of 204 CPFs were granted licenses to produce and market neera (Table 2). Most (91%) of these licenses were issued during the period from 2014 to 2016. Only 95 (43%) CPFs initiated the production activities. The remaining CPFs could not start neera production mainly due to the lack of skilled palm climbers and lack

of neera processing plant under the CPCs in their jurisdiction. It is noteworthy that only 13 federations (14%) out of the 95 CPFs who have ventured into production have continued with their activities, and in eight out of 14 districts neera production by all the CPFs was discontinued.

**Table 2: Field level scenario of sustainability of interventions taken up by CPFs pertaining to production and marketing of neera in Kerala State**

No.	District	CPF's with licence for neera production	CPF's started neera production	CPF's discontinued	neera production (% of discontinuance)
1	Thiruvananthapuram	10	6	6	100
2	Kollam	3	3	2	66
3	Alappuzha	17	9	9	100
4	Pathanamthitta	1	1	1	100
5	Kottayam	6	3	2	66
6	Idukki	2	1	1	100
7	Ernakulam	11	8	4	50
8	Thrissur	6	3	2	66
9	Palakkad	11	10	9	90
10	Malappuram	56	9	9	100
11	Kozhikode	58	35	30	86
12	Wayanad	1	1	1	100
13	Kannur	13	4	4	100
14	Kasaragod	9	2	2	100
	<b>Total</b>	<b>204</b>	<b>95</b>	<b>82</b>	<b>86</b>

Source: Thamban et al. 2020.



**Bottled Neera**

The scarcity of skilled manpower for neera tapping coupled with very high wage rate was observed to be the major factors that contributed towards the discontinuance of

neera tapping (Table 3). The handholding provided by CDB had been withdrawn sooner, which also had detrimentally affected.

**Table 3: Factors contributing to the discontinuance of neera production activities: CPFs' perception (n=82)**

Factors contributing to the discontinuance	No. of CPFs citing the factor
Scarcity and high wage rate of palm climbers/neera technicians	48 (59)
Lack of continued support from CDB	32 (39)
Inadequate support from state government agencies/LSGs	21 (26)
Marketing problems	45 (55)
Low yield of neera due to poor management of coconut palms	22 (27)
CPC not formed in the area of CPF functioning to manage marketing of neera	3 (4)
Low economic viability	28 (34)
Inadequate processing facilities	3 (4)
Drudgery involved in climbing palms for tapping due to predominance of very tall coconut palms	12 (15)
Problems in tapping palms during rainy season	23 (28)
Lack of product uniformity due to non-standardised technologies for neera production	9 (11)
Spoilage due to low shelf life of neera	9 (11)

**Note:** Figures in parentheses are percentages.

Source: Thamban et al. 2020.

## ALL THAT WENT WRONG

The study revealed that a substantial number of producer organisations could not sustain their activities due to various constraints related to technology, marketing and policy. These are discussed in detail below. It is imperative that there is need for a restructured support mechanism to sustain the FPOs so as to effectively carry out activities related to neera-based enterprises.

### 1. Lack of a support mechanism to enable FPOs to sustain interventions

Formation of CPFs and initiation of various activities for the production and marketing of neera were mainly triggered by CDB and the initial phase of these FPOs were quite encouraging. But as they entered the subsequent phase, CDB curtailed their active support in a phased manner, and the FPOs were unable to cope with the production and market-related hurdles that emerged thereafter, which ushered most of them to the exit routes. The results of the present study is in line with

the earlier observations that in the case of farmer producer organizations formed with the external trigger of a programme of the government, NGO, or other agency a common challenge for institutional sustainability is how to survive once the policy or programme has ended (GFRAS 2015).

### 2. Lack of strategies for marketing neera

Problems related to marketing were a major hurdle in sustaining neera enterprises by CPFs which included lack of product uniformity and lack of proper adoption of the recommended neera production protocol which affected the product quality. Consumer perception studies which are essential for streamlining strategies for successful marketing before launching the commercial neera production and marketing initiatives were not conducted. Neera enterprises under coconut FPOs were finding it difficult to handle competition with other products, including soft drinks, for its market share and neera as a unique product with a nutritional edge was not appropriately positioned while marketing.

### **3. Policy constraints which are not addressed**

Though the Government of Kerala has come out with a pro-farmer policy framework for the production and promotion of neera in the state, it is highly paradoxical that, even now the product is partially under the control of the Excise Department, which is entrusted with granting licences for neera production.

The producer organisations perceive it as a cumbersome process to obtain a licence for tapping coconut palms for neera and renewal of the licence every year. They also think that since neera is being promoted as a non-alcoholic health drink, it should be delinked from the Excise Department – thus making the formalities for issuing a license simpler.

### **4. Lack of a target specific entrepreneurial development programme**

Planning and implementation of interventions pertaining to production and marketing of neera were mostly done with a general format prescribed by CDB, whereas the majority of coconut FPOs were not having a clear handle on managing the neera enterprise on their own. The asymmetry of information on the level of inherent managerial and technical expertise of the FPOs was evidently the major reason for early discontinuance of the neera business by the aspirants. A well-designed, target specific entrepreneurial development programme on various facets of the neera value chain would have helped the business aspirants to survive the inertia of business inherent in the initial phase.

### **5. Labour-related constraints**

Scarcity of palm climbers/neera technicians coupled with high wage rates was observed to be an important factor that had adversely affected the sustenance of neera enterprises in the state. Predominance of tall coconut palms in the coconut groves in the state was another limiting factor that added to the workload of climbers engaged in neera tapping. Commitment from skilled climbers is a key factor in the successful management of a neera enterprise and in many neera units lack of punctuality of climbers and conflicts over the wage rate created difficulties in ensuring regular supply of neera.

### **6. Lack of technology assessment and refinement**

Lack of product uniformity due to non-standardised technologies for neera collection across the state was another important reason perceived by CPFs for the discontinuance of neera enterprises. Spoilage due to low shelf life of neera was also cited as another reason for discontinuance. The study revealed that majority of the CPFs (73%) adopted technology developed by CDB through SIBB R&D (SCMS Institute for Bio-Science and Biotechnology Research and Development), the private R&D firm, for neera collection and processing and the remaining 27% of CPFs resorted to technology developed by ICAR-CPCRI. Interventions were not carried out by the agencies who promoted neera production and marketing for pilot testing of neera collection technologies for assessing their effectiveness and refinement of technologies to suit the techno-socio-economic requirements for further scaling up production and marketing, and comparing the available technologies on different attributes for making target specific recommendations. Lack of back-up support for effective field level utilisation of neera technologies by the concerned agencies was thus cited as another problem by the CPFs.

### **7. Economic viability of the neera enterprise**

Even though a very attractive level of economic benefits was projected for neera enterprises, due to field level constraints it could not be achieved in reality. The neera collection was limited to a very limited number of coconut palms by most of the CPFs and the existing policy on neera production has prevented the CPFs from realising the economies of scale. Yield level of neera per palm per tapping day was not that attractive mostly due to poor palm health, thereby adversely affecting economic viability. Hence, scientific management of coconut palms plays a crucial role in ensuring better yield and continuous supply of neera in the upstream end (production node) of the neera value chain.

### **8. Lack of coordination among stakeholders**

It is a startling fact that the state's Department of Agriculture Development and Farmers' Welfare – with its vast network of extension

system in the state that includes Krishibhavans at grassroots level in every grama panchayat – was not involved in the formation of the three-tier FPO system in coconuts. Furthermore, the coconut development schemes of Department of Agriculture were implemented with separate

mechanism of farmers' participation without utilising the existing platform of CPS, CPF and CPC structure of FPOs. This lack of coordination among governmental agencies has failed in harnessing synergy for effective management of neera enterprises.



**Neera Outlets at Kannur District, Kerala**

## CONCLUSION

Promoting FPOs in a hurry to meet the targets without adequate technology refinement, and market assessment can do more damage to the fledgling FPO movement. FPOs do need continuous handholding support to help them deal with the technical and marketing challenges in enterprise development. There should also be mechanisms to respond to policy

and institutional bottlenecks that can constrain the scaling up of new farmer enterprise. In other words, Farmer Producer Organisations (FPOs) need support not only at the FPO level, but also at the promotion and ecosystem level (Aneesha 2021). We should also learn from the mistakes that ensued from the hasty promotion of FPOs, such as the one in the coconut sector, so that we can continuously make improvements in the way we initiate and mentor FPOs.

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# 36

## SOCIAL ENTERPRISES: AN INSTRUMENT FOR SUSTAINABLE DEVELOPMENT

Social enterprises have the potential to address the key concerns at the back end and front end of agri value chains. In this blog, **K K Tripathy and S K Wadkar** explain the conceptual understanding of social enterprises and talks of cooperatives, SHGs, and farmer producers companies as a form of social enterprise in agriculture. They also describe the challenges and implications for extension professionals and how to remain up-to-date and relevant in the growing agribusiness space.

In the current rapidly changing economic, environmental, social and political arena, there is a need for innovative solutions for addressing the key concerns of sustainable development. In this context, social entrepreneurs are providing solutions to achieve poverty reduction and enhance sustainable livelihoods opportunities by promoting entrepreneurship in varied sectors. Traditionally, business organizations have been classified as 'for-profit' and 'not-for-profit', wherein the former focuses on commercial activities for maximizing profits and the latter on facilitating development to achieve socio-economic and welfare activities. However, in recent decades, a hybrid form of organizations called 'Social Enterprises' (SE) is gaining importance.

### SOCIAL ENTERPRISES

There is no standard definition of a social enterprise. It varies, and is influenced by situations, structural and institutional forms. It is widely known as an organization that undertakes a businesslike strategy to achieve a social mission and keeps an eye on income generating opportunities for sustainable financing in their business operations in order to solve rooted social or environmental problems (Arena et al. 2014; Barraket & Yousefpour 2013; Ebrahim & Rangan 2014; Grieco et al. 2015; Haugh 2005; Katre & Salipante 2012; Luke 2016; Perrini et al. 2010; Yusuf & Sloan 2015). Currently, any form of organization that works for the attainment of any social concerns and creates social values which demands business and market orientation and entrepreneurial qualities is considered to be a 'Social Enterprise'.



**Board of Directors of self-reliant cooperative societies, Uttarakhand on an exposure visit to Chaitanya Foundation Pune**

## ORGANIZATIONAL FORMS: SOCIAL ENTERPRISE SPECTRUM

There is a difference of opinion in terms of organisational forms/legal status by which the social mission can be pursued, i.e., for-profit or not-for-profit entities. In addition, some researchers say that (social) innovation and technology is at the core of social enterprise,

irrespective of being for/not-for-profit. The social enterprise spectrum given by Dees (1996) differentiates between the 'purely-philanthropic' non-profit entity, 'in-between' social enterprise, and a 'purely commercial' for-profit organization/entity.

The European Research Network has developed the first theoretical framework based on the empirical analysis of different social enterprises that includes nine indicators, which are categorized into three dimensions, viz., (a) economic and entrepreneurial dimensions; (b) social dimensions; and (c) participatory governance of social enterprises, as highlighted in Figure 1. These indicators show that community-based and community-driven enterprises supported by promoting institutions<sup>1</sup> and/or self-promoted, strive for achieving socio-economic, cultural and aspirational needs of their respective members. This requires a high degree of autonomy in governing and managing the member-controlled organization.



**Figure 1: Dimension and indicators for defining social enterprises (Source: Adapted from Defourny & Nyssens 2012)**

<sup>1</sup>The promoting institutions could be public (central and state government and their developmental agencies), or private (corporate houses, foundations, NGOs) and Civil Society Organizations (CSOs).

## SOCIAL ENTERPRISES IN AGRICULTURE IN INDIA: TYPES AND STATUS

In the case of agriculture, including the allied sector, there are different types of informal groups, which vary according to the nature of scheme, programmes, situation and promoting institutions, such as livelihood collectives, farmers' groups/organizations/associations, farmer/commodity interest groups, self-help groups, joint liability groups, etc. The most formal type of group i.e., cooperatives, Cluster Level Federations (CLFs) of Self-Help Groups (SHGs) and Farmer Producers Companies (FPCs), conceptually now called as 'Farmer Producers

Organizations' (FPOs) can be classified as 'Social Enterprise'. Tripathy et al. (2020) highlighted in detail the emergence, status, challenges of these formal types of producer collectives and the way forward for making them competitive and sustainable. The objective is to streamline backward and forward linkages of the agri-value chains. The difference lies in the regulatory structure that governs and manages these forms of social enterprises, but most of these social enterprises are struggling to achieve the purpose of their existence. Figure 2 highlights the structure, status and broader roles of these social enterprises.

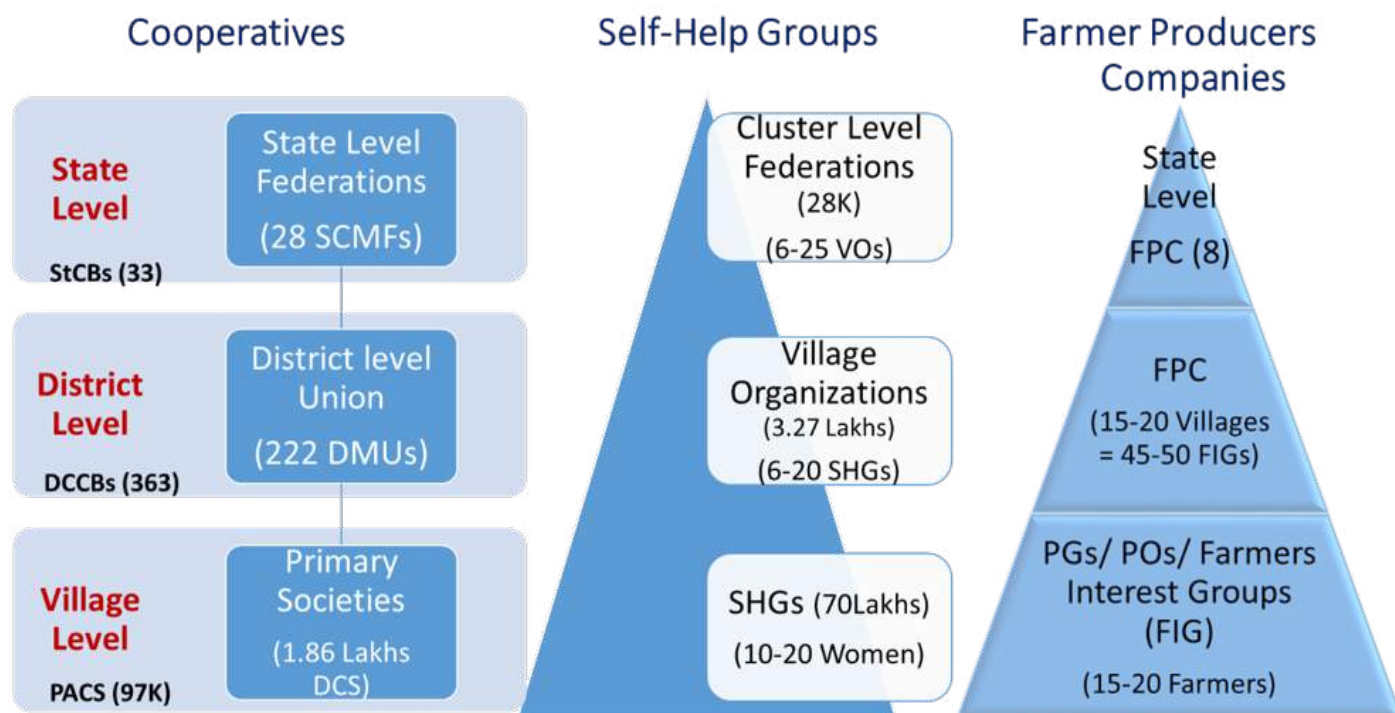


Figure 2: Social enterprises in agriculture

Cooperative form of social enterprise There are many success stories of social enterprises in agriculture, but most are not adequately documented. The cooperative movement started in 1904 as a Credit Cooperatives Society Act, and for non-credit cooperative societies in 1912. After India's independence, cooperatives have played a crucial role as a vehicle for the implementation of welfare schemes and programmes in order to achieve the socio-economic transformation of people in independent India. Unfortunately, only the dairy, sugarcane and inputs sector could develop an end-to-end value chain but other forms of cooperatives lost the intent of their existence due to various reasons. Over a period of time, the cooperative movement

itself got trapped between the nexus of political parties on one side and bureaucracy on the other.

The AMUL model has evolved over a period of time under the umbrella of Gujarat Cooperative Milk and Milk Marketing Federation (GCMMF), and developed certain 'standardizations' in their business operations, horizontally and vertically 'scaled-up' and ensured 'skilling' to their member farmers and also inculcated the qualities of 'democratic governance' and 'professional management'. Thus, during the Operation Flood Programme, the AMUL model got replicated pan-India, which has resulted in state-specific milk brands such as Nandini in Karnataka, Aavin in Tamilnadu, Milma in Kerala,



Sudha in Bihar, Sanchi in Madhya Pradesh, Verka in Punjab, etc. However, this sector is facing operational challenges, which needs immediate attention.

AESA Blog 102 highlights the journey of the dairy cooperative movement, its key impediments, and the way forward from dairy extension professionals' point of view. Similarly, IFFCO and KRIBHCO, the agri-input sector cooperatives have diversified their portfolio and ensured professionalism in their business operations. The Primary Agricultural Credit Cooperative Society, commonly known as PACS, the 'bottom-of-the-pyramid' of the cooperative institutions, that are mostly into lending crop loans, has potential to diversify their business operations. The Government of India, including state governments has been struggling to orient and convert these PACS into 'multi-service centres'.



**Milk Collection Centre, Bedva Dairy Cooperative Society Anand**

With the announcement of the New Ministry of Cooperation, renewed interest has been put on the cooperative model with the hope of infusing a lot of investment into the sector, research and development on the structural and legal issues, autonomy and independence, inculcating professionalism, and so on.

Structure	Mostly Federal and Unitary (in case of Urban Coops Banks, Sugarcane Coops)	Federal	Unitary
<b>Regulation</b>	Registrar of Cooperative Society (RCS) and Central Registrar (in case of multi-state coops society), Ministry of Agriculture & Farmers Welfare (in transition, Ministry of Cooperation)	State Rural Livelihood Missions (SRLMs), Ministry of Rural Development; CLFs are now being registered under State Coops Society Act	Registrar of Companies (RoC), Ministry of Corporate Affairs
<b>Numbers</b>	8.5 lakhs; Credit coops: 20% having 80% membership; and Non-credit coops: 80% with only 20% membership	70 lakhs SHGs federated as 3.27 lakhs VOs and 28,000 CLFs	Around 8700 FPCs and eight state level Federation of FPCs
<b>Roles</b>	Credit coops: Refinancing to secondary and primary tiers. Producers Coops: Advisory, Aggregation, Processing and Marketing at different levels (varies according to types of coops and state)	Primarily refinancing to VOs and SHGs. However, CLFs should diversify and function as 'multi-service centre' for long-term sustainability	Advisory, Aggregation, Processing, Market linkages and Distribution
<b>Objective</b>	To address the needs and interests of members. At the front end it aims to increase producer members' share in the consumers' rupee, and minimize post-harvest losses, whereas at the back end, it reduces the cost of production and improves productivity.		

### SHGs as a form of social enterprise

In order to achieve gender equality the Government of India has carved out several policies and programmes. In doing so, during the last three decades, the SHG movement

has been a revolutionary approach in India. In the first phase (1984 – 2011), the focus was on promotion of SHGs and inculcating a 'thrift & savings' behaviour among women members of SHGs. In the second phase (2012-13 onwards) i.e., during the ongoing DAY-NRLM scheme of

the Ministry of Rural Development, the focus is on scaling-up and institutionalization of SHGs across various States in India. The objective is to reduce poverty by enabling poor households to access gainful self-employment and skilled wage employment opportunities, resulting in an appreciable improvement in their livelihoods on a sustainable basis, through building strong grassroots institutions for the poor.

However, in order to sustain this movement and to make them competitive, there is a need for building a robust and stable community structure that is scalable across states. This requires robust institution building and a legal identity for the existing CLFs. This also calls for careful planning and contemplation. Most of the State Rural Livelihood Missions (SRLMs) are in a phase of transitioning and are considering the suitability of specific Acts to support the three-tier structure of SHG federations. Only a few states have done trial and error by registering it as 'not-for profit' entities under the Societies Registration Act 1860, and as 'for-profit' under respective state's Cooperative Society Act – for e.g., in Andhra Pradesh, Bihar, Madhya Pradesh, Odisha, Telangana, West Bengal, etc.

Furthermore, many income generating activities were initiated largely at an individual level and/or SHG level by availing refinance facilities from their respective CLFs. However, very few efforts were made on streamlining these income generating/business activities at the CLF level. These micro-entrepreneurs are struggling to streamline the back end and front end of their respective products' value chain. There is a need to federate these non-credit (on and off-farm livelihoods) activities at the CLFs level in order to address the members' socio-economic and aspirational needs.

Moreover, NRLM/SRLM promotes parallel structure of women 'Producers Groups' (PGs) which are federated into Women Farmers Producers Company (44 pan India, as in January 2021). This may create governance and accountability issues in the near future with respect to their parent SHGs' organization. Today, most of the SRLMs are trying to address the following pertinent questions in terms of the scalability and sustainability of CLFs:

1. SHGs and VOs are informal bodies, so how do we want to see CLFs? Is it as 'Not For Profit' or 'For-Profit' legal entities?
  - How far are CLFs capable of governing and managing any form of legal entity?
  - How far could the Cooperative Society Act be the best option to take care of socio-economic, cultural and aspirational needs of women members?
2. What should be the role of CLFs – is it only for refinancing VOs/SHGs or to act as a multi-purpose vehicle? If yes, how can CLFs diversify their credit and non-credit business?
3. What are the suitable business activities that can be undertaken by the registered CLFs?
4. How best can CLF act as an umbrella institution to bring about inclusive and holistic development of their members?
5. What would be the role of registered CLFs vis-à-vis other forms of Farmer Producers Organizations (i.e., Cooperatives Societies and Farmer Producers' Company)?
6. How are 'Women Producers Groups' (PGs) and their federated 'Women Farmers Producers' Companies' working in tandem with their respective parent SHG organizations?

### **Farmer Producers' Company as a form of social enterprise**

It is a hybrid form of an organization which is based on the principles of cooperatives and corporates. As part of the multi-pronged approach the Government of India has conceptually defined all forms of producers' collectives as FPOs, and created a renewed interest in the collectives' movement in order to overcome the structural issues of the cooperative model and also infused professionalism and business orientation into it. As of now, more than 8700 FPOs have been registered under the Producers' Company & Cooperative Act, section 8 company act, society act, and trust. Furthermore, this FPO movement also got an impetus with the launch of the

Central Sector Scheme on the Promotion and Formation of New 10,000 FPOs across the country – both under cooperative and Producers' Company Act. As of now the movement is still in the nascent stage and the focus is on creating social capital rather than on making them competitive and sustainable. The following issues need immediate attention:

1. How do the FPOs perform in mobilizing membership and ensuring systematic production and procurement from their members as well as non-members/potential members?
2. What is the extent of technology use and package of practices adoption for improving productivity and producing quality outputs at a reasonable cost?
3. How can FPOs undertake business activities in view of seasonality and variability of the agri production system and what is the extent of technology usage for processing?
4. To what extent are FPOs able to establish marketing connections - B2B or B2C through various channels – online and offline?
5. How competent are the board of directors of FPOs in handling business enterprise and having competitive business strategies?
6. Up to what extent has proactive decision making been in the interest of members and not gotten influenced by external stakeholders?
7. How far are the issues of governance and management, business and operation management systems, and members and consumers centricity being addressed to ensure members' belongingness and ownership towards their own FPOs?



**Board of Directors of Farmer Producers Companies across Maharashtra on an exposure visit to Devnadi Valley Agro FPC, Nashik**

## **IMPLICATIONS FOR AGRICULTURAL EXTENSION PROFESSIONALS**

Social enterprises in agriculture are an appropriate vehicle for providing and extending advisory services to the last mile. Extension professionals need to understand the nitty-gritty of these social enterprises models and need to play a pivotal role in facilitating the sustainable development of these social institutions and making them competitive.

In doing so, it needs to involve in activities such as sensitization and social mobilization of farming communities, entrepreneurial orientation, commodity specific value-chain analysis, developing a business plan, financial management, connecting them with relevant agribusiness actors including financial institutions and research institutions, for establishing backward and forward linkages, etc., and thereby generating better economic, social and environmental results for member farmers, FPOs, society and the nation. Some of

the ICAR institutions and Krishi Vigyan Kendras in India are already helping in initiating and handholding FPOs (For details, kindly see AESA Good Practices: (a) KVKs in support of producer companies, November 16 2019; (b) Mentoring Farmer Producer Companies by Krishi Vigyan Kendras, October 18 2018 and (c) COVID-19 Field Notes 2 - KVK Kodagu and Puthari FPO coming to the aid of farmers during the lockdown, April 10 2020).

The agribusiness space is changing rapidly. Thus, it is high time to update and adapt to the overall development scenario, which demands innovations in extension and advisory services (EAS) systems. This also requires development of new skill sets to support producers more holistically. Thus the EAS system needs structural transformation and reforms in the way it is being perceived and practiced in order to build a resilient agri-food system.



Agribusiness Management students interacting with Dr Rajiv Kale at the ICAR-Directorate of Onion and Garlic Research, Pune

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# 37

## PRIVATE EXTENSION AND ADVISORY SERVICES IN SRI LANKAN AGRIBUSINESS

In this blog, **Tharaka Jayasinghe** focuses on the private sector engagement in agricultural extension and how they cover their extension expenditure via the different business models they have adopted.

The public, private, and NGO sectors play an important role in providing extension and advisory services (EAS) in Sri Lanka. While the public sector EAS is mostly service oriented and the NGO sector EAS is mostly empowerment oriented, the private sector EAS is profit oriented.

### PRIVATE EAS

Private EAS refer to the innovative ways that a private agency/corporate adopts for delivering the information, inputs and other services as desired/demanded by farmers. Private EAS belong to the following sectors:

- Fertilizers;
- Specialty fertilizers used in protected agriculture (poly tunnels/tissue culture labs/nurseries);
- Seeds;
- Machinery and equipment;
- Agro-chemicals/Plant protection materials;
- Quality standards and Certification;
- Feeds/Medicine.

### RATIONALE FOR PRIVATE SECTOR INVESTMENTS IN EAS

The private sector is always interested in doing business with the prime objective of making a profit. This means that EAS provision is part of the marketing wing of the business and their rationale for investing in EAS are as follows:

1. *Gaining comparative advantage with competitors:* Companies realize that providing discounts, promotions, trips, tips, transport, etc., to customers directly impact their profit margins. Using such tactics to win customers are not helpful in the long run. Therefore, they are keen to invest by using social marketing tools, such as EAS, to positively impact the client's perception of the company so as to achieve long term sustainable profits.

2. *Overcome limits to direct product promotion:* In Sri Lanka, there are a few regulations that were imposed by the government to minimize direct promotion of agro-chemicals among the farming community. Marketing staff, therefore, face huge challenges while promoting products, creating awareness and capturing the market using marketing tools. To overcome this challenge, EAS provision is considered to be the most suitable tool.

3. *Rising competition:* The agriculture market for agro-chemicals and other inputs is shrinking yearly due to the development of new pest

and disease tolerant/resistant varieties, developments in biotechnology, etc. Apart from these, new agro-chemicals are entering the market every year and therefore market competition is continuously rising. To face this competition, corporates should have mechanisms to reach potential customers (estates and farmers) on a continuous basis. Therefore, EAS is considered to be the best solution to address this challenge.

Due to the above-mentioned strategic reasons, corporates are maintaining extension teams and investing in EAS provision.



**An extension officer from private sector making a presentation for tea farmers on effective use of fertilizers**

## **APPROACHES USED BY PRIVATE EAS**

### **Private EAS use the following three approaches to provide EAS:**

- Business to Business:* EAS is directly given by one business to another business. E.g., Company to Company.
- Business to Customer:* EAS is directly given to the end user of the product or service. E.g., Company to Customer.
- Business to Industry:* EAS is given to any stakeholder in the company supply chain without considering their profit.

### **Private EAS is often organized for:**

- Brand Promotion:* Companies are keen to promote the brand so that potential clients easily recognize their product by its name. The EAS team will work on distributing information related to the product and its quality among potential clients. This will help the company to promote the brand and develop a premium pricing strategy to cover the expenses entailed by the extension service.
- Product Promotion:* This kind of persuasive communication is meant to inform and

persuade target clients on the relative merits of a product or a service. This approach will help achieve additional sales and the EAS investments are thus covered via additional quantity of sales.

- **Ensuring Quality Supply Chain:** Most of the upmarket consumers of food products, especially those buying vegetables and fruits from supermarkets, look for quality products. Such firms involved in delivery of quality food products are keen to support farmers with knowledge on Good Agricultural Practices (GAP), Good Management Practices (GMP), Good Handling Practices (GHP), and Good Hygienic Practice (GHyP). The cost for such EAS can be covered via quality-based pricing.

All these approaches are deployed to influence the buying cycle (Figure 1) of the customer. Though most of the time provision of EAS appears to be free, these investments are covered via enhanced sales volume and value-added price/premium pricing strategy. To influence the buying cycle the following steps are considered.



**Figure 1: Buying cycle of the customer**

**Step 1: Awareness of Needs**

Use training programs, extension campaign, individual farmer and estate visit and distribute leaflets to enhance awareness about the product/technology/service as a solution for their problem and help them increase productivity or profit.

**Step 2: Assessment of Alternatives**

At this stage, customers/farmers are comparing available alternatives before purchase. So, now product demonstrations, individualized solutions (e.g., site specific fertilizer recommendation, pH testing, leaf analysis) are conducted to influence farmers' decision making.

**Step 3: Alleviation of Risk**

At this stage, farmers are considering the opportunity cost and special benefits available with a product and service, guarantees, loyalty and brand names. EAS personnel should be available to answer these types of questions from the customer.

**Step 4: Decision**

At this stage, the farmer will be taking a decision on the most suitable alternative. The cumulative impact of all advisory activities will have an effect on farmer decision in purchasing a product or service.

**Step 5: Achievement of Result**

At this stage, EAS personnel should visit the customer, advise him on guidelines for using the product and address any complaints on the product/service.

**CONCLUSION**

Private EAS is one of the functions of the marketing arm of a company. The private sector deploys EAS as a value-added service for their customers or consumers, and they generate additional profit or minimize extra marketing expenses through this approach. Providing EAS is a sustainable, long term and cost-effective approach for the private sector to survive in a competitive market and it brings benefits for both farmers as well the company. As a result provision of private EAS has increased over the last one decade in Sri Lanka. This demand-driven and market-driven problem solving approach of private EAS also has positively impacted the performance of the public EAS, and the increasing calls for public-private partnership in EAS delivery is a testimony to the growing importance of private EAS.



# 38

## Professionalization of Cooperatives: Is there a Role for Extension Professionals?

Community-based institutions, such as cooperatives, SHGs, and FPCs are being promoted to address development challenges, but their growth is constrained by various factors. In this blog, **K K Tripathy and S K Sagar** explore the importance of the 'Cooperative Identity' as the foundation of all collectives, and identify key indicators to ensure their professionalism. Extension professionals can play a very important role in this regard, they argue.

Cooperatives and collectives are being introduced in developing countries to address developmental challenges and enhance living standards. India has the largest cooperative network in the world, with 854,000 units engaged in various activities (NCUI 2018). Various stakeholders are working towards promoting and forming cooperatives, Self-Help Groups, and community-based institutions. There is great potential to form cooperatives in emerging sectors of the economy. Researchers and practitioners have studied cooperatives and collectives extensively, highlighting their success stories, challenges, and good practices (AESA Blogs [13](#), [34](#), [110](#), [154](#), [156](#), [157](#); AESA Good Practice Note [56](#)). In the agricultural sector, social enterprises face issues pertaining to size, scope, capital, talent, technology, market, governance, and management. The government-appointed committees have also identified critical points that restrict the growth of the cooperative sector, such as the lack of avenues for capital infusion, weak financial discipline, undue government and regulatory interference, inadequate advisory services, poor market connect, low adoption of professionalism, and substandard management.

In developing countries, it is crucial to have collaboration among stakeholders so as to overcome challenges and establish cooperatives, Self-Help Groups, and community-based institutions. Financial institutions and governments should extend their support to tackle issues related to capital, regulatory interference, advisory services, and market connections.

Professionalism in governance and management is essential for cooperatives and collectives if their growth and sustainability is to be ensured. These organizations play a vital role in reducing poverty and promoting socio-economic development.

India has recognized their importance and established a separate Ministry of Cooperation in July 2021 to provide administrative, legal, and policy frameworks to strengthen this sector. The Ministry has taken various initiatives (refer to Box 1) to facilitate the ease of doing business for cooperatives and expand their reach across

the country. To sustain as member-driven and member-controlled business enterprises, cooperatives and collectives need to address operational and business-related concerns, while adhering to the fundamental values and principles of the 'Cooperative Identity'.

### **Box 1: Initiatives of the Ministry of Cooperation (Government of India) aimed at strengthening cooperatives**

1. *National Cooperative Policy*: A national level committee, comprising of experts and stakeholders drawn from all over India was constituted to formulate the New Cooperation Policy to ensure creation of an enabling ecosystem to realize the vision of 'Sahakar-se-Samridhhi'.
2. *Model bye-laws for Primary Agricultural Credit Societies (PACS)*: Model bye-laws prepared and circulated for adoption as per the respective State Cooperatives Acts to enable PACS to undertake more than 25 business activities such as dairy, fishery, setting up of godowns, LPG/ Petrol/ Green energy distribution agency, banking correspondents, Common Service Centres (CSC), etc.
3. *PACS as Common Service Centres (CSC)*: MoU signed between Ministry of Cooperation, Ministry of Electronics and Information Technology, NABARD and CSC – Special Purpose Vehicle (SPV) to facilitate functioning of PACS as CSCs to improve their business viability, provide e-services at village level, and generate employment.
4. *National Cooperative Database*: Preparation of an authentic and updated unit level data repository of cooperatives in the country started to facilitate stakeholders in policy making and implementation.
5. *Level Playing Field to Cooperatives*: Surcharge reduced from 12% to 7% for cooperative societies having income between Rs. 1 to 10 Cr; MAT reduced for cooperatives from 18.5% to 15%. Relief under Section 269ST of IT Act; Lowering tax rate from 30% to 15% for new manufacturing cooperatives; Increase in limit of deposits and loans in cash by primary credit societies and agricultural & rural development banks, etc.
6. *Cooperatives as 'buyers' on GeM portal*: Cooperatives permitted to register as 'buyers' on Government e-Market (GeM), enabling them to procure goods and services from nearly 40 lakh vendors to facilitate economical and transparent purchases.
7. *Three New National Multi-State Cooperative Societies*: Three new apex national multi-state cooperative societies established in the areas of seed, organic farming and export marketing, as umbrella organizations to give thrust to quality and climate resilient seeds, organic farming and its certification, and exports from cooperative sector.

Source: Ministry of Cooperation, February 2023.

## **COOPERATIVE IDENTITY: THE VALUES AND PRINCIPLES**

In 1995, the International Cooperative Alliance (ICA) adopted the revised Statement on the Cooperative Identity which contains the definition of a cooperative, the values of cooperatives, and the seven cooperative principles (as described below).

Cooperatives are autonomous associations of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise.

### **Cooperative Values**

Cooperatives are based on the values of self-help, self-responsibility, democracy, equality, equity, and solidarity – all in the spirit of honesty, openness, social responsibility and caring for others.

### **Cooperative Principles**

Cooperatives have considerable freedom to draw up their own bye-laws based on the Cooperative Law (Act/Rules) and Cooperative Principles. Cooperative Principles are a set of basic guidelines by which cooperatives put their values into practice. The seven principles are:

Voluntary and open membership; democratic member control; member's economic participation; autonomy and independence; education, training and information; co-operation among cooperatives; and concern for the community.

## LESSONS FROM COOPERATIVE BUSINESS MODELS

Sixteen cooperative business models – across the credit and non-credit cooperative sector – have been featured in the 'Turnover over GDP Per Capita' category of the World Cooperative Monitor 2022 (WCM 2022). This includes IFFCO (Indian Farmers Fertilisers Cooperative Limited, New Delhi; Gujarat State Cooperative Milk and Marketing Federation (GCMMF), Anand, Gujarat; Krishak Bharati Cooperative Limited (KRIBHCO), New Delhi; seven State Cooperative Banks, namely Kerala, Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Gujarat, and Uttar Pradesh; four Urban Cooperatives Banks: Saraswat Cooperative Bank, Mumbai; TJSB Cooperative Bank, Thane; Cosmos Cooperative Bank, Pune; and SVC Cooperative Bank, Maharashtra; and two primary societies, namely Buldhana Urban Cooperative Credit Society, Maharashtra, and Uralungal Labour Contract Co-operative Society Ltd. (ULCCS), Kerala.

There is widespread recognition of these cooperative business models across the country. The learnings may be adopted and replicated

to enhance and expand the capacities of cooperatives and collectives in India. Based on the interim analysis and observations, authors have identified the key lessons for adoption by other cooperatives and collectives, as follows:

- Standardization of business procedures and processes to undertake activities in a business-like fashion;
- Scaling-up – horizontal and vertical integration of business activities, and accordingly the governance and management structure evolved over a period as per the need of the members as well as demand from the primary cooperatives;
- Skilling – the way its members and personnel are treated, compensated and motivated. However, there is a still gap in terms of robust cooperative sector-specific HR policy, services and rules;
- Sustainable competitiveness – business diversification adhering to quality of products and services. There is still a lot of scope to develop products and services as per the changing needs and demands of members as well as the tastes and preferences of consumers;
- Self-regulation by complying with statutory and legal requirements.



**Inception meeting for establishing Campus Cooperatives at Bhagat Phool**

## DRIVERS FOR ACHIEVING PROFESSIONALISM IN COOPERATIVES

### A. THROUGH THE LENS OF COOPERATIVE PRINCIPLES

Based on the ICA guidance note, the authors have decoded each of the cooperative principles and identified key indicators, which may be used for developing a code of conduct in order to boost professionalism. These are:

#### 1. Open and Voluntary Membership

- Provide information handouts to all members and prospective members without discrimination;
- Maintain and update a membership database;
- Develop an agreed set of rights and responsibilities for members in the form of a 'Members Job Description/Members Agreement';
- Establish a checklist for assessing members' intent and provide mandatory training programs;
- Consider installment payment options for equity shares in high investment cooperatives;
- Ensure representation of marginalized and vulnerable sections of society;
- Maintain political and religious neutrality.

#### 2. Democratic Member Control

- Qualification for Board of Directors: educational and patronage/business participation;
- Skills mapping of Board of Directors to exercise effective governance;
- Clear delegation and distribution of authority between individual board members;
- Youth representation in Board and democratic renewal and retention of experience;
- Enabling employee unions' representative to be on the Boards (functional director);
- Election Committee ought not to be appointed by, or be accountable to, the current elected Board or committee;
- Free flow of information related to meetings, agenda, minutes of meetings, financial reports, etc., to each and every member.

#### 3. Members' Economic Participation

- Enabling members and non-members to

- invest in the cooperative society;
- Clear/agreed upon benefits structure, including non-financial benefits;
- No differential treatment between member-user, member-non-user, non-member user, or non-member non-user;
- Standard Operating Procedures (SOPs) for various aspects of business operations;
- Incentives to non-voting shareholder/investor member;
- Performance measures of cooperatives;
- Utilization of reserve fund and other funds.

#### 4. Autonomy & Independence

Strong financial controls and investment appraisals;

- Maintenance of records books;
- Maintenance of statutory registers;
- Identifying business opportunities;
- Performance benchmarking with national and international businesses;
- Regular conduct of Board and General Body Meetings, and Audit;
- Legal Compliance as per business operations.

#### 5. Education to Members, Training to Board Members & Employees, and Information for Youth & Opinion Leaders

- Capability enhancement of members: Programmes, not only on cooperative identity, but also on the other aspects of social development such as (financial) literacy, gender sensitization, leadership development, etc.;
- Members to complete specific sets of training programmes so as to become eligible to stand for Board election;
- Technical, managerial, and functional skill assessment of members including Board of Directors and employees in line with the objectives/business of cooperatives;
- Intergenerational transitional training to attract new and young members;
- Recruitment, HR Policy and Service Rules including career progression and performance incentives;
- Informing politicians, public servants, media representatives, and educators about the nature of cooperatives and vital benefits of cooperatives for advocacy and lobbying;
- Integration of cooperative education in the National Educational System and linkages with universities to encourage research.

## 6. Cooperation among Cooperatives

- Collaborating with sectoral cooperatives and collectives to economise scale of production and marketing, as well as with inter-sectoral linkages and other business players or value chain partners;
- Local resource mapping and networking with business entities in locality and similar industries to share intelligence, best practices, and to brainstorm solutions to address key issues;
- Establishing federations and/or becoming member of federal cooperative organisations (district, state and national level);
- Finding and referring new business opportunities to other cooperatives;
- Performance demanded from, and support to, primary cooperatives;
- Creating and participation of local, regional campaign and cross sector events;
- Soft loans/grants and technical assistance

by larger/well-established cooperatives to rehabilitate defunct cooperatives and promote cooperative start-ups.

## 7. Concern for Community

- i. Embracing diversity, equality and inclusion;
- ii. Ensuring access to healthcare, social welfare and other essential services to members, employees, and to non-members as well;
- iii. Concern about employees – employment policies, procedure, adhering to health and safety standards for workers and employees, etc.;
- iv. Mechanism to fulfill youth aspirations;
- v. Mechanism to achieve sustainable development – economic, social and environment;
- vi. Promoting peace and social justice, and helping to build civil society;
- vii. Activities undertaken as part of social responsibility given in the Annual Report.



ToT of Trainers of State & District Coop Unions on Training Methodology

## B. THROUGH THE LENS OF COOPERATIVE LEGISLATION

The National Cooperative Union of India's (NCUI) 2022 study identified key provisions followed in few states that could be implemented in all states to promote uniformity in cooperative regulation, enhance professionalism among cooperative members, directors, and employees, and improve the ease of doing business for cooperatives. These are:

### 1. Recruitment reforms to ensure selection and up gradation of competent professionals and workforce

To adapt to changing economic policies, there is need for a paradigm shift in the management of cooperatives and collectives. A Recruitment Board/Cooperative Service Commission could be established so as to recruit competent professionals transparently. Competent professionals are required for educating people on the benefits of cooperation, how to run

cooperatives as a business, and maximize economic returns to members. Additionally, cooperatives need to shift towards member-owned and controlled self-reliant and self-regulatory organizations and away from political and state interference. To succeed in the market, cooperatives need to adopt quality and excellence as prerequisites, use advanced technologies, innovate and explore new business opportunities. Finally, problems arising from divergent actions of members and federal bodies can be resolved through member education and healthy dialogue.

### **2. Electoral reforms to ensure fair and transparent election of Board of Directors**

To achieve professional cooperative management, simply appointing professionals is not enough. The Board of Directors must ensure that the cooperative is being run well and in the right direction. A 'Cooperative Election Commission/Authority' should be established to supervise elections. Directors must understand their responsibilities, act in good faith for the benefit of the cooperative, understand the business plans and industry changes, monitor operations, examine the cooperative's value and transparency, seek expert advice, establish long-term objectives and systems, and review financial information. Directors must also maintain the cooperative's integrity, reputation, and accountability.

### **3. Online registration and amendments of bye-laws and compliance to ensure ease of doing business**

Some States/UTs have made provisions for online registration, but due to lack of digitization, the cooperative registration process ranged from 30 to 120 days, in comparison to a Private Company which gets registered between 7 to 10 days. In addition, the provision of 'deemed registration' beyond the stipulated time period of registration may be made mandatory in all States/UTs. The period for amendment of bye-laws ranges between 30 to 90 days, wherein 'deemed acceptance' of amendments may be made compulsory in all States/UTs' Acts.

### **4. Establishing partnership and subsidiary to infuse capital and ensure business diversification**

The Cooperative Laws should be permitted to

organize cooperatives through partnerships with private or public limited companies or other community-based institutions/ agencies, without impacting the cooperative identity. This will support the accumulation of the required funding and create a win-win business model for both cooperatives and other business entities.

### **5. Adoption of uniform accounting and auditing standards to give a true and fair view of the state of affairs**

Books of Accounts, financial statements and other relevant papers for each financial year, which give a true and fair view of the state of affairs of cooperatives, must be kept on accrual basis and double entry system of accounting, comply with the standards issued by the Institute of Chartered Accountants of India (ICAI), and shall be in the requisite form(s) as may be mandated for different types of cooperatives. The Cooperative Law must insist on adherence to accounting and auditing standards and every auditor must comply with these Auditing Standards.

### **6. Attracting and retaining youth in cooperatives**

There is no provision for promoting 'Coop Startups'. If youth and women are to be drawn into the cooperative fold, cooperatives as legal entities need to be considered under the definition of 'Start-up', in order to get access to the benefits of the start-up ecosystem.

## **ROLE OF EXTENSION PROFESSIONALS**

Extension professionals can play a vital role in strengthening the cooperative as an institution and a business enterprise. These include:

Facilitating genuine community participation: Currently, while forming and promoting new collectives the focus is on achieving targets rather than on making a community realize what their felt and unmet needs are for coming together, especially with regard to enhancing and expanding their livelihood opportunities. So, extension approaches and participatory methodologies may be used for awareness generation and social mobilization of farmers in order to inculcate a sense of ownership and belongingness, which is fundamental to

ensure their active participation not only in the formation and promotion of community-based institutions but also in the business affairs of the enterprise.

### **Promoting vision mapping and leadership development:**

Another core aspect while establishing a strong foundation for cooperatives and collectives' business enterprises is ensuring good governance.

### **Identifying and nurturing social entrepreneurs:**

Cooperatives and collectives are often misconstrued as entities led and governed by senior aged members. In order to ensure renewed life to this ageing movement, youth and women must be oriented towards the nature and benefits of these social enterprise models that can fulfill their aspirations as individuals, community and society as a whole.

### **Assist in realising the full potential of cooperatives:**

To promote the potential of cooperatives, it is important to create awareness and build capacities through education and training. Cooperatives should be assisted in developing business plans, improving productivity, and accessing markets and finance. It is also essential to educate members on financial management, establish effective processes and systems, and assist them in fulfilling legal requirements. Providing technical know-how and recruiting competent management professionals can help improve the quality of goods and services produced. Finally, cooperatives should be encouraged to self-regulate by assisting them on the statutory and legal requirements.

### **Piloting new cooperatives in emerging areas:**

New 'Commodity Cooperatives' in emerging

areas, such as renewable energy, service sector, industrial and manufacturing sector, tourism, etc., need to be identified and pilot tested for formation of area-specific cooperatives. In addition, there is tremendous scope in the social sector which is not economically viable for other forms of private enterprises. The USP of cooperative is "primacy of people over profit", wherein cooperatives can reduce costs through the voluntary participation of their members.



**NCUI Faculty Development Programme on Cooperative Management**

## **END NOTE**

Professionalism of cooperatives and community-based social enterprise is not merely a prerequisite but a permanent condition for ensuring sustainable competitiveness of their business enterprise as well as for evolving as a self-regulatory organization. There is vast scope for extension professionals to pursue their career in various managerial positions in the cooperatives/collectives as well as in the cooperative departments of the State and Union Governments. Let's cooperate, collaborate and take collective action to make cooperatives and collectives Aatma Nirbhar.

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# 39

## SUCCESS OF FPCS, NECESSARY, BUT HOW LIKELY?

Farmers, more so the men, have a poor history of working together as a collective. Today, Farmer Producer Companies (FPCs) are mooted as a silver bullet to catapult farmers into entrepreneurs. Many not-for-profit organizations are willingly, or often unwittingly, promoting FPCs that are supposed to be profit making. Apparently, there are many stumbling blocks.

**Arun Balamatti** examines only the process part of the FPCs' evolution and discusses the roles of various players, the required skill sets, challenges, issues, and then invites the attention of the government and key stakeholders to revisit the template.

"There seem to be but three ways for a nation to acquire wealth. The first is by war...This is robbery. The second is by commerce, which is generally cheating. The third is by agriculture, the only honest way, wherein man receives a real increase of the seed thrown into the ground, in a kind of continual miracle, wrought by the hand of God in his favour, as a reward for his innocent life and his virtuous industry".

**-Benjamin Franklin**

We have moved on from the Self-Help Groups (SHGs) and entered another phase of working with groups of rural communities, and currently with Farmer Producer Companies (FPCs). Of course, there were attempts to harness the potential of SHGs in agricultural development, which were met with mixed results, primarily because almost all the SHGs were composed of only women. There has always been need for an institutional mechanism since it does not make economic sense for the small and marginal farmers (over 85%) to operate as individuals. We are now given to believe that FPCs are the way forward and they will be able to deal with every challenge in agriculture. These lofty expectations could well weigh down the FPCs as farmers have not worked as collectives in the past.

It appears that all the stakeholders are convinced that FPCs are the ultimate panacea for all the farmers' plight, except the farmers themselves. There is a government policy to promote and support FPCs; there are agencies scrambling to promote FPCs; there are centers of excellence for FPCs; there are resources being made available by different agencies; there are corporates willing to invest in aggregation; there are value chain funders to reduce cash flow crunches for the FPCs. However, except for the logic that most of the small and marginal farmers cannot access knowledge, harness technology, or benefit from the input and output markets so long as they operate as individuals, nothing else seems to make logical sense on the larger FPC canvas – if the farmers have difficulty coming together as a cohesive group.



## Box 1: Evolution of FPCs

In 2003 the YK Alagh Committee recommended the formation of FPCs, a combination of the cooperative form and the company form. Today, there are 33,711 FPCs registered across India, that brought in over 28.20 lakh farmers into their fold in 28 states and seven Union Territories. But let us not get swayed simply by the sheer numbers, let us see what some of these numbers actually mean. It was only in 2012, a decade after the enactment, that the FPCs started showing up; between 2014 and 2018 as many as 5,058 FPCs were registered. The real surge occurred between 2020 and 2022 during which period 25,750 FPCs were registered (over 76% of the total). Going by the total number of FPCs and shareholders, it works out to less than 84 members per FPC, too few to constitute a decent paid-up capital. Among the 28 states and seven Union Territories, only six states contribute the majority of FPCs, i.e., 21,285 (63%), and 18.36 lakh shareholders (65%) – Bihar, Maharashtra, Odisha, Rajasthan, Tamil Nadu, and Uttar Pradesh. These six have more than 500 FPCs per state; Maharashtra alone contributing over 34% of the FPCs (11,540). Given that the National Bank for Agriculture and Rural Development (NABARD) and the Small Farmers' Agri-Business Consortium (SFAC) are the major players in promoting FPCs in the country, the available shareholder details of FPCs under each of these are only 21% and 14%, respectively, whereas the details of 43% of shareholders are not available. The available data on revenue across 2,727 FPCs is INR 3989.9 crores, an average of INR 1.46 crore; it is quite likely that the major portion of the revenue may be sitting in the accounts of only a handful of FPCs (<https://fpo.tci.cornell.edu/dashboard>).

What the numbers mean is, the story of FPCs has only just begun, their growth and distribution in the number of FPCs, membership, and revenue is lopsided. The few extraordinary success stories may be coming from the five thousand plus FPCs started between 2014 and 2018 while the 25,000 plus FPCs that have come up only after 2020 could still be struggling with many challenges.

Here are the arguments as to why the template we have put in place for the FPCs is defying our efforts to achieve the larger goal – a better deal for all farmers.

### WHY FPCs?

The best thing for an Extension worker to realize in their career, early on, is that there is a limit to their ability in increasing crop productivity and optimizing production costs. This leaves us with a hard-hitting truth about how little a farmer earns after all the hardship they put up with. Their lives are a constant struggle against increasing cost of inputs, farm gate prices that refuse to budge for years, and the interplay of so many variables – erratic rainfall, ever-undependable laborers, invasive pests, unknown diseases. Too many odds are stacked against farmers keeping them from celebrating the occasional triumph. What a farmer earns at the end of one good harvest is always inadequate if one understands the fact that the profits from one good crop must cover the losses of a few previous crops and the almost inevitable uncertainty of the next crop.

When a tomato farmer sells his produce at Rs. 10 a kilo and goes to the market the next day and must buy the very same thing for

himself at Rs. 40 a kilo, he apparently finds it grossly unfair. The management gurus explain to him why it is not at all iniquitous; between wholesaling and retailing there are things such as grading, transportation, perishability, risk around investments, and a scale at which all this works. This is how the idea of aggregation is being sold, which is often not fully understood by the farmer, because farmers, in general, have always operated as individuals, have focused on production, have been glad, or have often been compelled, to dispose of their produce immediately after harvest. The idea that a greater share of the consumer rupee can be harnessed by farmers only by taking a few steps beyond production is not merely a matter of comprehension on the part of farmers but that these next steps, post-production, are not the ones to be taken individually but collectively. The farmers have not done it in the past; they, on their own, are not able to do it even now. Farmers graduating to become farmer-entrepreneurs must therefore be a guided process. This is where the government comes in with an enabling policy on FPC. A policy, however, is only a trigger, and it must open up opportunities for those who can make it happen.

## WHAT IS AN FPC?

An FPC is a legal entity of any kind of producer – agricultural produce, forest produce, artisanal products, or any other local produce – where the members and managers are the primary producers. An FPC, therefore, is an institution of the farmers, by the farmers, and for the farmers. Going forward, the FPC is meant to take care of the flaws in cooperative societies (such as external interference), keeping its strengths (collectivization of people and their interests) and borrowing the strengths of the corporates (financial discipline).

The quote at the head of this article by Benjamin Franklin says, 'Commerce is generally cheating'. We have never associated this trait with farmers who are engaged in farming, a 'virtuous industry'. What is certain is that farmers must function as collectives for this, and they need to learn a few new skills. However, the farmers are not forming the FPCs by themselves, and the not-for-profit organizations – the agencies not conversant with entrepreneurial skills – are promoting most of the FPCs.

### Box 2: Cooperative vs. FPC

It is important to understand the difference between a cooperative and an FPC because the origin of the FPCs is partly owed to the cooperatives, but the FPCs are not really meant to be cooperatives. Cooperatives emphasize WELFARE; farmers' cooperatives invariably tend to offer inputs to their members at low prices and buy members' produce at a higher price. In the process, the members of cooperatives receive little because they hardly have profits, and they seldom share. FPCs, on the other hand, are expected to emphasize PROFITS and wealth creation. FPC's focus should not be on offering low-cost inputs and higher procurement prices. Rather, they should work towards maximizing profits and sharing the dividend. This is the reason they are referred to as FPCs in this blog, not Farmer Producer Organizations (FPOs).

An FPC, unlike a cooperative, is an exclusively farmer-centric profit-seeking entity. However, farmers as we know them, are recognized more for their hard work, magnanimity, and ignorance, especially on the market front. Farmers have always considered farming as a full-time occupation; they have rarely ventured into any activity beyond production. The prerequisites of success in the market are QUALITY of the product, EFFICIENCY with which it is produced, SCALE, and CAPITAL. If we agree these are all the basic ingredients necessary for an entrepreneur to succeed, farmers as a community have not really demonstrated that they have the required entrepreneurship spark in their DNA. To put it briefly, the market demands different skills and attitudes.

### Key Skills for FPC Success

Promoting successful FPCs demand multiple skill sets; the three critical skills mentioned below illustrate why it is not everyone's cup of tea.

- *Social engineering*: If we were to follow the template that helped the SHGs succeed, the promotion of successful FPCs requires the promoting agency to begin by developing rapport with the community, initiating the formation of small and cohesive groups, introducing savings and thrift habits, educating members and office bearers on democratic functioning, financial management skills, and then bringing together disciplined and willing smaller groups on to a larger platform that can work as an FPC. This is a slow and complex process that can be managed by only those agencies that have had experience working with

SHGs or SHG-like institutions. There are civil society organizations (CSOs) that are best suited to do this job. But, make no mistake, making an individual farmer understand the value of joining a group is only the beginning of an FPC, not the end.

- *Technology management*: The production part in terms of crop choice, acquiring critical technologies (inputs), and knowledge of the actual production process is another skill which many farmers are familiar with, on an individual basis. However, the choice of crop or enterprises (such as dairy, poultry, and managing small ruminants) for individuals and for a collective could be entirely different depending on the resources (capital and more importantly, intellectual), and the possible scale of operation depending on the number of members in each FPC. Many CSOs engaged

in promoting FPCs may struggle in recognizing the strengths, weaknesses, opportunities, and threats when it comes to facilitating the operations from farm to fork, and suitably guiding the FPCs in managing these operations as a collective.

- *Enterprise management:* The next step, after ensuring an FPC is formed with like-minded individuals who have gone through a minimum apprenticeship on working as a collective with proper fiscal management and book-keeping, is to progress to enterprise management. This requires FPCs to deal with the challenges in both the input market and the output market that have a direct bearing on the production costs and profitability. And to be able to succeed in the input and output markets the

FPCs and or the promoting agencies need the wizardry to identify and pick only those enterprise ideas, which are commercially viable, understand the value chain, develop business plans, and mobilize capital for short and longer-term investments. Unfortunately, the competence and experience in managing this part of building an FPC are certainly not the strengths of farmers nor of many CSOs.

In simple terms, social engineering is what the CSOs are good at, and technology management is something most farmers are capable of handling, but enterprise management is where both struggle. Expecting the CSOs or any other single agency lacking in one or more of the three skills could be a risky affair.



## CHALLENGES FACED BY FPCs

Not surprisingly, most of the FPCs are encountering many challenges, implying that neither the CSOs nor the members of the FPCs have the wherewithal to deal with them. Here are some of the common problems faced by the FPCs.

- *Difficulty in member enrollment:* This is a typical problem of such CSOs that have not had experience in community mobilization, more specifically those which have no working experience with SHGs. If an FPC-promoting agency is struggling to ensure enough enrollment it could be because of one or many reasons, for example, they may have failed to instill confidence among farmers about the power of FPCs, its value, trust in the person

chosen to lead the FPC, or the individuals chosen as directors on the governing board, or even the very familiarity or credibility of the agency which is promoting the FPC. Raising capital without proper onboarding of the shareholders could turn out to be a hurdle while making important decisions by the FPC.

- *Capital mobilization:* All the FPCs invariably claim they have inadequate paid-up capital, their transaction costs are extremely high, and hence many of their 'plans' cannot be executed. The maximum paid-up capital an FPC of a thousand members can raise through a share with face value of Rs 1000 is Rs. 10 lakhs. There are at least two issues if they are not able to mobilize enough shareholders. One, the FPCs are compromising on their social engineering process and hence they are not able to win

the confidence of a thousand members or motivate a small number of members willing to buy a share with a higher price. This has multiple implications – the FPCs end up with less than the desired number of shareholders, and more seriously, those who buy the shares are less likely to know what the FPC is all about and what they can expect, leading to a gradual loss of trust in the FPC. The second issue is, assuming the FPC can mobilize only half the expected number of members, the FPC could choose to invest all or most of this capital into one or a few enterprises. This can be risky because when the capital investment gets larger the cash flow and returns take longer to materialize. If we were to draw a parallel from the case of listed companies, how many companies go to town pleading with people to buy their shares? Isn't it the product or service, the value proposition, or the people who run the business that attract the shareholders? So, it is not about motivating the farmers to join the FPC but luring them toward a cause that assures them of some form of benefit.

- *Limited sources:* NABARD and SFAC are the leading agencies that came forward to promote and support FPCs by providing financial assistance in the form of time-bound working capital and matching grants. More importantly, these institutions are encouraging CSOs (mostly) to promote FPCs and the financial assistance to FPCs is being channelized through the CSOs. It seems that the CSOs are entirely dependent on the support of NABARD and SFAC for their FPC promotion activities, including staffing, whereas the money that the FPCs get is always seen as too little for investing in enterprises. Both the CSOs and the FPCs miss the point that their primary objective is to invest the paid-up capital in an enterprise, even if it is a small one, to begin with, earn profits, gain experience, and then think and act big. Excessively depending on the funds provided by NABARD, SFAC, and others is neither expected nor a desired way forward.

- *Banks not prepared to lend:* Another reason for not being able to invest and earn, often mentioned by many FPCs, is that they have little or no assets to mortgage and raise money. Their individual or common property such as farmland or a building does not qualify for collateral. This is, in fact, a blessing in disguise

that they are not able to borrow before they acquire experience in handling commercial opportunities. They should rather start small, with paid-up capital, instead of going all out with borrowed money, risking their assets early in their entrepreneurial journey.

The challenges reveal the fact that the FPCs have difficulty mobilizing both human and financial capital, thus raising concerns about the success of the enterprise at an early stage.

Let us explore the issues that lead to these challenges and prevent many FPCs from getting off the starting block.

## ISSUES WITH FPCs

**Collectivization and aggregation:** There are fundamental flaws in the very understanding and operationalization of the principles of collectivization and aggregation. The small and marginal holdings have rendered farming uneconomical because the farmers buy inputs in retail, obviously in small quantities, and sell their little produce at a wholesale price, thus getting a poor deal at both ends. This is precisely the reason farmers should operate as collectives so that their input needs are pooled, and their produce can also be aggregated to harness the economies of scale. In practice, unless the farmers grow similar crops and varieties, aggregation of both the inputs and outputs is untenable. Therefore, it is not only important for the farmers from contiguous geography to come together to aggregate their input needs and output, but they should also work towards pooling their land resources to grow one or few crops on a large scale so that their input needs and outputs are similar, and hence can be easily pooled. While NABARD guidelines for FPCs clearly mention this we do not actually see any FPC practicing land pooling.

**FPC promoting agencies:** Even though the FPCs are supposed to be by the farmers, of the farmers, and for the farmers, they are being promoted not by farmers but by others. The irony is that it is mostly the 'not-for-profit' non-governmental organizations promoting FPCs that are supposed to be 'making profit'. But unfortunately, there are no alternatives. None of the public or private Extension agencies have the skills and experience to provide professional

handholding support through the FPC lifecycle. The only choice now is to work through a few select CSOs or other agencies that have acquired experience in the past few years and have demonstrated the ability to fill the missing gaps by networking. such as seeking guidance from Krishi Vigyan Kendra's (KVK) for technical assistance and hiring professionals for value chain studies and business plan development.

The FPCs lack a core focus: In the initial stages, there was an idea of promoting commodity groups, i.e., by collectivizing farmers producing certain crops. Eventually, the FPCs went on to first mobilize the farmers and then look for whatever entrepreneurial activities they wished to pursue. Although crop-specific FPCs are not really a clever idea, especially when the shareholders are growing more than one crop (which is what many farmers do), starting an FPC without clarity on a specific enterprise idea also does not help. The next point explains why.

The cooperative hangover: It is evident that the majority of FPCs are getting into the trap of trying to meet every need of their members. Dealing with seeds, fertilizers, and agrochemicals as well as trying to procure and sell every product of its shareholders is an invitation to trouble. This move entails the risk of missing viable commercial opportunities. For instance, many FPCs invest their hard-earned paid-up capital in procuring chemical fertilizers in bulk by paying in advance, investing in their stocking, and ending up locking the capital because the sale in small quantities to member farmers over a longer period means the cash flow is in trickles. Similarly, another pet project of the FPCs is investing in a 'Custom Hiring Centre (CHC)', a high-investment enterprise that is full of risks. Buying expensive farm machinery and equipment and leaving them at the mercy of low-paid drivers or operators or even the member farmers renting them often leads to poor handling, heavy wear and tear, breakdown, and excessive maintenance costs. Neither fertilizers nor CHCs are high-margin enterprises.

There are two reasons for this cooperative hangover among the CSOs. One, many FPCs are being registered under the Cooperative Societies Act of the respective state or the Society Registration Act, 1860, or as Public Trusts under the Indian Trusts Act, 1882, simply

because it is a lot easier than registering them as a Producer Company under Section 581(C) of Indian Companies Act, 1956, or Section 25 of the Indian Companies Act, 1956. Apparently, the objectives of the FPCs are written and followed typically to suit a cooperative society. The other reason is that the CSOs promoting FPCs are conversant with welfare activities rather than enterprise activities. The Alagh Committee (2002) had clearly mentioned in its report that registration as societies or public trusts is inherently unsuitable for commercial enterprises. The Committee said, 'Companies Act offers a statutory and regulatory framework that allows for competition on an equal footing with other forms of enterprise. If the Companies Act is suitably adapted to serve producer-owned enterprises, their registration as a company will go a long way to advancing the interests of producers'.

Who runs the FPCs: The requirement at the stage of registering an FPC is to have a minimum number of farmers as members, and a Board of Directors chosen from among them, including a designated president for the board. While NABARD stipulates 700 to 1000 members, an FPC can be registered even with just 10 farmers. The common mistake done at this stage is choosing the wrong people as directors and president or selecting them without the concurrence of all the shareholders. In the process, many FPCs end up choosing office bearers who harbor political aspirations or are looking for social esteem rather than the ones who have the inclination and ability to run the FPCs for the benefit of their members. The weakest link in the FPC structure, however, is in the choice of the Chief Executive Officer (CEO).

Many FPCs find it difficult to find a qualified and competent CEO among their members and hence hire an external person. And because the external person hired as a CEO needs to be paid a salary the FPCs look to NABARD and SFAC for resources. Since these agencies have a meager allocation for this role the FPCs end up hiring a less qualified person (normally a fresh agriculture graduate) with no prior experience in managing an enterprise. Such a person ends up being managed by the president (often equally inexperienced) or by a few dominant directors. The legal and financial compliances are often too intimidating for such a novice

and running the business of an FPC is indeed a daunting task.

Mismatch between volumes and earnings: A study of seven FPCs in Mysuru district during 2017 revealed that all the FPCs tended to show large volumes of transactions whereas their profits were negligible. Interestingly,

we get to hear success stories or otherwise of many FPCs, but they hardly throw any light on their financial health. We are yet to see reports and feedback on the liquidity, solvency, profitability, and operating efficiency of the FPCs, the true measures of the success of enterprises.

## THE NEED TO CHANGE THE TEMPLATE

Clearly, the farmers on their own are unable to form and run FPCs. The CSOs can be good at social engineering but will fall short in their

ability to support the FPCs in technology and enterprise management. Unless this is understood and addressed, we are likely to see many FPCs being registered, only adding to the numbers but very few FPCs really achieving what they were meant to. Leaving the promotion and management of FPCs to private entities also has the risk of poor social engineering.

A possible strategy therefore could be to go with select CSOs that have acquired experience in the three phases of the FPC lifecycle described below, or to depend on multiple agencies sharing roles based on their core competencies.

The following graphic shows distinct phases of the FPC's lifecycle, and who could play what role at each phase.

### Phase 1: Inception

- Key actor: **CSO**

Roles

- Mobilize members
- Educate the members of the benefits of collectives

### Phase 2: Incubation

- Key actor: **Professional Incubator**

Roles

- Guide the FPC in legal and financial compliances
- Help FPCs choose suitable office bearers
- Offer FPC office bearers training on value chain analysis and business plan preparation

### Phase 3: Inflate

- Key actor: **FPC on its own**

Roles

- The FPC to invest in a few commercial opportunities and acquire experience
- The FPC could choose viable options from experience and then upscale

(Source: Author)

**The FPC growth phases and the roles of key actors**

The CSOs may lead the inception process with the social engineering part until the mobilization of the shareholders (Phase 1). A professional private entity or an incubator may step in at Phase 2 to help the FPC choose the governing board, president, and CEO, build their capacities on their respective roles, value chain analysis, preparation of business plans, and assist in the legal and financial compliances. Phase 3 should be for the FPCs to be enabled to run the affairs all by themselves with advisory support from private entities or incubators. While the CSO could anchor the FPCs throughout the lifecycle they should be aware of their critical and direct role during Phase 1, and the facilitation roles during Phases 2 and 3.

## CONCLUSION

Typically, a company takes six to eight years to break even and stabilize with a decent profit. Many of the over 5000 FPCs registered between 2014 and 2018 should have reached this stage, but that has not happened, except for a few. Naturally so because FPCs are not typical companies in the sense the farmers lack

entrepreneurial skills; furthermore, they are being coaxed into forming FPCs by agencies that are also constrained by their limited skills and abilities. Therefore, it is time to moderate our expectations, tactfully manage the process of promoting and enabling FPCs, and look for suitable agencies to meet the necessary competencies.

The CSOs need to quickly acquire new skills, the public Extension system itself needs to realize how farming is now being driven entirely by the markets, and therefore, adapt to market-led Extension.

The ever-increasing costs of agricultural inputs and the farmers' continued struggle to get a fair deal for their produce emphasize the fact that the success of the FPCs is inevitable. The government has indeed recognized this fact and has been encouraging the promotion of FPCs on a war footing. But the obsession with numbers and ambitious targets needs to be moderated. Clarity on who comes in at what phase of the FPC's lifecycle could certainly help improve the success rate of FPCs.



Plutalants Sankshara



# Education and Teaching

06

# 40

## ONLINE ASSESSMENT TOOLS FOR E-TEACHING AND LEARNING: MAKING ICTS MORE HANDY

In this blog, **Tannishtha Bardhan, Shraddha Mohanty and Abir Dey** illustrate the use of online assessment tools and their potential use in agricultural higher education. These new technologies in the hands of great teachers can be transformational, they argue.

COVID-19 induced global lockdown has affected every sphere of life and the educational sector is not an exception. The sudden shutdown of all educational organizations starting from kindergarten schools to colleges and universities has affected more than 1.2 billion children across 186 countries. This new normal situation has changed the educational sector dramatically, with the distinguishing rise of e-teaching and learning. These online teaching-learning gained momentum due to COVID lockdown. One of the important parts of this e-teaching and learning is to evaluate the students' performance. Hence, the present situation demands an online form of assessment of the students which was earlier being done on pen paper mode.

### MODES OF ASSESSMENT

Arousing the motivation of students to achieve meaningful learning experience is a major objective of education. Often, assessments are the prime source of motivation for students and drive their decisions of when and how to study. Before discussing anything about online mode of assessment, let's have a quick look at different modes of assessment before COVID-19. Mostly, teachers used to take traditional pen and paper mode of assessments, surprise class tests, open book examinations or practical based evaluations. One advantage of offline assessment mode is it can check misconduct on part of students. Besides, in offline mode students did not have to face technical glitches, could manage their time, could easily interact with teachers, and its familiarity in the teaching and learning community. But, offline assessment has some limitations too. Especially in OMR based tests, one has to be very cautious as answers once marked cannot be changed. Chances of missing questions occur frequently. Above all, embracing an online exam system would significantly aid in safeguarding the environment with reduced paper usage. Without a choice

in the present time, adopting online teaching-learning and assessments is the only feasible option.

## ONLINE ASSESSMENTS

Online assessments can be any means of evaluating student achievements, giving feedback or channelizing students forward in their learning process in a fully online mode. Assessments can be either formative, designed to monitor students' progress in a low or no stakes environment, or summative, designed to evaluate students against criteria. Examples of such commonly used assessment tools are Google Form based quizzes, Kahoot!, Quizizz, Socrative, Near Pod, Educanon, etc.

Along with the insertion of smart technologies in the classroom, inclusion of scenarios supported by games and competition can enhance participation of students. There is a major concern that online education is one way and ensuring interaction is not as easy as regular classroom teaching. To make it more interactive and lively, quizzes, polls and games can be incorporated in the online teaching

**Step 1:** Open Google Chrome and type Kahoot in the search bar. You will be provided with a list of options. For teachers to sign in and create a quiz, click on <https://kahoot.com> and for students to join any live session on Kahoot platform click on <https://kahoot.it>.

The screenshot shows a Google search for 'KAHOOT'. The search bar contains 'KAHOOT' and the search results show 'About 71,00,000 results (0.42 seconds)'. The first result is 'kahoot.it' with a red arrow pointing to the link, titled 'Play Kahoot! - Enter game PIN here! For students'. The second result is 'kahoot.com' with a red arrow pointing to the link, titled 'Kahoot! | Learning games | Make learning awesome! For teachers'. Below the search results is a 'People also ask' section with questions like 'How do you make a kahoot?' and 'Is kahoots free?'. On the right side of the screenshot is a mobile app preview for 'Kahoot!' with a rating of 4.6/5 and a description: 'Kahoot! is a game-based learning platform, used as educational technology in schools and other educational institutions. Its learning games, "Kahoots", are user-generated multiple-choice quizzes that can be accessed via a web browser or the Kahoot app. Wikipedia'. The app preview also lists the initial release date (September 2013), launch date (March 2013), available in (Only English), users (50 million monthly active users as of May 2017), URL (Main website: kahoot.com; Player login: kahoot.it), and registration (None for quiz participation; required for quiz creation).

**Step 2:** After opening Kahoot.com, you have to sign up if you are registering for the first time. Otherwise, you can log in with your existing id. After signing up, choose your account type (teacher, student, personal or professional) and describe your workplace (school, higher education, school administration, business).

environment. Two such platforms are Kahoot and Quizizz. These tools can be easily integrated with exiting online teaching/learning platforms. The steps in using such tools are discussed in this blog.

## Kahoot!:

Kahoot! is an open access, easy, game based learning platform which provides the facility to conduct gamified quizzes during online teaching-learning sessions. It can be used as an educational technology in schools and higher education institutes to assess performance of students. Teachers can use Kahoot! in two ways: either during an online class to check a student's knowledge or it can be assigned to students at a later date where it works in a student paced manner. The most attractive part of this platform is its time bound questions, where one can allot a time duration starting from 5 seconds to 240 seconds per question in a quiz. Now let's see how this platform works and move forward towards a step by step description of creating quizzes and its sharing with the class.

Are you a teacher, business or parent affected by COVID-19? See how Kahoot! can support you. [Learn more](#)

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**Step 3:** The next step is choosing your plan where there is an option to choose among basic free plans and other paid versions. Our basic purpose of online assessment can be served with the basic free plan. So click on "Get Basic for Free" and continue. In the paid versions, one can choose up to 2000 participants and get all question forms and distant learning features. Institutions and organizations can go for the premium version. After this, a welcome page will pop up and it is optional to put your name or nickname there. Once done, you will be on Kahoot! Homepage.

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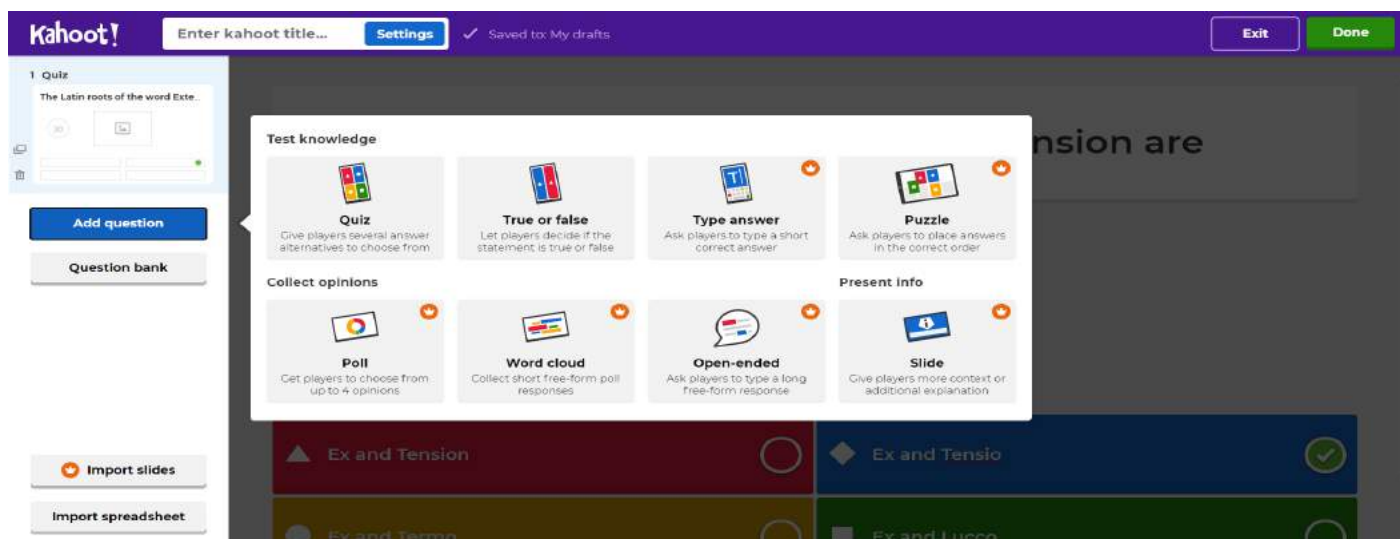
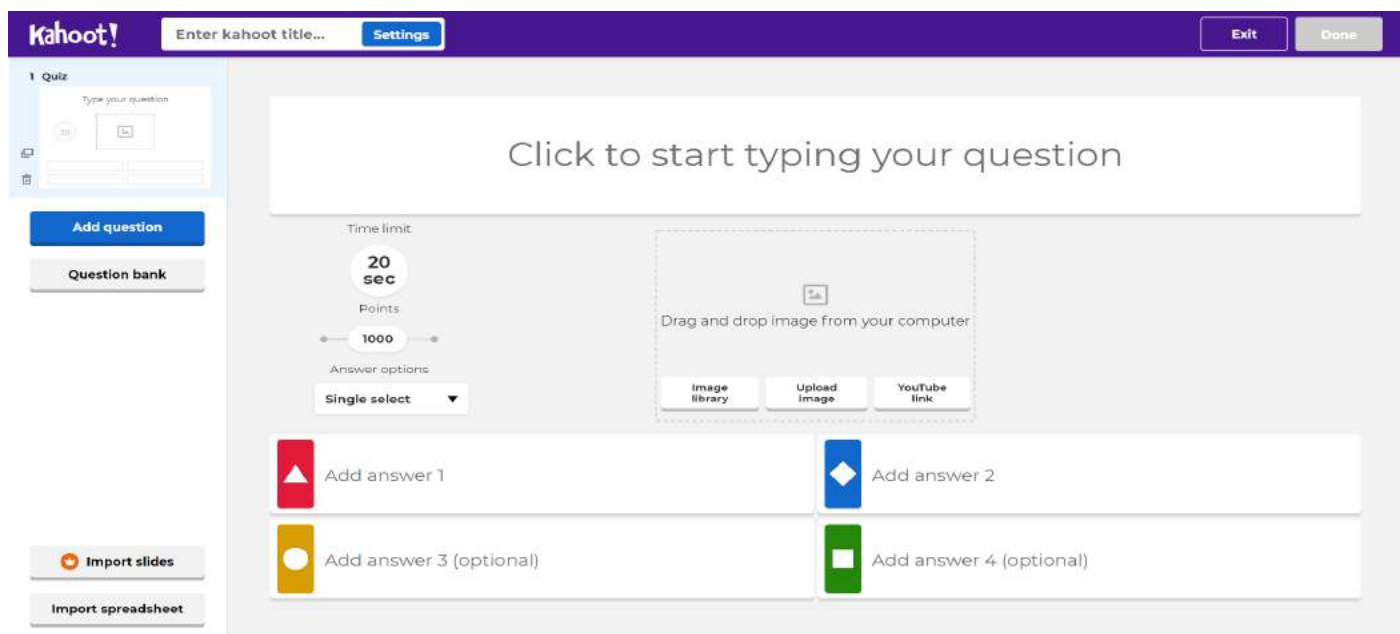
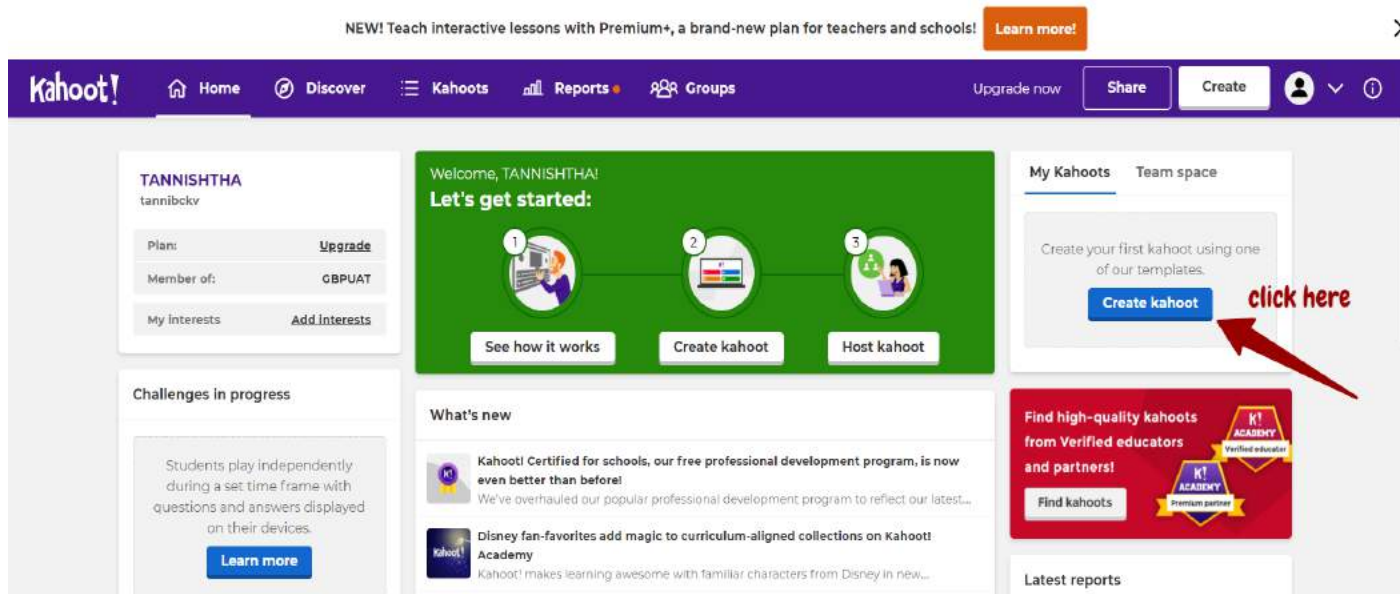
per teacher/month (billed annually)

[Buy now](#) [Start free trial](#)

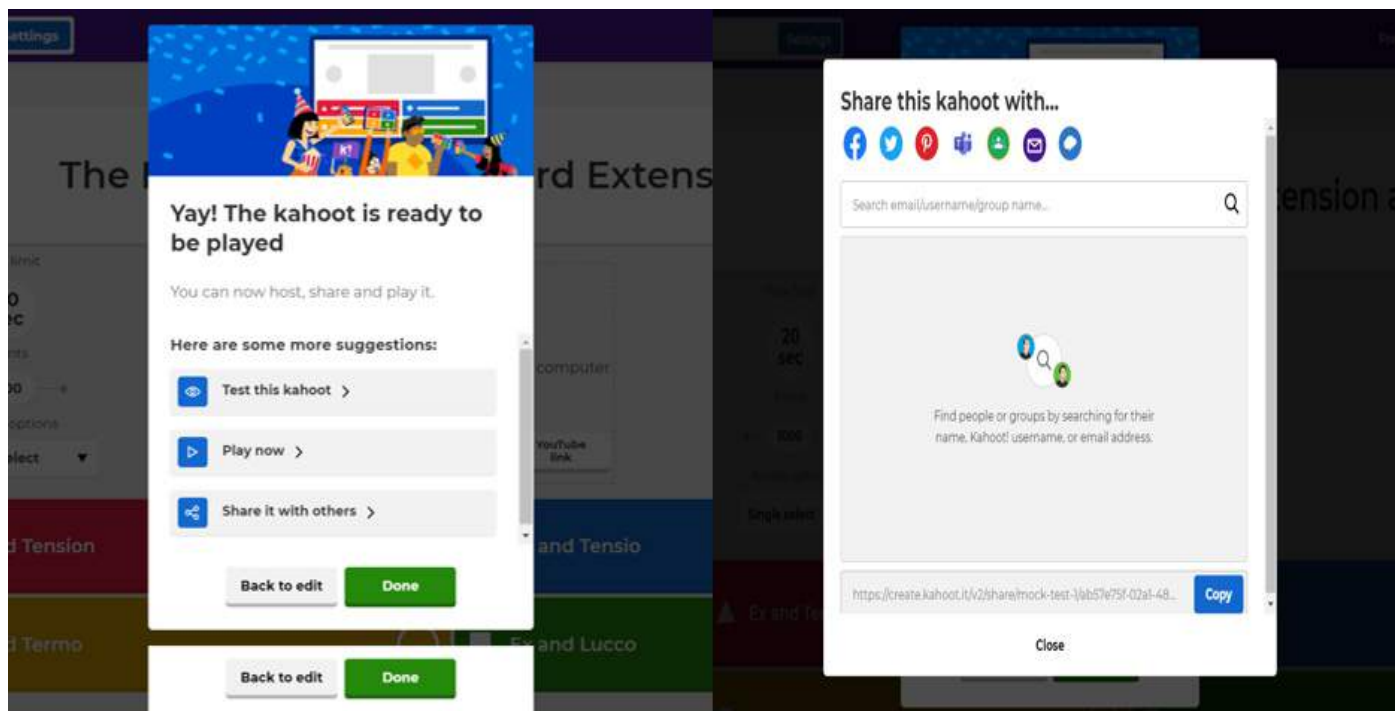
Trial duration: 7 days. Cancel at any time. \*only applies to "Buy now!"

Basic features for creating and playing kahoots. [Get Basic for free](#)

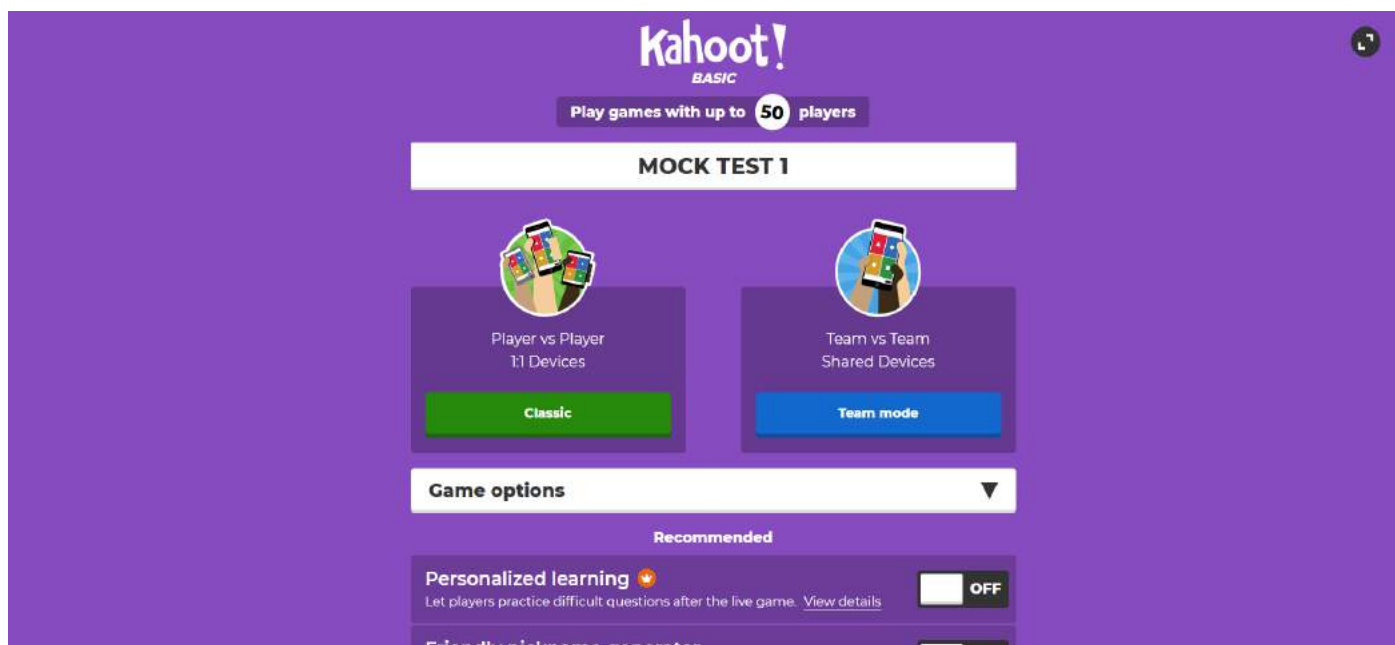
**Step 4:** On the homepage, click "Create kahoot" icon. You will be provided with different options like creating from scratch or either using any template of formative or summative assessment. Click on "New Kahoot" and start adding your questions. Since we are using the basic free version, we are allowed to use quiz type (MCQ) and true-false type questions. One can also insert videos/images and ask relevant questions regarding those. There are options to select time duration for each question and adding points to each question.



**Step 5:** When the quiz is ready, you will can test it, play it and share it. It's advisable to test the quiz prior to sharing. Sharing can also be done in the form of assignments at a later date. The best feature is one can share the quiz using the shareable link or share via google classrooms, Microsoft Teams, Twitter, Facebook etc. While assigning any kahoot quiz, there are options to choose question timer, shuffle questions and to allow students write their nicknames.

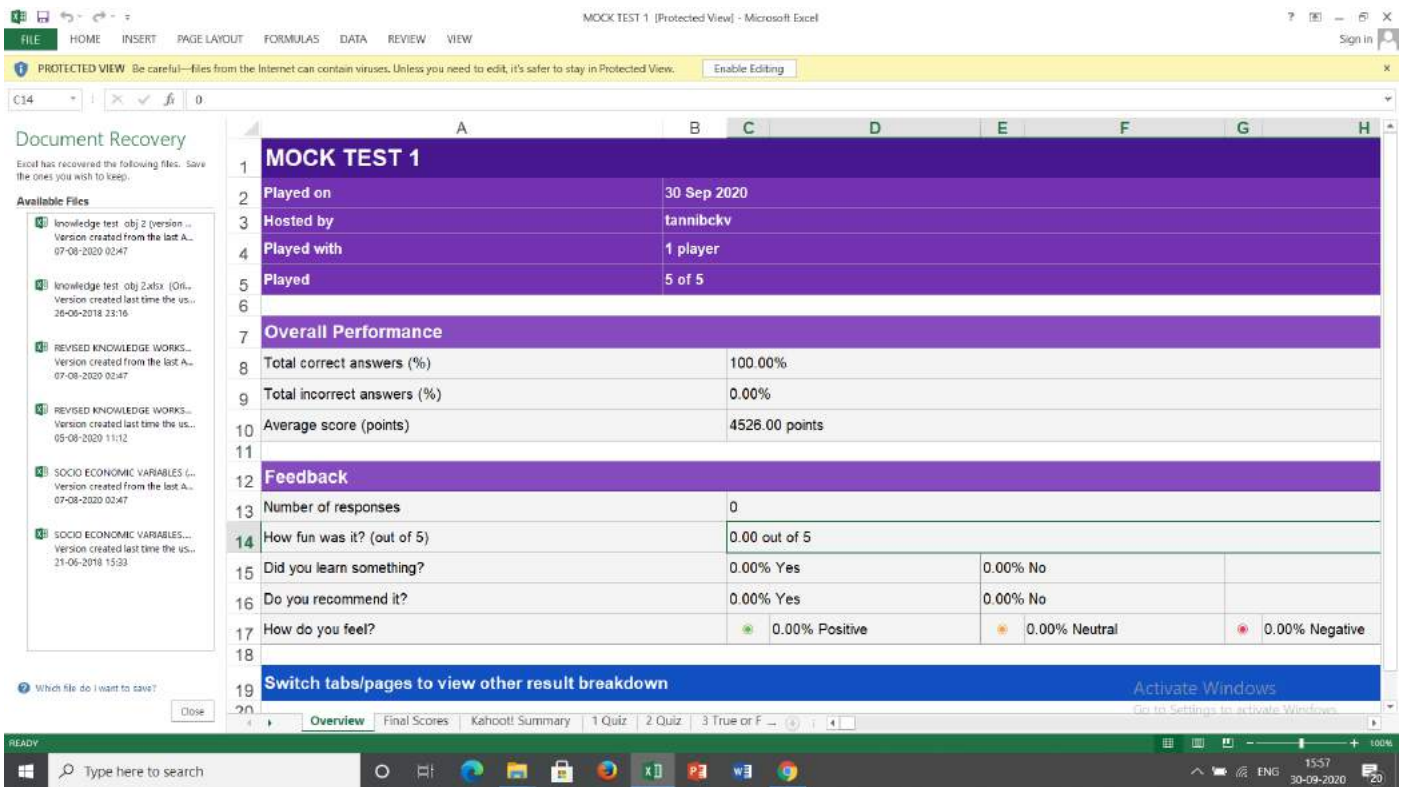


**Step 6:** If a teacher wants to play the quiz right at that time, he/she can click the play button and run the quiz. Another advantage of Kahoot quiz is that it can be played both in team and individual modes.



If the teacher /instructor is playing the quiz in real time, students have to access the website using the link mentioned in step 1 and enter the pin displayed on their teacher's screen. It is necessary for students to download the app or register. So, it saves time and reduces the technological complications for students.

After finishing a quiz, teachers can see individual and overall responses. There is also an option to see correct or incorrect answers for every question. Instructors can download the report card in a spreadsheet.

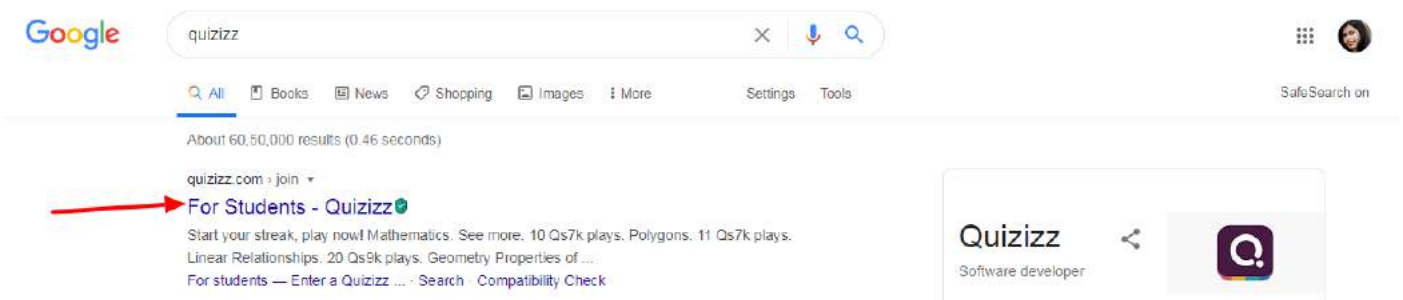


## Quizizz

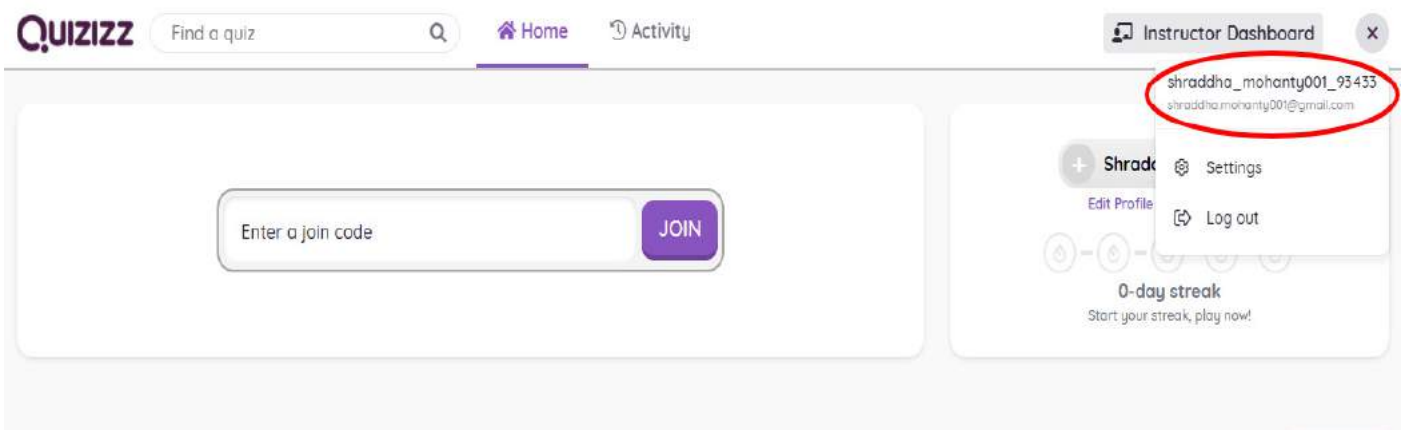
Quizizz is an open access website created in 2015 by Ankit Gupta and Deepak Joy Cheenath. It is used as an online assessment tool which helps teachers to create and assign quizzes to students. Along with this it also provides the

feature to create lessons for students along with quiz and poll questions and with an inbuilt option of saving. It provides facility to present the quizzes live or as a home work with a specific deadline. Now let's see how to create a quiz and share with learners using Quizizz.

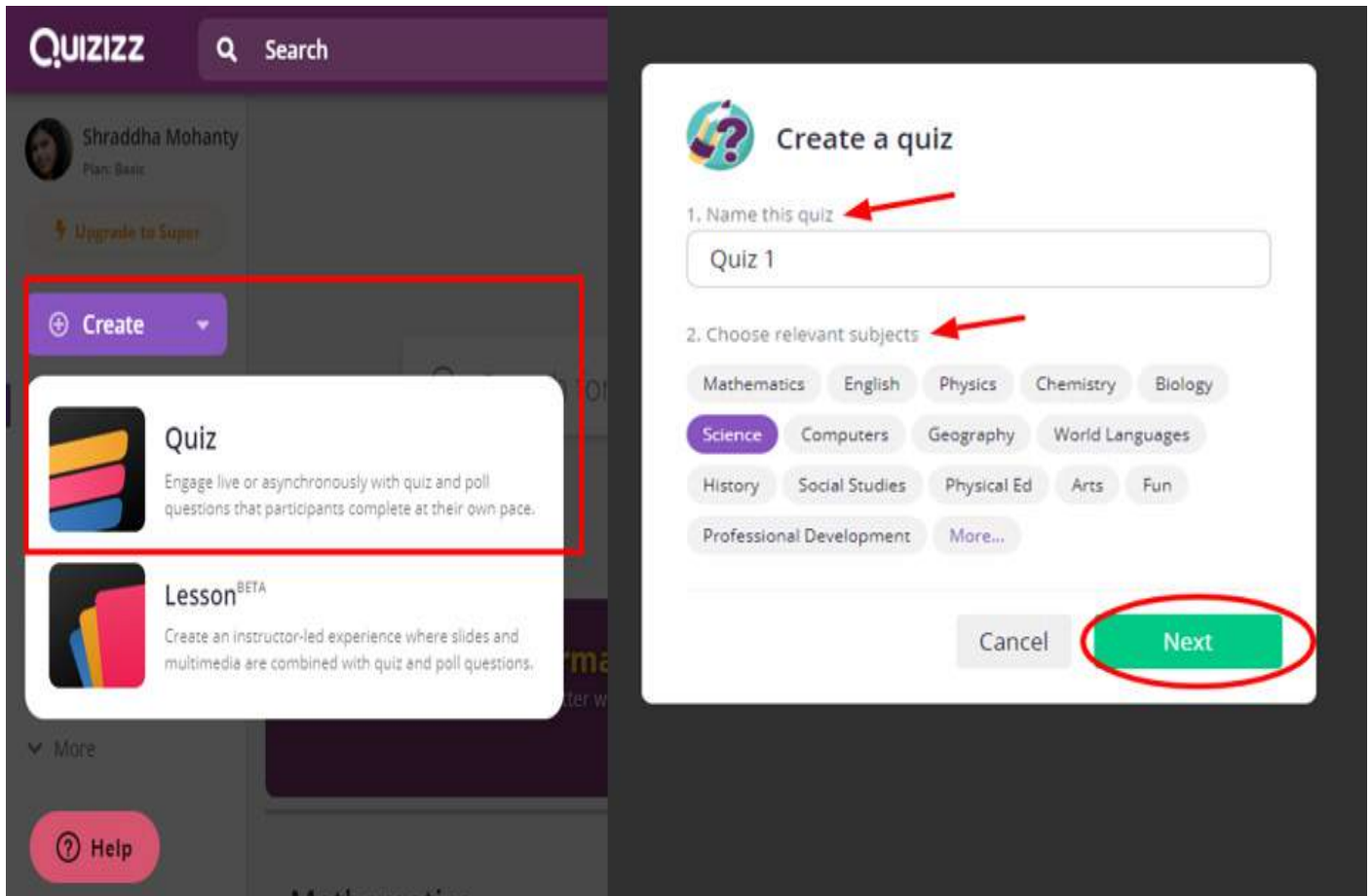
**Step 1:** Search for "Quizizz" in Google search bar. Click on the tab <https://quizizz.com> as "shownBelow".



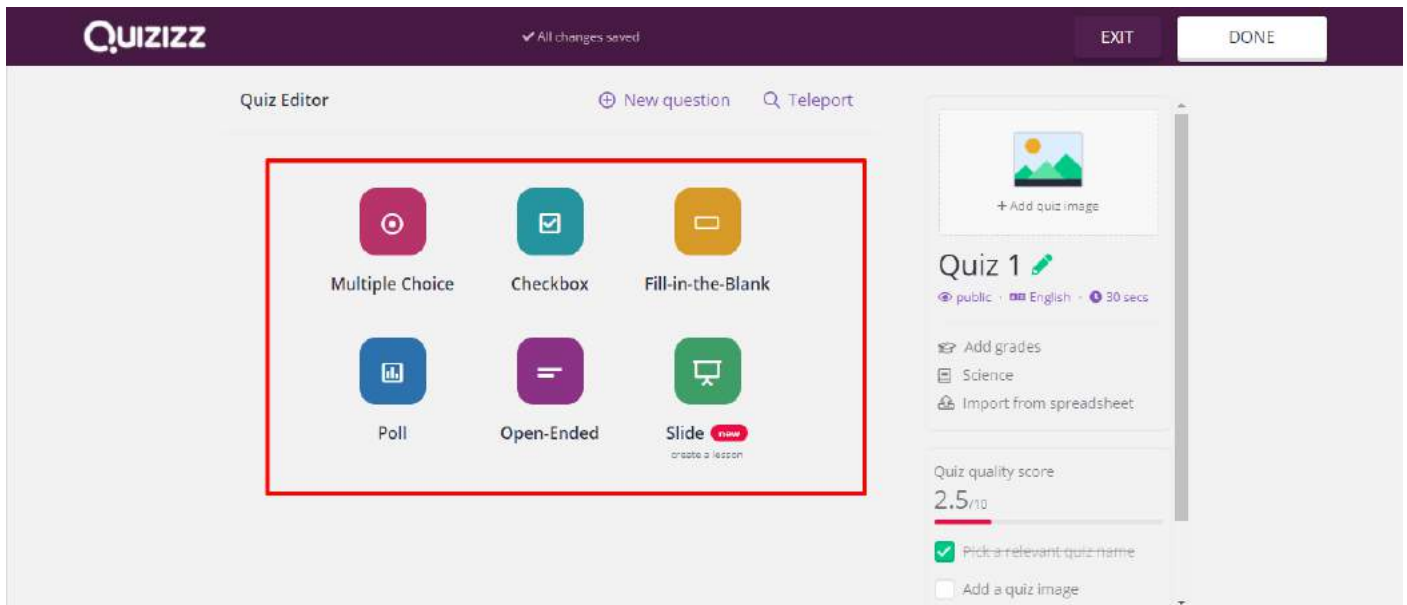
**Step 2:** First, sign up through a valid email id. After successful signing up, you will be directed to Quizizz home page.



**Step 3:** Apart from using inbuilt quizzes, we can create custom quizzes. For that, click on **“Instructor Dashboard”**. Go to **“Create Quiz”**. Now write the quiz title and choose relevant subjects. Click on **“Next”**.

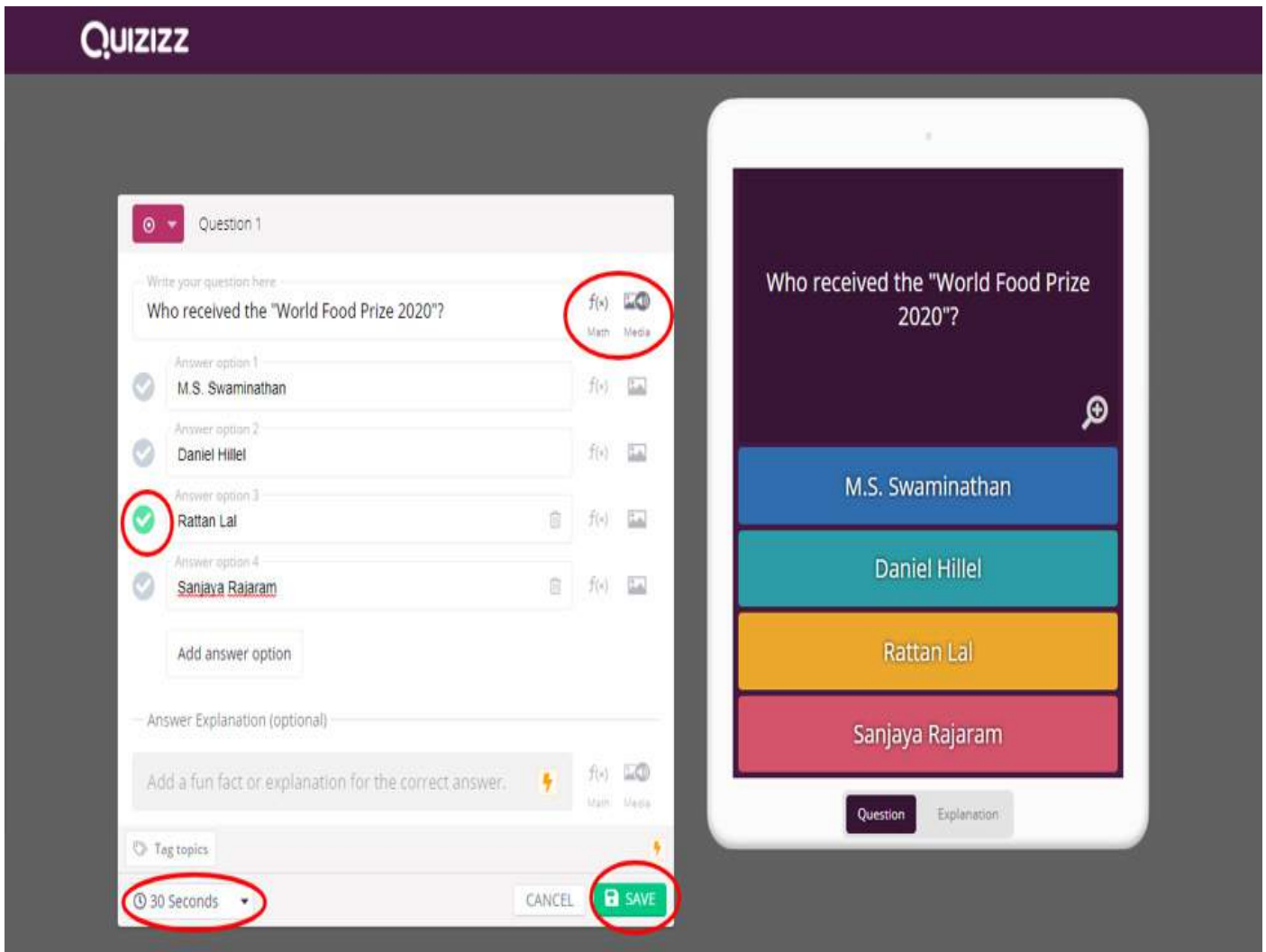


**Step 4:** Choose the type of question from the given options (Multiple choice, Check box, Fill in the blank, Poll, Open ended, Slide).

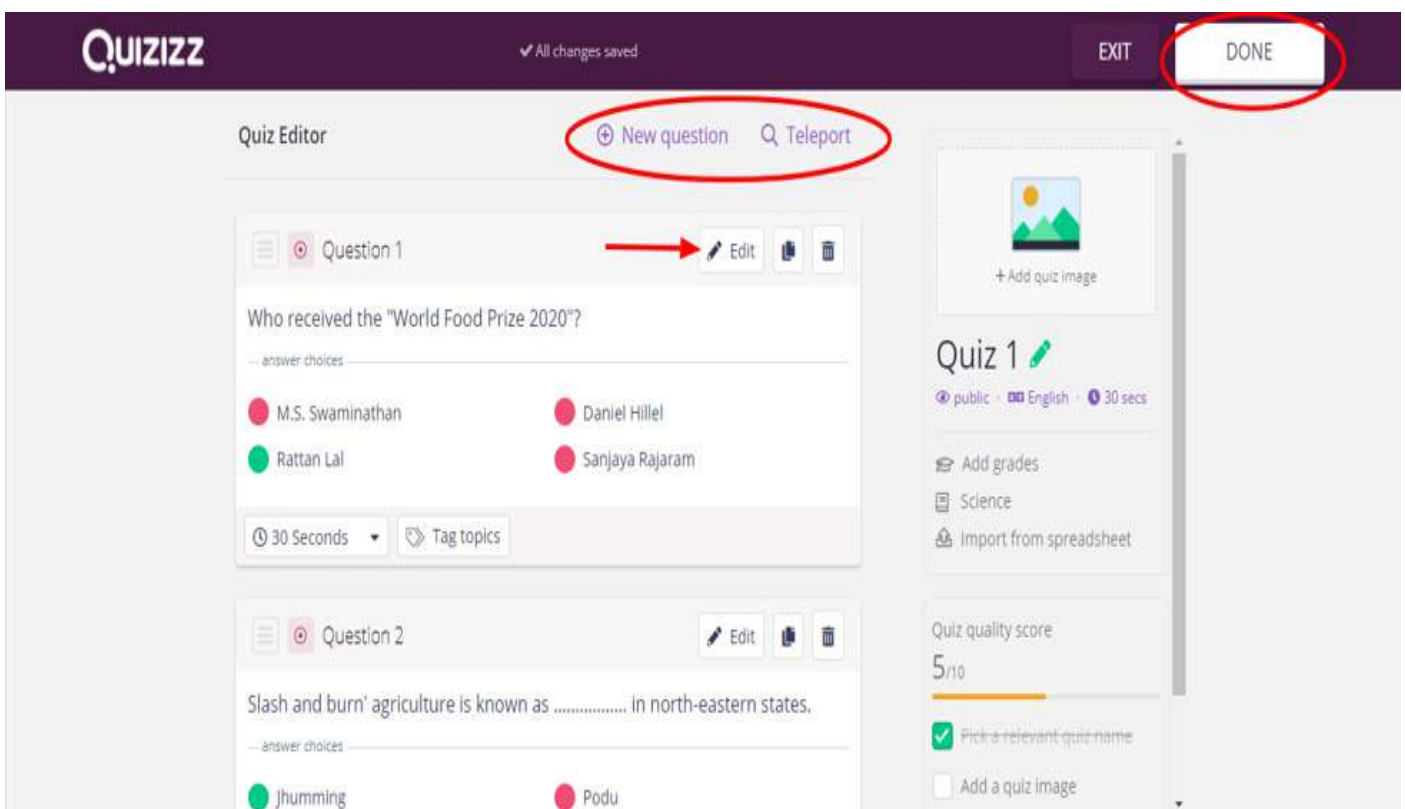


- Let's take demonstrate its use with multiple choice questions. The following screen appears when selected. First, write the question and probable options in the boxes given. You can also add or remove options. Put a **tick mark** next to the correct answer.
- You can add mathematical equations by clicking the **f(x)** tab and click on the **Media** tab for adding audio or images to the question.
- A timer can be set for each question (5 seconds to 15 minutes).
- Click on **“Save”** icon to save the question.



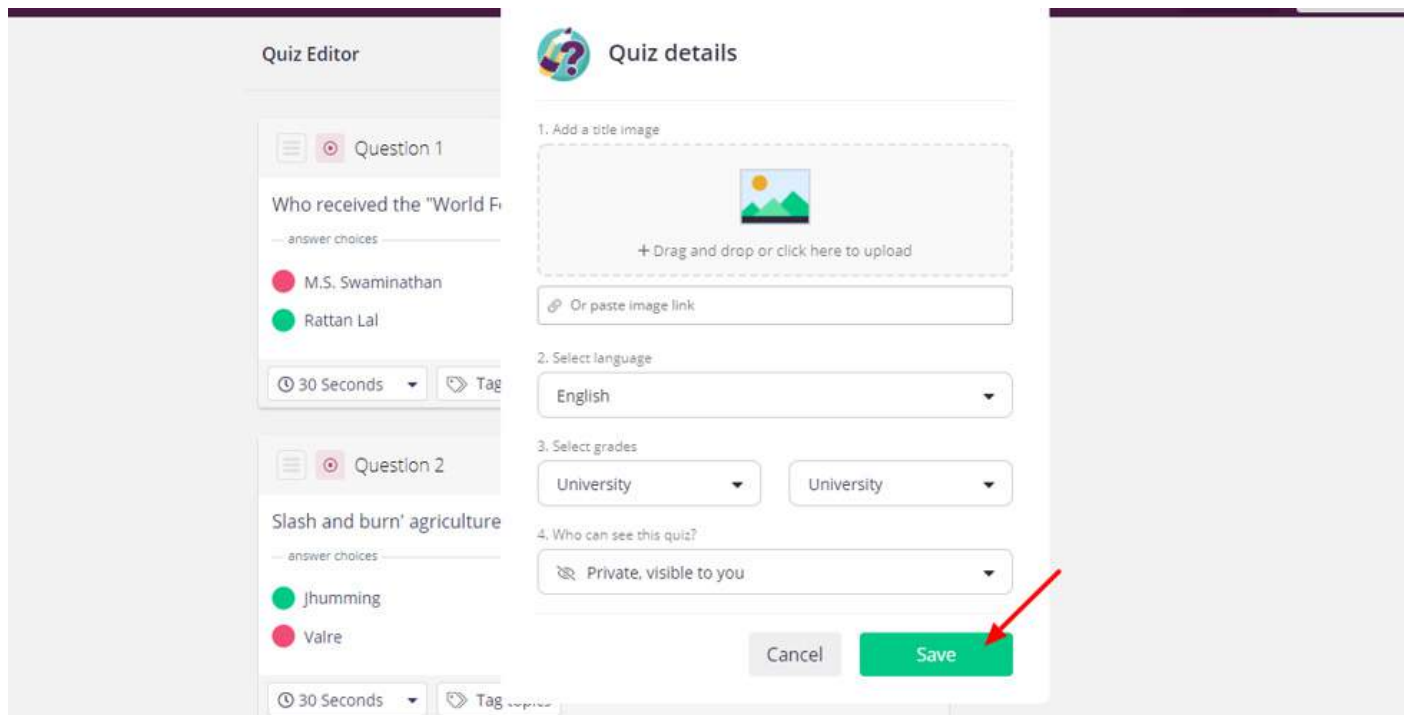


**Step 5:** Click on **“New question”** to add more questions to the quiz. You can also use the inbuilt question bank offered by the website by clicking the **“Teleport”** icon. There is an **“Edit”** option for each question to incorporate any necessary changes.

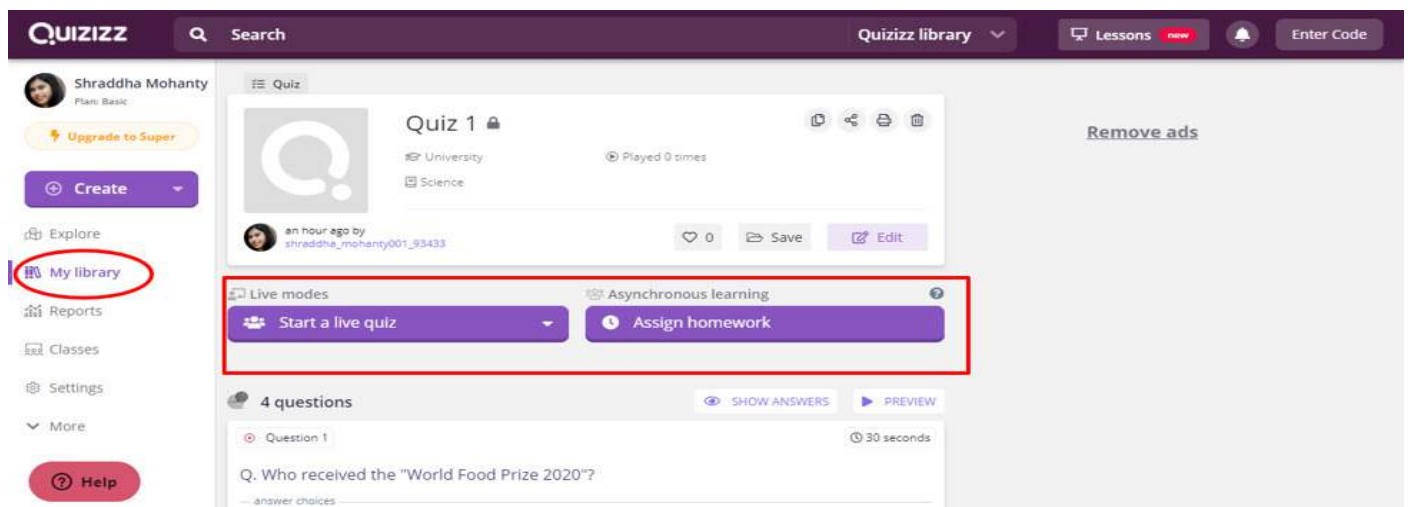


Click the **“Done”** tab, once you are done with your quizzes.

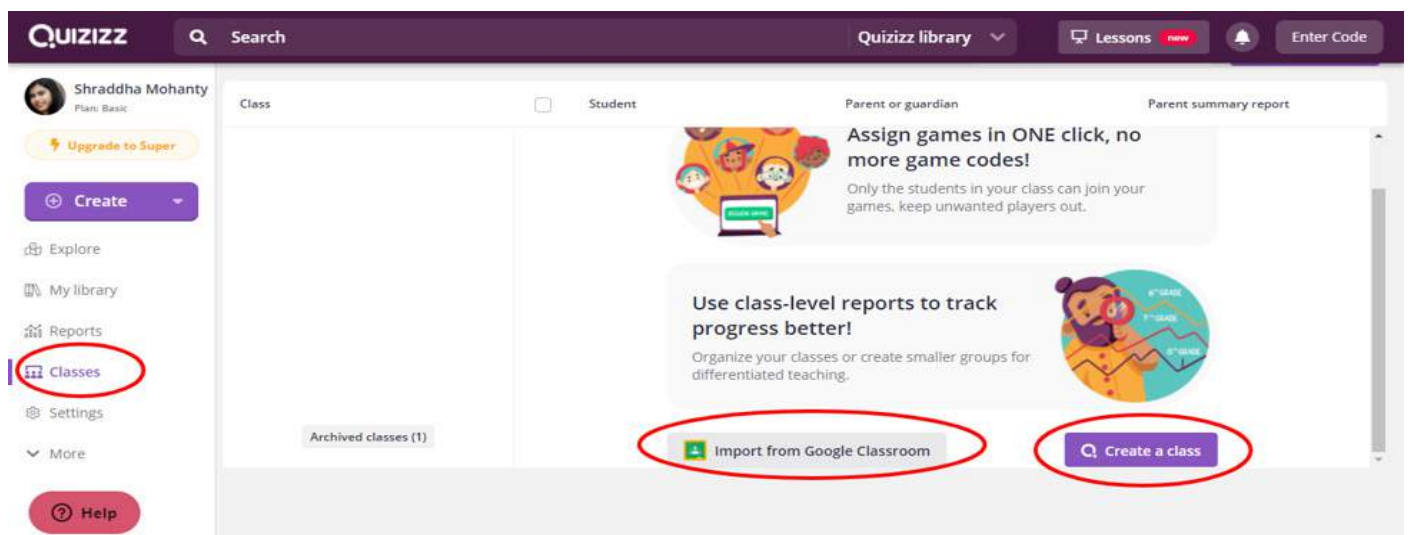
**Step 6:** Now, fill up the quiz details like language, grade, privacy and click **“Save”** to proceed to the next step.



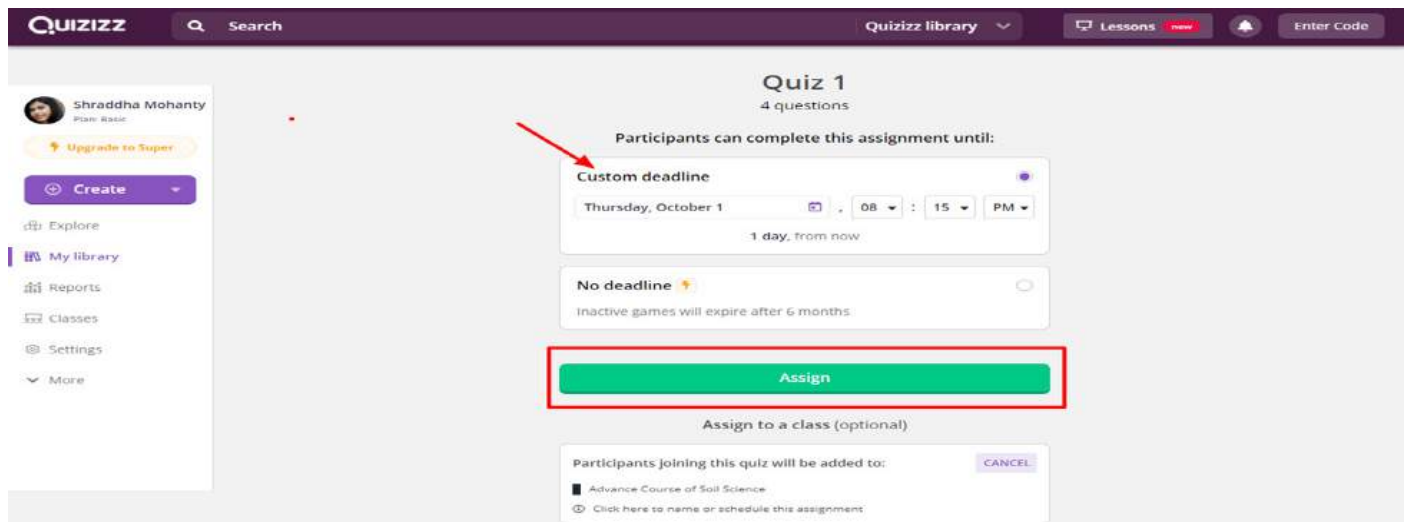
**Step 7:** After creating a quiz, go to **“My library”**. Now, you can either **“Start a live quiz”** or **“Assign homework”**.



Before assigning a quiz, you need to add a class by **“Import from Google Classroom”** or **“Create a class”**.

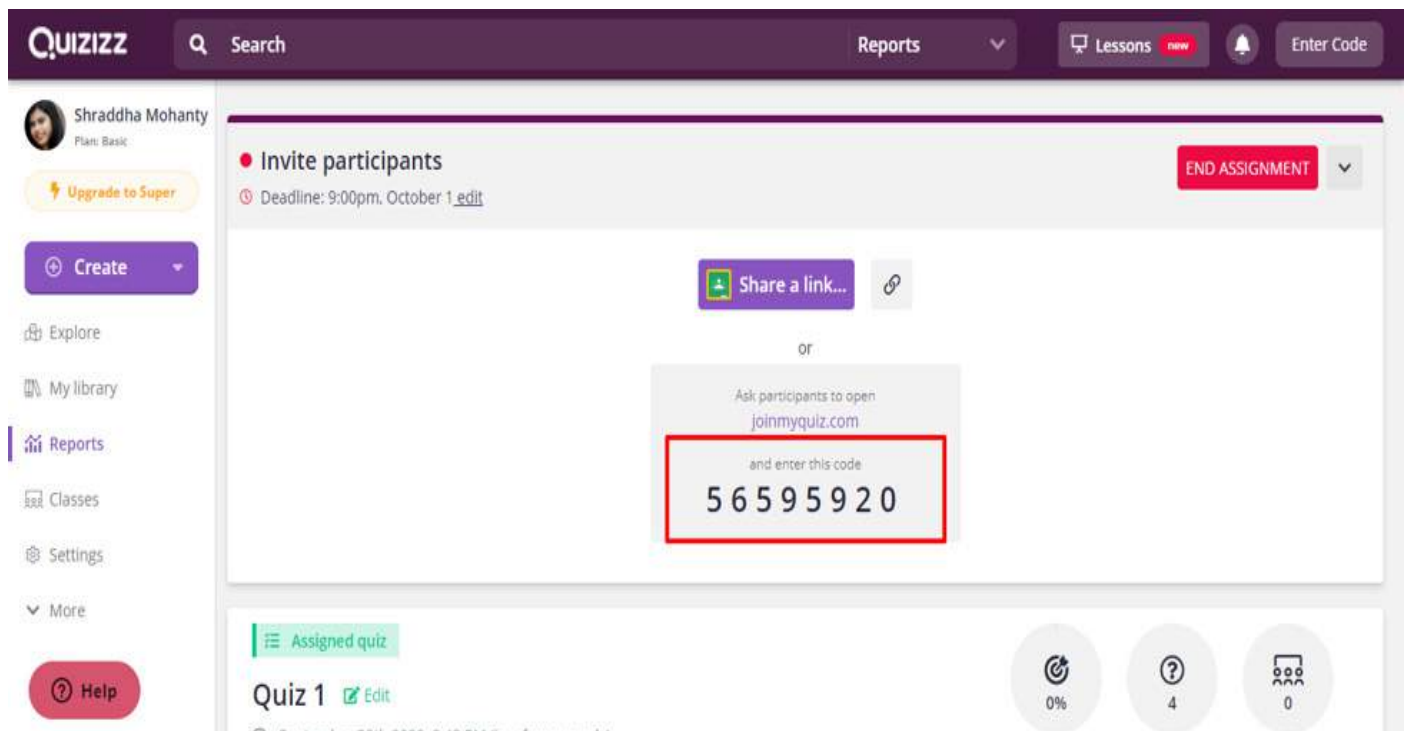


**Step 8:** Click **“Assign homework”** and fill the required deadline and add a class. After completing the process, click the **“Assign”** tab.

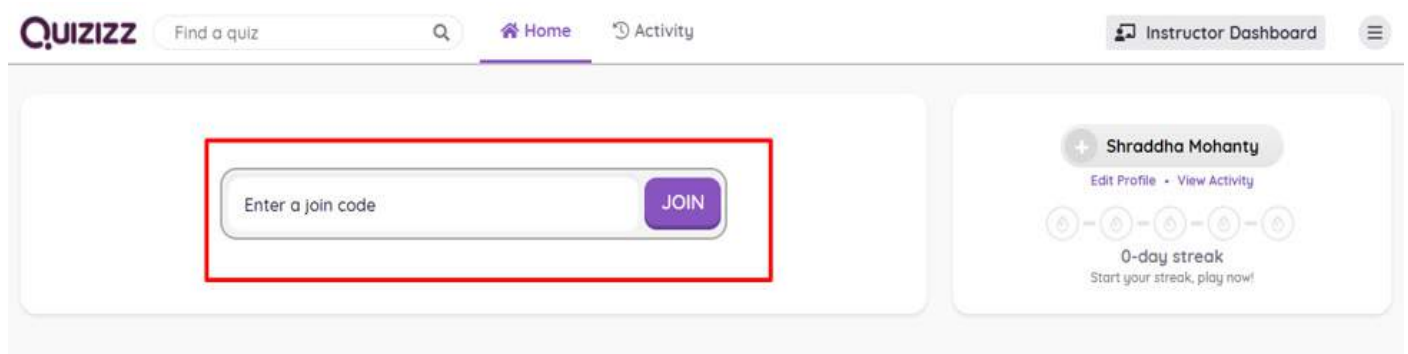


The quiz will now automatically be assigned to your class.

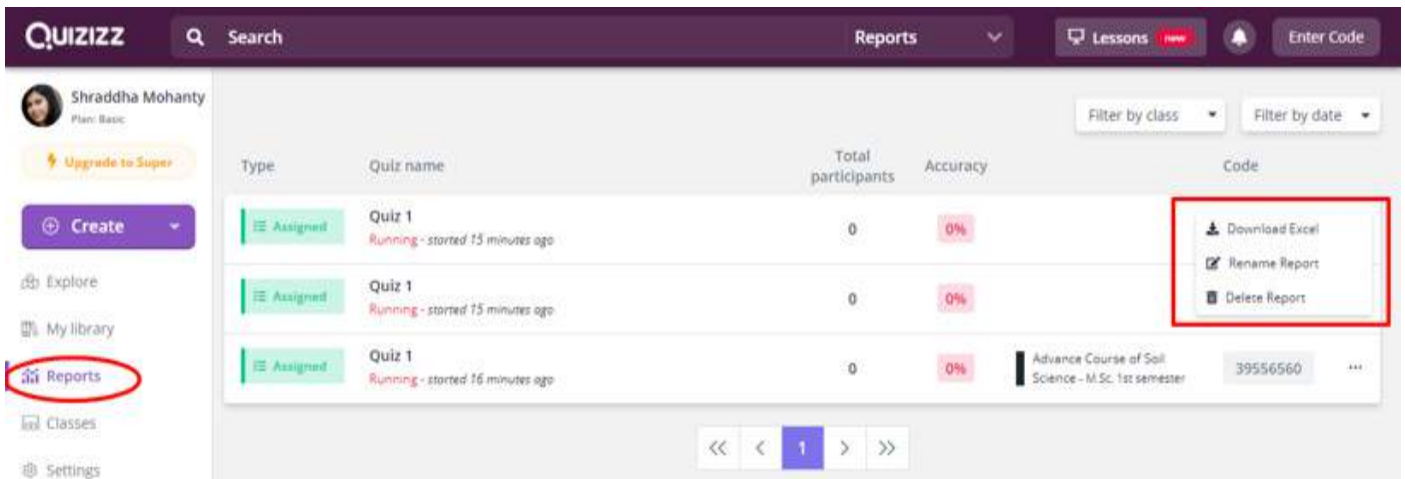
You can also generate a code for specific quizzes and share it with students through mail, WhatsApp, Telegram groups or through other platforms



Students need to enter that particular code and click **“Join”** to access the quiz.



Once students turn in their assignments, you can check their scores by clicking the **“Reports”** tab. It also provides options viz. **“Download excel”**, **“Rename report”** and **“Delete report”**.



### Comparison of different online assessment tools:

Point Of Comparison	Kahoot!	Quizizz	Google Forms	MS Teams Based Quiz
Mode	Online	Online	Online	Online
Real Time Interaction	Yes	Yes	No	No
Instantaneous result	Yes	Yes	Yes	Yes
Flexibility of place	Yes	Yes	Yes	Yes
Practice option for students	Yes	Yes	No	No
Time allotted/ questions	Yes	Yes	No	No
Competitive environment	More	More	Less	Less
Gamified quizzes	Yes	Yes	No	No
Ease of accessibility	Easy	Easy	Easy	Moderately difficult

The above table shows comparison between Kahoot, Quizizz and other commonly used assessment tools like MS Teams based quizzes and Google Forms. The striking difference is time allotted per question and real time interaction: which is a unique feature of Kahoot! and Quizizz, but unavailable in Google forms and MS Teams quizzes. So, it's not easy for students to cheat. Quizizz is student paced, students don't have to wait for the whole class to answer a question before they continue to the next one while kahoot can be used in both teacher paced and student paced modes. Kahoot provides a feature to discuss after each question. Gamified version of assessment by Kahoot and Quizizz help in enhancing students' participation in an online class and keeps them motivated. Chaiyo and Nokham (2017) reported in their study that Kahoot and

Quizizz has presented a lot of positives points over Google Forms in terms of enhancing concentration, engagement when used in a classroom situation. Similarly, Sabandar et al (2018) also pointed out that learners were engaged thoroughly when they were using Kahoot! in the classroom. They were also more enthusiastic and were quite satisfied as they got a chance to give exam in a live game show format. They stated that this game will be useful not only to review materials that they will present later in the classroom but will create a fun and interactive atmosphere and is easy to adopt.

### ADVANTAGES OF ONLINE ASSESSMENT TOOLS

1. Online assessment tools save time and money.

2. Easily accessible and easy to handle. One can use mobile phones, tablets, laptops and computers to access the quiz. Students can select their device as per convenience.
3. Free availability of basic versions.
4. Teachers can download the report card just after the assessment is over and can be saved for later use.
5. Creates a friendly competitive environment in the online platform which motivates and engages students.
6. Students can get instant results and feedback on their performance.
7. Results in effective learning by students due to involvement of more than one sense.

### INTEGRATING KAHOOT! AND QUIZZ IN AGRICULTURAL EDUCATION SYSTEM?

Agriculture is basically a practice oriented subject where both lab as well as field based practicals are involved. So, prior to this pandemic situation, SAUs and other research institutes used to conduct both theory and practical based assessments. Although online classes help students to gain theoretical knowledge, students' exposure to lab and field based practicals are questioned. Recorded videos and MOOCs can help students to get a practical touch to some extent but conducting practical examinations is not possible. This shortcoming can be overcome to a certain extent through Kahoot, Quizizz, MS Teams based quizzes, Google Forms etc., as these provide the facility to incorporate multimedia tools in question form and make online mode of teaching more interactive. Specifically by using Kahoot! and Quizizz, instructors can easily conduct practical examinations like identification of plant species, diseases, weeds, seeds, insects etc., with the facility of uploading images with questions in a specified time period and in an interactive manner. So, surely use of such online assessment tools will enhance the interaction in online class mode and teachers can keep a check on whether students are listening or not in an online class. Besides, teachers can use this tool for taking both formative and summative assessments of students. Instructors can use these as sub modules to evaluate what students are learning during a particular class.

### DRAWBACKS OF ONLINE ASSESSMENT TOOLS

- In online mode of teaching, learning and assessment, internet connectivity is a major problem for both instructors as well as learners.
- Lack of expertise on part of instructors to handle these online tools.
- Limited number of students can be accommodated and limited facilities are available in the basic free version of these tools.
- Teachers cannot control malpractices by students.
- As students are unaware about the uses of these kinds of tools, it takes them time to get comfortable and familiar.
- Limited character length for questions.

### CONCLUSION

Online assessment tools can serve as the most appropriate alternative for the pen and paper based assessments of students, especially during this COVID-19 pandemic. Although it has some disadvantages, the benefits outweigh pitfalls. These game based quizzes will not only grab students' attention but will also motivate them. It allows instructors to conduct mobile learning i.e. they can take assessments at any place, at any time and record results immediately. In agricultural higher education, this tool can be easily incorporated to conduct assessments online during midterm or hourly examinations. These e-learning tools enable us to spread education beyond the four walls of a classroom. Some add-ons of these technologies are inculcation of positive energy among students, exploration of new concepts and ultimately adding a pinch of fun in the classroom. We guarantee that this gamification of learning has enhanced students' engagement, including the most introverted ones, along with combining both a digital fast-paced and friendly competitive environment. So, let's get smarter and a little bit more digitized by blending e-learning technologies with our traditional ones because technology in the hands of great teachers can be transformational.

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Chaiyo, Y., & Nokham, R. (2017, March 1-4). The Effect of Kahoot, Quizizz and Google Forms on the Student's Perception in the Classrooms Response System [Conference presentation]. International Conference on Digital Arts, Media and Technology, Chiang Mai, Thailand. doi:10.1109/icdamt.2017.7904957.

Kahoot!. (n.d.). In wikipedia. Retrieved October 6, 2020, from <https://en.wikipedia.org/wiki/Kahoot!>

Sabandar, G. N. C., Supit, N. R. & Suryana, H. T. E. (2018). Kahoot! Bring the Fun Into the Classroom. Indonesian Journal of Informatics Education, 2(2), 127-134. doi: 10.20961/ijie.v2i2.26244.

# 41

## SYSTEMS THINKING AND SUSTAINABLE TRANSFORMATION OF AGRICULTURE

In this blog, **Bhuvana N and Aditya K S** argue that to achieve sustainable transformation of global food systems we need to promote systems thinking at all levels, viz., research, extension, education and policy.

Initial research in agriculture has focussed on the reductionist approach: taking the complicated systems of agriculture, dividing it into manageable bits and then doing experiments on them. The reductionist approach mainly focussed on increasing the productivity of agriculture ignoring its linkage with society and environment. This has led to growth in food production and in increasing food productivity across the globe. However, this myopic focus on production has led to a negative state of affairs in the form of resource depletion and climate change. Gradually the focus has shifted towards sustainability in agriculture. 'Sustainability', a term coined in the 1990s, has since become a buzzword in both research and policy. Probably everyone, at the same time, agrees that agriculture has become increasingly unsustainable. This shows how difficult it is to make agriculture sustainable. Agriculture has its linkage with society and environment, forming a complicated system with interlinkages within and across. Systems thinking has emerged as a problem-solving approach in agriculture, to address the complex problem of improving agricultural productivity within ecological boundaries. In this blog we explore the need for systems thinking in agriculture, and then introduce an innovative learning model focussed on sharing and co-creation of knowledge related to systems thinking in land management.

### SUSTAINABLE DEVELOPMENT

Lindner (2016)<sup>1</sup> uses the concept of 'Shadows' – coined by Prof. To Pietschmann (2002)<sup>2</sup> – to explain the need for a holistic and inter-disciplinary approach for understanding sustainable development; every position has a negative side to it, which we can call as its 'Shadow'. Take sustainable development for example. Reducing emissions for slowing down the pace of climate change is a position. Slowdown

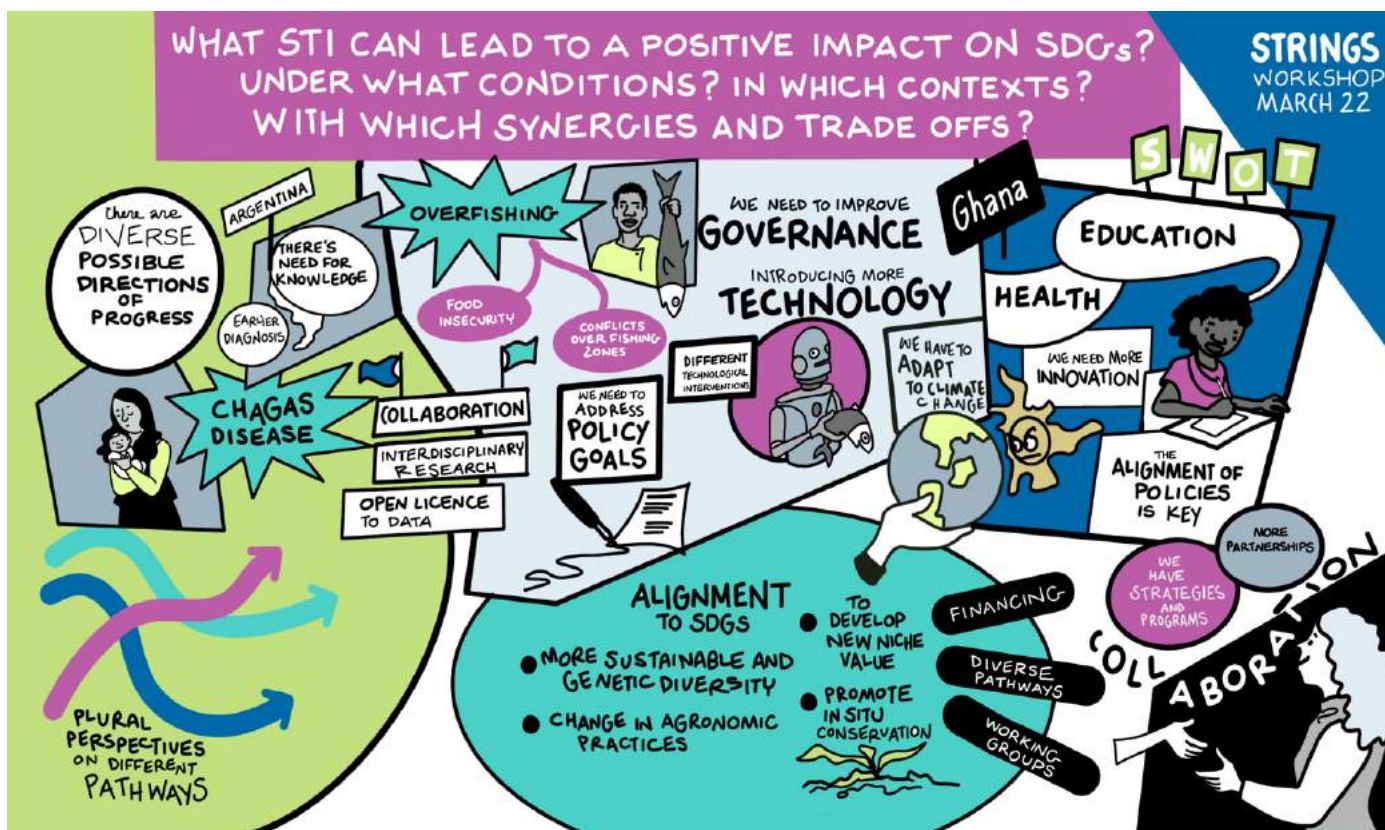
of economic growth and increase in poverty and inequity are its shadows. Making energy for irrigation costly is suggested as a remedy for over-extraction of groundwater. But on the flip side it will lead to reduction in food production and worsening of poverty, which therefore is its shadow. Since agriculture is a part of the larger systems comprising of society and environment, the need of the hour is to examine each position, its shadow both within and between the different subsystems, and then aim for those strategies that have largest systems level incremental benefits. This is the essence of Systems Thinking.



Consider the sustainability issues surrounding the global food systems. Recently released AR6 climate change 2021 report by the IPCC<sup>3</sup> has reiterated that possible climate futures

in the light of climate change could have devastating and irreversible consequences. It is also established that the main contributor to climate change is anthropogenic activities, and one such is landscape management. About one-third of the greenhouse gas emission is caused by the global food systems. Food systems are also linked to loss in biodiversity and overexploitation of natural resources such as water and land. Despite the prevalence of malnutrition and hunger nearly 40% of the food produced is wasted, clearly highlighting that the current ways of managing our food systems is unsustainable. The interconnection between human welfare, climate change, food, land and water systems call for a systems perspective for sustainable transformation.

We cannot address any of the aforesaid global challenges in isolation without understanding the interconnections; for example, exclusive focus on achieving food security might put more pressure on water resources. At the same time, the interconnections between these systems offer a way to simultaneously address many global programs, provided one understands the synergies and the trade-offs between the different agricultural systems.



An Illustration by Raquel Duran summarising the discussions from a session at the STRINGS [http://strings.org.uk/] Project Workshop: Perspectives and Policies to steer Science, Technology and innovation for the SDGs (28 Feb and 1 March 2022)



## SYSTEMS THINKING

Food systems are very diverse, so are the linkages, synergies and trade-offs. The strategies for sustainably transforming the food systems require understanding these systems and regional level planning. Systems thinking is seen as a causal inference approach for problem solving, with a difference that we look for systems level outcomes, after considering the interlinkages between and across various subsystems. This involves describing or conceptualizing the whole systems, modelling the interdependencies, and identifying the causal effect of interventions in the systems. Systems thinking is important not only for researchers but also for extensionists and policy makers. It enables one to look beyond the disciplinary silos, synthesise and develop solutions which are better for the systems.

Unfortunately, agricultural education in India is yet to catch up in the area of improving systems thinking in students. Not discounting the importance of a reductionist approach for knowledge gain, the time is ripe to develop the systems thinking skill in students. With the development of computational capabilities and improved methods, it is possible to account for the complexities of systems in research. Though systems thinking is increasingly getting traction in the scientific world, knowledge on the approach and the tools are still scattered. One notable initiative in bridging this gap is the 'interactive learning modules - synergies and trade offs in food, land and water systems hosted by Agro landscapes' – a research project of CGIAR on Water, Land and Ecosystems (Box 1).

### Box 1: Agrolandscapes

Agrolandscapes is a project funded by CGIAR Water, Land and Ecosystems, a research program for managing agro landscapes for greater impact (<https://agrolandscapes.org/>). The project is focussed on how the research across different CGIAR centres can help landscapes become sustainable and resilient. The project also looks at how interlinked global challenges, such as ending poverty, managing and reversing land degradation, water, food and nutritional security, halting biodiversity loss etc., can be addressed.

The project aims to synthesize and integrate the learnings across CGIAR centres related to these challenges and strategies in different landscape approaches, and to create capacities through open discussion and reflection. The project hosts an interactive and free learning module on synergies and trade offs in food, land and water systems (<https://agrolandscapes.org/tosa-page/home/>).



[AGRO LANDSCAPES](#) | [Home](#) | [Exploring materials](#) | [Glossary](#) | [Further reading](#) | [Contributors](#) | [Contact](#) |



INTERACTIVE LEARNING MODULES

***Synergies and tradeoffs***  
*in food, land and water systems*

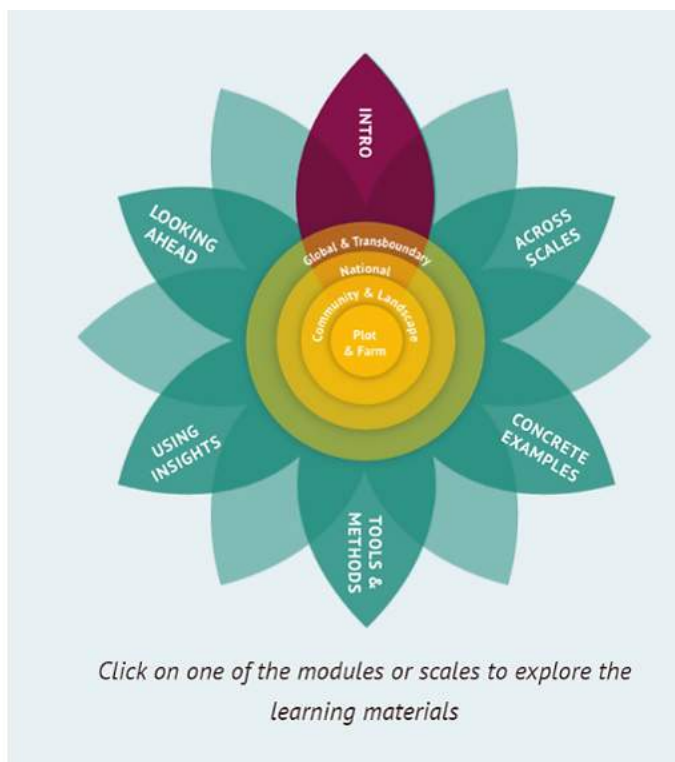
In the following sections, we explain the contents of the learning module.

## THE LEARNING MODULE

There are 6 learning modules:

1. Introduction;
2. Across scales;
3. Concrete examples;
4. Tools & methods;
5. Using insights; and
6. Looking ahead.

Furthermore, the learning modules are also categorized based on levels – plot and farm; community and landscape; national and global or transboundary. Contents in each of the learning modules consist of blogs, interviews, summary of methods and case studies. There are also questions for reflection at the end of each learning module. The best thing about the learning modules is the quality of the contents that are contributed by experienced researchers on these topics. The modules do a great job in bringing together learning from different case studies, and initiatives from different parts of the world in making food systems more sustainable.



We particularly liked the module on methods and tools. Often it is difficult for early career researchers to decide on methods and tools that can be used to answer the specific research

question in mind. Even in research papers, seldom is it discussed in sufficient length on why the authors have decided to use a particular method. In this learning module, all the relevant methods and scales are listed along with a brief description of what it is and how to use it, with a list of references. The website's interactive design makes it easier to find what one is looking for. The questions at the end of modules help the learners to think through and self-assess. It also provides scope for readers to pose questions, contribute content on respective modules in the space provided under each module. The modules also provide an opportunity for networking.

## WHO SHOULD INVEST TIME ON THESE MODULES?

These learning modules are very useful, particularly for researchers who are looking for a comprehensive review on sustainable management of food-land-water systems from a systems perspective. The learning modules provide a synthesis of learnings and challenges from different research efforts, and interventions in agro systems from across the world. This is useful to understand what has been already done, and what are the gaps in the knowledge where more research is needed. This is also useful in understanding what systems thinking entails and what the advantages of such an approach are. For instance, systems thinking prompts researchers to understand and account for the implications of their work on other sectors through interlinkages. When systems level impacts are considered, the value of research for policy formulation increases. Further, system thinking is important for extension workers as well. It is commonly observed that the extension system often promotes different technological solutions without an iota of thought on the trade-offs, negative externalities and synergies. Systems thinking is a skill which needs to be taught in agricultural education as well as training programs, so that people can visualize the technological change beyond immediate outcomes.

The learning modules are also relevant for policy makers to help them understand what has worked in the past in different parts of

the world and in replicating them, as well as in avoiding the bottlenecks faced by earlier efforts. Having said that, anyone who is interested in learning about sustainable food-land-water systems can gather a lot by going through the contents in the modules. In particular, these modules can help beginners who want to learn and take up their research work in the nexus of sustainable food-land-water systems (agro landscapes). Hopefully the contributors to this module may also be keen to discuss their insights with young researchers who are trying to explore this topic. Finally, the way this module is presented also provides great lessons

for all those who are interested in developing online interactive learning modules on any topic.

## CONCLUSION

To conclude, solving today's challenges in global food systems needs an inter-disciplinary and systems level approach. The old school piecemeal approach to research will have little practical utility going forward. It is time that we incorporate systems thinking as an essential skill in the agriculture education and training curricula.

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## ENDNOTES

<sup>1</sup>[https://enter.educagri.fr/fileadmin/user\\_upload/pages/Resources\\_publications/Proceedings\\_Prague\\_2016.pdf](https://enter.educagri.fr/fileadmin/user_upload/pages/Resources_publications/Proceedings_Prague_2016.pdf)

<sup>2</sup>Pietschmann H. 2002. Eris & Eirene. Eine Anleitung zum Umgang mit Widersprüchen und Konflikten. Wien: Ibero.

<sup>3</sup><https://www.ipcc.ch/assessment-report/ar6/>

# 42

## THE VILLAGE SIMULATION GAME: IMMERSING INTO THE REALITY

The life, challenges and dilemmas faced by a typical rural Indian farmer dependent on agriculture for sustenance are an enigma for most of the students coming from an urban context to Rural Management courses. In this Blog, **Satyendra Nath Mishra** narrates experiences from applying the Village Simulation Game to help students better understand the nuances of agrarian rural life.

A new batch of two-year MBA-RM students were busy buying land, selling animals, and taking loans from the market for their agriculture operations. A few were negotiating a loan, and some others were negotiating for the lease of lands.

Surprised! Let me crack the enigma. The students were playing a simulation game and were fully engrossed in it. Most of them, born and brought up in urban environments, had never visited villages and were ignorant about the realities of rural India. Understanding and appreciating the life, challenges, and dilemma a typical rural Indian, dependent on agriculture for sustenance faces was deemed as essential for these students. With this as the objective a well-crafted Village Simulation Game was introduced as part of their orientation programme. Run by the faculty members of the school under the able guidance of Dr Rakesh Saxena, former Director of the Institute of Rural Management, Anand, the game proved to be a successful educational tool. It sensitized the city-born, convent-educated, English-speaking students of Rural Management on how agriculture-based rural economy functions, with individual households as the functional unit. This was captured well when Mr Alekhya, one of the students, shared:

*"I got to know about the actual problems which are faced by the farmers practically. Their life is not easy anyway."*

Alekhya and his batch mates did get interesting, but eye-opening, insights from their two-year long journey of a field and application-oriented course.

### ABOUT THE GAME

To play the game, two students are grouped (male and female preferably) together as one family unit. At the start of the game, the family members were

provided with details of the number of members in their family (number, age, gender of the members, cattle, cash, and land). To facilitate the game, there are a few other actors involved as well, namely a game manager, a trader, and game inspectors. The role of the game manager is to act as the overall coordinator of the game. The game manager is also responsible for the announcement of government schemes, rainfall, pests involved, access to insurance services, and births/deaths in the family. The game is played within the annual cycle. At the end of the year, the household member must get clearance from the game manager by clearing their dues (such as fulfilling the basic needs of the family members, their livestock, bullocks, as well as loans). The trader's role is to provide loans, agricultural inputs (seeds, high yielding varieties, fertilizer, pesticide, irrigation) and other market support, both formally and informally, to the village households. The role of the game inspector can be seen as analogous to the direct interface of state functionaries. One game inspector is responsible for facilitating the day-to-day activities of about five to six family units. The role of the game inspector includes checking the timely allocation and arrangement of all agricultural inputs (such as seeds, fertilizer, and pesticides) and ensuring the relevance of inter-household transactions between family units.

## STUDENTS AND THE GAME

The game starts with allocating basic household details to family members, including land, family members, buffalos, (non) milking livestock, and some cash. Then the first-year cycle starts. For example, during the first-year cycle of the game, family members must arrange for seed, fertilizer, irrigation, and pesticide (based on preferences and needs of the family). If they do not have the requisite cash to purchase input items, they can borrow from another family (who have extra money) or from a trader. The role of the game inspector is to ensure that all these transactions are correctly noted in the first-year entry sheet. The family members must plan the agricultural activities to fulfil the mandatory food requirements of all family members (for grain and milk) and for cattle (straw from agricultural produce). The allocation of inputs involves selecting the option between 'high

yield-high risk' versus 'low yield-low risk'. Like high yield-high risk, options include using high-yielding variety seeds, pesticide, and fertilizer. The option of low yield-low risk includes regular seeds with no extra inputs. Multiple options exist for varying agriculture production from the allocated land. For students, this becomes a classic case of engaging with live risks and taking appropriate decisions. These options have implications for agricultural production, availability of food for family members, and feed for livestock. If the family fails to arrange for members' food requirements, then for the next year, the game manager announces the death of the youngest member in the family or the youngest cattle. Now family members must manage their resources. They still can take a loan from traders or some other resource-rich families.

Usually, the condition changes year after year, and the family members must manage their resources themselves. The game manager maintains the input-output ratio for each year for each family on a display board. This gives family members a fair idea of how and what to explore to minimize risks and for better decision making. This interactive process, when played for three to four cycles, with different types of government and natural interventions, provide valuable insights to students about decision making and appreciation of the role farmers play while sustaining their family's lives.

## THE LEARNING

As the situation is given based on the history of any given village, it is real. The essence of the field reality was captured well by Ms. Pretty in the following words:

*"I learnt how difficult it is to cultivate with few resources, unforeseen realities, and the role of barter system in farmers' lives."*

Students could learn about the uncertainties that make agriculture activities risky for small farmers. Mr Sagar said,

*"I learned about how weather conditions play a key role in crop production and the importance of optimistic decision making during the game."*



Another student Ms. Isha has a different take on the outcome. *“The village stimulation game made me realize how farmers take high-risk involving decisions and how tough it gets to meet the food requirements of the family.”*

The game also teaches students how to optimize, take calculated risks with minimum losses, and learn resource mobilization and conservation, and cooperation among all the players to help grow together.

Ms. Tanuja summarized her experience thus, *“As the richest family in the game, I understood that you need to think before taking risks and only when one has enough reserve resources should one take risks and experiment.”*

During the post-game discussion session, the feedback given by Yash and Arijeet: *“Now they have come to understand that rural life*

*is complex and there are many factors which affect farmers’ livelihoods. They need to learn a lot before making any recommendation for farmers’ welfare or rural upliftment.”* This accurately summarizes the outcome of the simulation game.

## THE OUTCOME

The Dean of the School of Rural Management, Prof. Niraj Kumar, was a happy and satisfied man. He said, *“If the pedagogy lets the students experience the reality, understand that lives and livelihoods are not as simple as it appears from outside, and realize that one needs to learn more and more to bring changes in farmers’ lives or to do sustainable business with rural people, our objective is met. Thus ‘The Village Simulation’ game puts our students in self-start and self-learning mode.”*

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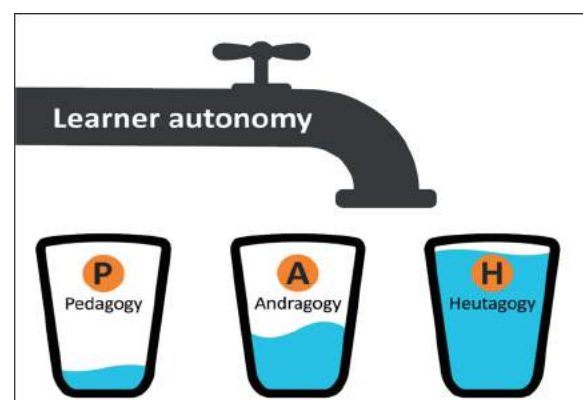
## Application of Heutagogy in Agricultural Education and Extension

Heutagogy is the methodology of learning for self-managed learners. It has relevance and application in professions that require lifelong learning. In this blog, **R. M. Prasad** discusses the principles and methodology of heutagogy and its potential application in education and extension in state agricultural universities.

With information bombarding us through multiple sources, learning in educational institutions needs to be more relevant and authentic for the learner. This warrants a shift in the methodology of teaching. Self-directed learning (andragogy) and self-determined learning (heutagogy) are two pathways that can help students become 'future ready'. The key difference between self-directed learning and self-determined learning is the double-loop capability of self-determined learning. Beyond problem solving, double-loop learning involves scrutinizing and questioning original concepts and learning processes. Reflection is a key aspect of increasing learning capabilities through double-loop learning. Self-determined learning revolves around 'learning how to learn'. The best way to help students become 'future ready' is to guide them towards learning in a self-determined way. Applying heutagogy in the agricultural education system is the way to do so.

### WHAT IS HEUTAGOGY?

Heutagogy is the management of learning for self-managed learners. In training, the desired objective of this learner-focused ecosystem is to enhance the capacity of trainees to identify core issues that are uniquely interesting and relevant to their learning curve. Trainee sets their own context-specific learning objectives. This main tenet of a heutagogy approach enables trainees to discover their own problems and questions to which they seek answers, which are satisfying and rewarding.



Heutagogy can be applied in education and extension systems in State Agricultural Universities (SAUs). It encourages students to find problems and questions to answer themselves. Instead of simply completing teacher-assigned tasks, students have the voice and choice in seeking out areas of uncertainty and complexity in the subjects they study. The teachers help by supplying context to students' learning. In the heutagogical classroom, much of the learning is student-driven rather than traditional instructor-led. Students take a more active role in determining what is to be learned based on their own needs and interests and the instructor acts as a facilitator.

Before the concept of heutagogy was derived, Chris Kenyon and Stewart Hase designed a course that placed the learner at the center of the learning process, as full partners in designing their own learning (Hase and Kenyon, 2000). This is at the heart of heutagogy. The concept of heutagogy was derived as an extension to andragogy, and antithetical to pedagogy.

## Differentiating Pedagogy, Andragogy and Heutagogy

In the triad of pedagogy-andragogy-heutagogy, there are basic differences in the approach, which need to be understood.

Pedagogy is the teaching of children or dependent individuals. Andragogy is the facilitation of learning for adults who are self-directed learners. Heutagogy is the management of learning for self-managed learners. Pedagogic theory is a systematic conceptualization of the process of education and conditions of human development in both the individual and the societal sphere. It deals with processes of upbringing, teaching, learning, and social and cultural development. Knowles' theory of andragogy is an attempt to develop a theory specifically for adult learning. Knowles emphasizes that adults are self-directed and expect to take responsibility for decisions. Heutagogy is defined as a form of self-determined learning, which focuses on developing an individual's capability and capacity to learn (Blaschke, 2012).

Features	Pedagogy (child learning)	Andragogy (adult learning)	Heutagogy (self-directed learning)
<b>Dependence</b>	The teacher decides what, how and when a student should learn (dependent)	Adults strive for autonomy and self-direction in learning (independent)	Learners identify the potential to learn from experiences and manage their own learning, it is self-determined (interdependent)
<b>Resources for learning</b>	The teacher devises various techniques on the students to learn	Adults use their own and others' experiences	The learner decides the learning path by negotiating the learning process
<b>Reasons for learning</b>	Learning to advance towards the next stage	Adults learn when they experience a need to perform more effectively	Learning is based on the identification of the potential to learn in novel situations
<b>Focus of learning</b>	Learning is focused on the prescribed curriculum and planned sequences	Adult learning is task or problem centered	Learning goes beyond problem solving by enabling proactivity
<b>Motivation</b>	From external sources (parents and teachers)	From internal sources (self-esteem and confidence)	Self-efficacy, knowing how to learn and working with others
<b>Role of teacher/trainer</b>	Designs the learning process	Enabler/facilitator	Develop the learner's capability, capable people know how to learn

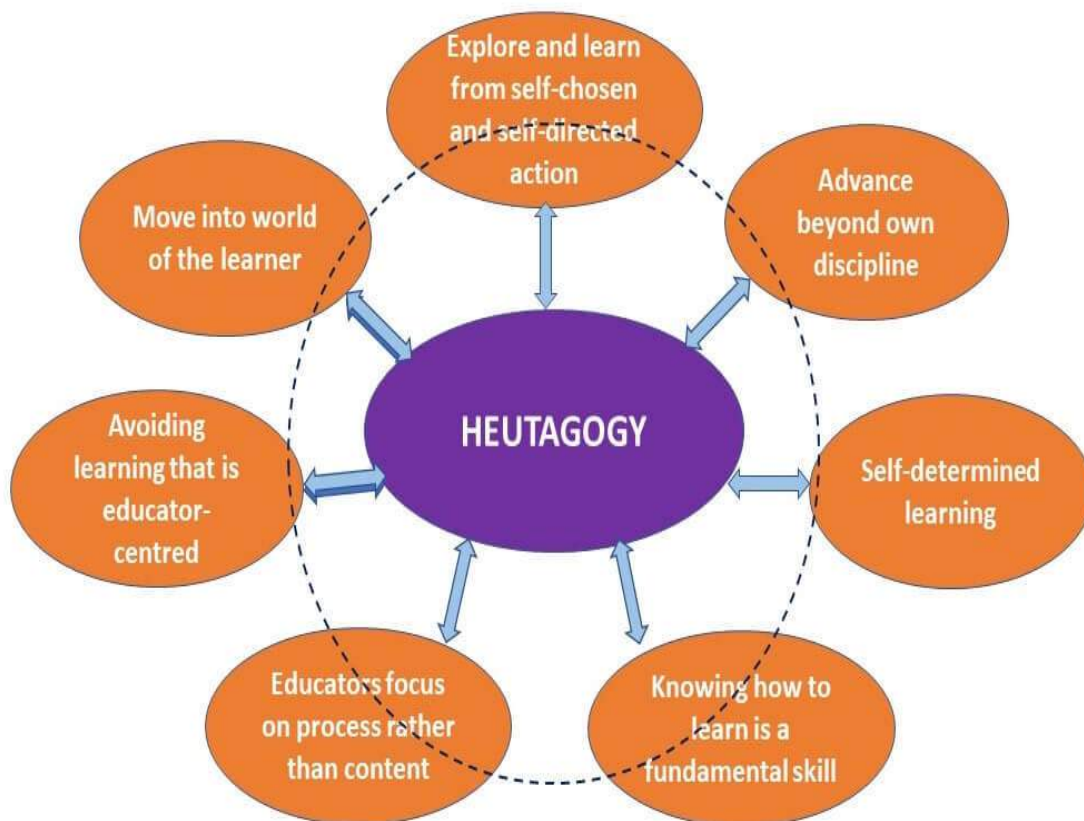
Source: COLRS, University of Illinois.



## Principles of Heutagogy

There are five main principles underpinning heutagogy (Blaschke and Hase, 2015):

- 1. Learner agency:** The central principle of heutagogy is learner agency, where the student is the primary agent of his/her learning, with the learner making decisions about learning, from what will be learned and how, to whether learning has been achieved and to what degree (e.g., self-assessment).
- 2. Self-efficacy and capability:** The principles of (1) self-efficacy, which is the learner's belief in his/her own abilities, and (2) capability, which is the ability of the learner to demonstrate an acquired competency or skill in new and unique environments, have the potential to create transformational learning.
- 3. Metacognition and reflection:** Reflecting upon and critically thinking about what has been learned and the process of learning, in the form of double-loop learning (metacognition), is another principle of heutagogy.
- 4. Non-linear learning:** The learning path is directed by the learner, and is not pre-defined or sequential, as the learner is responsible for identifying what will be learned and how. As a result, this path can often be chaotic and divergent, but more effective.
- 5. Learning how to learn:** While this is partly inherent in the other principles, McAuliffe et al. (2008) single out this factor as a key principle of heutagogy.



**Figure 1: The principles of heutagogy,**  
Source. McAuliffe et al. (2008)

## Heutagogic methodologies

The methodologies that can be used to design a heutagogic learning experience are not hierarchical or prescriptive. They are based on:

**Negotiated learning:** The learner is at the centre of heutagogy. Learners need to be able to negotiate the learning process and content,

depending on what they want to explore and how they want to reach learning outcomes. One way of facilitating this process is to have the learner review his/her unique context.

**Context:** Enabling the learners to explore how they will apply the learning to their own context is critical to heutagogy. Learners do not enter into or leave a learning experience as a blank

slate. Rather, they bring with them previous experiences, and they will take the learning from those experiences and apply it to new experiences.

**Learning resources:** Ensuring that the learner can access appropriate learning resources is key to any heutagogic learning experience. The provided resources are not intended to be exhaustive; rather they should be adequate and indicative, so that learners can explore further as part of learning to be effective practitioners.

**Collaborative learning:** Learners learn from each other, so the trainer needs to be able to establish a means of communication among learners, either face-to-face or using mobile technology, or both.

**Questioning:** An important skill for the heutagogue is the skilled design and asking of questions. The questions should not concern content; instead, questions should encourage exploration, reflection, insight and creativity.

**Negotiated assessment:** The design of assessment that provides the learner with the freedom to assign context, explore beyond the outcomes, to be creative, to innovate and to demonstrate capability, is an important skill and a departure from providing standardized assessments.

While heutagogy was theorised in 2000, it remained largely unacknowledged and underutilized until the rise of social media tools (Blaschke, 2012). Narayan et al (2019) conducted a study that investigated how mobile and social media tools and affordances could be harnessed to facilitate a student determined learning experience. A design based research (DBR) approach was utilised to analyse and investigate a set of draft design principles that was established in collaboration with a group of teachers and literature.

## APPLICATION OF HEUTAGOGY IN AGRICULTURAL UNIVERSITIES

Heutagogy can be applied in the education and extension system in agriculture.

## Education

The principles of heutagogy can be applied among students and teachers in the system and the changes it can bring to the education system in agriculture can be studied and refined. Heutagogy also finds application in the curriculum design of courses in the field of agriculture. The Deans Committee constituted by ICAR and responsible for finalizing the agricultural curriculum at the undergraduate level may take the lead in this. In European/American universities, a certain percentage of every course syllabus is left for students to learn on their own (one of the applications of heutagogy). When students learn on their own, they learn to explore the content relevant to the topics, learn to think, discuss and understand its implications in the real world. Similarly, the Rural Agricultural Work Experience (RAWEX) programme can be effectively transformed and refined using heutagogical principles.

The New Education Policy (NEP) 2020 has indicated that 'the design of agricultural education will have to be strengthened towards developing professionals' with the ability to understand and use local knowledge, traditional knowledge and emerging technologies. As per its recommendations, the Indian Council of Agricultural Research (ICAR) shall act as a Professional Standard Setting Body (PSSB) for agricultural education to develop curricula and lay down academic standards for agricultural education. Given the available alternative modes of quality education, there is a need to complement/enrich traditional and in-person modes of education (Agrawal, 2022)

A study by Kalule et al. (2023) revealed that fulfilling farmers' learning needs influences intrinsic motivation, formation of learning intentions and farmer learning behavior. Gillaspay and Vasilica (2021) suggest that a heutagogical approach has the potential to develop learners who demonstrate key principles of heutagogy, including non-linear learning, learner agency, capability, self-reflection and metacognition and double-loop learning. Their study provides insight into the process of developing a self-determined learner and encourages further research into flexible and learner-centric approaches across disciplines in higher education.

## Extension

Heutagogy must be an inherent trait in extension professionals. How they must be prepared and flexible in the teaching process to meet the purpose of the extension service and the needs of their clientele is an important concern. The concept is more applicable to social scientists/social science professionals where there are many instances where one needs to learn on one's own to meet the purpose.

Though Krishi Vigyan Kendra (KVK) trainings follow the experiential learning (EL) approach, in practice the trainings are designed by trainers and follow a learning sequence that is characteristic of a pedagogical approach, without the involvement of trainees. The process tends to be that of guided learning and not self-directed learning, hampers the effectiveness of trainings and in no way helps to develop the competence and capability of farmer trainees.

In heutagogic training, trainees are given the opportunity to think deeply about a problem and the actions they have taken to solve it and critically reflect upon the problem-solving process itself. The trainers only act as facilitators who help the trainees become self-directed in the learning process. Heutagogy demands a transformed trainer role. With information now being widely available at the click of a mouse, the trainer is no longer the sole subject expert. The trainee should be at the centerstage of the learning process and the trainer should only be a facilitator. In the heutagogical approach, the learning process shifts focus from receiving learning inputs to analyzing those inputs. This is a critical skill for learners as they interact with a society in which knowledge management is more valuable than its access. The desired outcome of this self-directed learning approach is to enhance the abilities of trainees

to identify salient issues that are personally more interesting and most relevant and then orchestrate learning activities that result in meaningful cognitive growth and behavior change. However, the knowledge of technology tools is critical for any trainer in order to be successful in the heutagogical approach.

For instance, let us consider organic farming as the content of KVK training. It is known that farmers receive a lot of information about organic farming from various sources. During the trainings, they get an opportunity to critically analyze the information they have acquired with the help of trainers who act as facilitators and aid them to develop a learning path to their satisfaction and competence. Different technologies can be used by trainers to make farmers critically reflect on the issues and problems associated with their adoption of organic practices in the field. This gives farmers the opportunity to share their experiences (both positive and negative), clarify their doubts and apprehensions and come out with a clear action plan. In this way, learning becomes more interesting as well as applicable.

## END NOTE

The Deans Committee ensures the quality of agricultural education, revision of course curricula and suggests new approaches to make teaching more effective. The Committee can suggest the application of the principles of heutagogy among students and teachers in the SAU system and study the possible changes that it can bring to the agricultural education system. How the RAWE programme can be suitably transformed and refined using heutagogical principles can also be explored. In short, the best way to help students become 'future ready' is to guide them towards learning in a self-directed way via heutagogy.

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## STAY AWAKE AND UPDATED: THE CHANGING DYNAMICS OF AGRI JOURNALISM IN INDIA

In this blog **Anjana Nair** discusses the dynamics and scope of agri journalism in India.

Agriculture journalism is embedded in the psyche of every agriculture science graduate. The very mission of the educational system at the graduate level in agriculture is to nurture the journalistic instincts in them, and they ultimately become an information disseminator for the sector. Agriculture Extension, a basic subject taught in all agricultural colleges across the country, by definition means 'to expand or extend' the work of universities beyond the campus and into the neighbouring community. It is essentially meant to transmit the practices and knowledge in agriculture to the end user – the farmers – in a language that is suitable and clear to them. The remaining subjects taught are meant to groom students and to let them understand the basics so that their communication becomes more effective. So, it wouldn't be an overstatement to say that all agriculture graduates are nurtured to be agri journalists. They are all journalists in waiting!

### CHANGING DYNAMICS OF AGRI JOURNALISM

Journalism is the systematic and reliable dissemination of public information, public opinion and public entertainment by modern mass communication media. Agricultural journalism is a specialized branch of journalism which exclusively deals with disseminating information gathered from different sources in a presentable format through various media, such as newspapers, periodicals, radio, TV, internet, advertising, and so on. The process is elaborate and entails several phases: receiving news, writing it up in the appropriate format, editing the content, and then reporting it through the relevant media. The content, most often will be supported by photographs, and dissemination happens through newspapers, magazines, radio, television and the internet. And as agriculture bloomed and matured, the branch of agriculture journalism has also diversified.

From being a more print-oriented segment, it started to lean more towards the visual side. According to me, the disturbances and stress brought on during the COVID period spurred a revolution and the Audio Visual (AV) media basically won over the print media. The change is understandable as the AV segment does not entail the painstaking effort of reading. The news or content complemented with video and audio essentially made it 'instant' news. With the added flexibility of it being available for viewing at any time and every time through a handheld device, news travelled in the pocket of the news seeker. While print became the comfort of those who wanted good writing and details, the audio-visual media became the choice of the masses. One thing must be emphasised – it created a revolution in journalistic circles. It led to an explosion of news and content. Knowledge has become freely and easily available.



Today millions can access the news simultaneously. News has ceased to be a one-dimensional activity. One thing that stands out in the era is the continuous engagement of readers with the news. The modern digital infrastructure has helped them to converse and interact with the news. This engagement has, therefore, resulted in enhancing the intended purpose of news in multiple ways. So a farmer who sees a new technology being used by another in a faraway region can reach out for information, technology and assistance. The speed between action and reaction has considerably shortened.

Readers can now also become source of news. They can share news and then the news may reach many new ears. News has turned now into a source of knowledge, entertainment, and thus acquired the status of showbiz. The activity

that was once meant to convey a message has now the added responsibility of making the news engaging. So the new age journalist ends up twisting, moulding and fashioning the news so as to align it with the sensibilities of the reader/viewer. Instances of news being created have become common and (maybe!) a necessity. Finding news and putting out a bait for news have become an accepted fact. The proliferation of news and news sources has created this whirlpool of information and misinformation. Now the responsibility rests on the readers' wisdom – to discern and take a call on what to believe and what not to.



### AGRICULTURE JOURNALISM'S EXTENDED SCOPE

Agriculture journalism is an important field. As India is a nation with more than sixty percent of people dependent on agriculture, every news item that is related to agriculture automatically becomes the news of the nation. MSPs, policies, exports, embargoes – all are newsworthy – and so any traditional news agency will be delighted to have an agriculture journalist on board, although it is highly unlikely that they would root for a candidate with an agriculture background. The number of candidates with a journalistic background outnumber agri graduates who would prefer a job in the media rather than a job in the government sector.

Content creators of the new world too fall into the category of journalist, and as freelancers they (far too eloquently) disseminate information and news. Trade magazines related to agriculture have emerged and they provide an open access platform for authors to spread awareness on developments in the agriculture sector. As the content and readers are agri sector specific, the job should technically

require someone who understands them easily and can create content convincingly. Sometimes the articles need to be converted into a popular format. So, in that case, the agri journalist becomes an interface between the industry and the readers.

Another very promising area is the communication departments of many corporate houses who are increasingly invested in propagating the news from the companies to spread awareness on their technologies and activities. They need someone to communicate

with the outside world on their achievements, or to create content for their brochures, websites, and press releases.

The world stands at the threshold of new communication systems and the communicators therefore need to evolve and integrate with it. As news has become interactive and requires instant dissemination, the agriculture journalist needs to stay abreast or ahead of what is happening in the world. I believe they have to be evolved breeds of agriculturists, staying awake and always one step ahead.

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# APPROACHES FOR STRENGTHENING EAS

07

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## TRAINING NEEDS ASSESSMENT FOR ENHANCING THE IMPACT OF FARMER TRAININGS

Effectiveness of farmers' training depends to a large extent on an efficient assessment of their training needs. But quite often, these training needs assessments (TNA) are not undertaken. In this blog **Aparna Radhakrishnan** clarifies the basic concepts involved in TNA.

*"If we are going to go anywhere, we've got to have talent, and I'm going to put my money in developing talent," said McDonald's founder Ray Kroc.*

Training is one of the important methods for developing and enhancing the capacities of individuals to improve their performance. Training farmers to enhance their knowledge, skills, and practices is a major investment of EAS. In India, training for farmers is offered by Krishi Vigyan Kendras (KVKs), Agricultural Technology Management Agency (ATMA), the Directorate of Extension of State Agricultural Universities (SAUs), Agriculture and Allied Departments at the state level, agribusiness companies, NGOs and Producer Organisations. Despite spending huge resources on farmer training, farming is increasingly turning out to be an unprofitable venture with youth quitting farming (India has been losing about 2000 farmers per day since 1999) and migrating to urban areas (Sainath 2013). The government's vision of doubling farmer's income will not come true if farmers are not trained effectively to apply new and relevant knowledge at the farm level (Nandi and Ravi 2019; Chand 2017). If the content and methodology of trainings are designed in a way that neither the trainer nor the trainee wants, it will not produce desirable change in the behavior of people.

### TRAINING NEEDS ASSESSMENT (TNA)

TNA is the primary step in training cycle management. 'Training Needs Assessment' is the method of determining if a training need exists and, if it does, what training is required to fill the gap. TNA seeks to accurately identify the current levels of knowledge, skills and practices existing in the target area through surveys, interview, observation, secondary data and/or workshop. The gap between the present status and the desired status may

indicate problems that in turn can be translated into a training need. Training need refers to the gap between 'what is' and 'what should be' in terms of trainees' knowledge, skills, attitude and behaviour in a given situation and time.

In order to deliver effective training for farmers, it is necessary to understand the training needs of the farming community. Farmer training should be based on adult learning principles (Knowles 1950) that require a clear analysis of the situation and provision of need- and demand-based knowledge. There is a need to identify the points of dissatisfaction with the current situation and desire for change. Each request implies that a gap or discrepancy exists between what is and what could be or should be the situation.

TNA aims at the following situations:

- Identifying and solving the exact problem;
- Avoiding repetition, saving time and money;
- Finding out what the future problem could be and taking steps; and
- Providing learning, development or growth.

The processes of Training Needs Assessment can be divided into five steps:

1. Identify problems and needs;
2. Determine design of needs assessment;
3. Collect data;
4. Analyse data; and
5. Provide feedback.



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## MAJOR APPROACHES FOR TNA

### 1. Performance Appraisal and Task Analysis

In the performance appraisal approach the actual performance in a given situation is compared with that of the ideal or expected performance. Through this approach one can link knowledge and skill requirements with respect to a particular operation, usually used easily for employees in a particular job role.

In task analysis, the data pertaining to the knowledge and skill requirement for the task, their performance in the actual situation is task analysis. Task analysis is a process by which one can know the different elements or sub-tasks which are critical for its performance. The skill requirements for various tasks are distinct.

Both performance and task appraisal is relevant in group farming or joint group farming situations where the activities of each and

every member determine overall efficiency. For example, if a particular group/individual is performing less, then this approach can be used to send them for specific training that will enhance the particular skill that is lacking.

The whole agricultural value chain can be divided into various tasks and the performance in each task can be analysed. Open-ended questionnaires, interview methods, case methods, direct observation and scales could be used to measure the skill gaps. The blog published by a farmer from the United States shows how well performance evaluations can be done for family members engaged in farming (Brown 2014).

## 2. Survey method

It is one of the most frequently used and the most standard method. Questions in surveys can be open-ended, closed-ended, projective, and ranked according to priority depending upon the respondents. In survey method, if anonymity is kept, it will increase trustworthiness and authenticity. TNA can be done based upon the individual perception and opinion of the individuals for whom the training programme is organised. This method is fast and inexpensive. Through this method we can involve a large number of people and it is less expensive for training needs identification.

Village level assessment of needs can be done through Subject Matter Specialists (SMS) of KVKs, and Agricultural Officers, and villages with similar characteristics could be grouped together. If there is heterogeneity, groups can be formed within villages and similar groups can be clubbed for trainings. Survey is a very efficient tool and can be done at least twice a year. One can be done when funding is sanctioned and the second can be done after the training is over. The participants can rightly

assess whether the training was need-based or what more they need in upcoming trainings.

- Questionnaire for farmers should be developed by following a step-by-step procedure (Marshal 2010);
- Questionnaire should be in prepared in the local language;
- The questions should be simple and straightforward;
- Sufficient time should be given for the farmers to read, comprehend and answer the questions.

An introduction should either be given orally or in a written format about the confidentiality and purpose of the data collected.

## 3. Competency Study

In this approach, the first step is to measure the different qualities needed for the individual to perform his/her job effectively and efficiently. Based on the qualities required the individuals are further analysed in terms of their competencies in performing the job. The competencies in terms of knowledge, skills and other qualities required need to be identified by experts.

For example, for marketing of an agricultural commodity, one requires many competency skills, including the use of ICTs. A thorough analysis is made by matching individual qualities with the expected competencies required for marketing. The same commodity may be marketed quicker and at a higher price with the appropriate market chain competencies. It includes the active involvement of experts and trainees through an open discussion approach so as to arrive at the right conclusion. This method is comparatively fast and inexpensive.

Simple Likert scale could be used to measure competency as given below:

Scale	Level of skill	Definition of skill
1.	Not at all skilled	: CANNOT or NEVER perform before
2.	Not very skilled	: Can perform WITH guidance
3.	Somewhat skilled	: Can perform INDEPENDENTLY but require guidance at times.
4.	Skilled	: Can perform independently WITHOUT guidance

## 4. Feasibility Analysis

Another simple but very relevant method that involves economic terms is feasibility analysis.

Under this method, the major questions to be addressed are: "Why should the training be done?" and "Is the benefit of training higher than the cost of current deficiency?" If, for example, the current deficiency is loss in agricultural production due to the lack of skill in a particular technology then this can be assessed. The benefit of training is also calculated. If the difference amount is higher, the more feasible is the training and there is a need to conduct that training.

For example, let's imagine organisation A is looking to invest in mushroom cultivation training. First, the organisation will have to analyse what specific problem the investment will address. The teams will also take training costs into account, plus what resources will be required for training and implementation. Those conducting the study will then evaluate all the pros and cons. Finally, based on all these, they can make an informed decision on whether the investment is a go.

TNA feasibility analysis generally means financial feasibility analysis. Feasibility analysis also gives an idea of whether the training has to be replicated for similar sets of farmers.

## 5. Target Group Analysis

Target group analysis is a less popular but relevant approach. In this method, trainees for a particular training are identified. It is also necessary to find out what is known about them so as to help design and customise the training, and what other group can also benefit from the training. In other words, we may have to do the target group analysis based on the objectives of a programme if the programme comes first, or else identify the target group and formulate programmes based on their needs.

For example, if the training is given to a group that has more social contact, this group will disseminate information at a faster rate, thus benefitting other farmers. So such target groups have to be given more weightage for

faster dissemination of information. Therefore the complete information of a target group gives an idea about their training needs.

## 6. Contextual Analysis

This is a very important but less used approach. Fund availability should match with the training requirement of the farmers. If the fund for the Kharif season comes towards the end of the year, it's in vain. The contextual analysis approach analyses the timing when the training be presented and what the other requirements are to deliver training successfully.

If training on a nutritional garden has to be given, it should be a few weeks prior to the vegetable growing season of a region; and the requirements of training may vary according to the target as well as type. Such data helps in designing the training and needs of farmers appropriately.

## 7. Stakeholder Interview

It would be difficult to assign a large sample size of respondents for the assessment. Therefore, a small but representative sample size in each sector will have to be selected. The sample size could vary between 0 (if non-existent) to 10 (if various players are available within the sector), with an ideal size ranging between 3 to 5 key players whenever possible. It is important to remember that the aim of this assessment is to consult key stakeholders in relation to their views on the needs for a particular training. The outcome expected is to identify key areas of interest, and the knowledge and skills needs of relevant target groups, thereby ensuring the relevance of the modules and sessions suggested for the training programme.



## GROUND REALITIES

Though I presented different approaches to TNA to help those who are keen to improve the effectiveness of training through conducting TNA, in reality, it is often ignored. The reasons include:

- The training is usually based on the specific objectives/targets to be attained, as determined by the Central or State Government or by the District Administration. For instance, it could be for a particular group of people or a region or on a topic pre-decided and the role of the training agency is confined only to getting participants and organizing the training for them.
- Training funds are exclusively kept for training implementation (travel, lodging, honorarium for resource persons, overheads, etc.) with no allocation for TNA.
- This could be intentionally ignored as trainer himself does not spend time to modify or update the regular and routine training content, or he/she may be unaware of methods for organising TNA.

In such cases, there is no mechanism to organize TNA and this often results in:

- A. similar production centric trainings without proper convergence being organised by different agencies leading to ineffective use of resources (very common when institutional convergence is poor);
- B. missing the major areas where farmers are interested in enhancing their capacities – resulting in unintended and uninterested participants attending these trainings leading to very limited impact on the ground; and
- C. Trainings get concentrated around a group of so called 'usual attendees' of training programmes and the really needy get ignored.

In such cases, the trainers may have to consider different approaches. For instance:

**Case 1:** The topics are decided based on the objectives of a project. In this case location, specific customization both of problem, methods and selection of participants need to be done based on TNA.

**Case 2:** Topic not decided. Broad objective is known as livelihood enhancement. In such a case, a detailed TNA needs to be done to decide upon the topic, methods, and selection of participants. In both cases, during TNA, the participant too could also make suggestions as to the trainer's qualifications or expertise.

**Case 3:** If the training arises from the occurrence of a specific problem in a locality, then the methodology and selection of the rest of the participants needs to be done based on TNA.

Keeping a register in KVKs, other SAU Centres, offices of the Department of Agriculture to collect the knowledge/training gaps of farmers and other visitors is another way of collecting their demands for training. Though it may not be very representative, it may still give some directions on the demand for training.

## CONCLUSIONS

TNA is the first step in organising effective training. TNA with farmers can be organized in many ways starting with document reviews and farmer interviews. A part of the training fund should be kept aside for TNA. Each approach has its own pros and cons and the trainers should use this depending on the time and resources available to undertake TNA. TNA also helps training organisations to clearly define the needs of its stakeholders. This would help them in saying 'No' to requests or orders for routine trainings which sometimes these organisations are forced to do.

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# 46

## THE ART AND SCIENCE OF COMMUNICATING SCIENCE TO COMMON PEOPLE

Misinformation and fake news make it difficult for farmers to identify trustworthy information. With more and more farmers using social media, identifying and reporting misinformation becomes important. In this blog, **Aditya KS and Bhuvana N** discusses the communication strategies to tackle the menace of misinformation in agriculture.

In this era of information deluge, thanks to social media and internet usage, it becomes important for scientists to communicate their research to the common public in ways that are easy to understand. This is even more important in the case of applied sciences like Agriculture, where the end users of research are mostly farmers.

Extension personnel have a dual role to play here: one is to communicate the important information to farmers in a way they understand (Box 1), and the second is to help farmers to identify and deal with misinformation (Box 2).

### Box 1: Making sense of the information

Anyone who has a smart phone now can access weather forecasts on an hourly basis. However, how many of us can make sense of the forecast? What does 40% chance of rain for a particular day mean? Does it mean it will rain slightly? Does it indicate that the area will receive 40% of the average daily rain of the region? The true interpretation depends on the level of confidence in the forecast and the probability. But do people really understand the odds/probability? Sadly, the proportion of such people is low. Science communication needs to provide information in a way which is easier to understand.

### Box 2: Non-transparent communication

A pesticide manufacturer claims that by using the new seed treatment formulae, there is 25% reduction in disease incidence. This gives an impression that the new chemical is very effective. However, we cannot come to this conclusion, unless we understand the base rate effect. Suppose, without the seed treatment, there were 4 cases out of 100, and after using the chemical, the incidence of disease was 3 per 100. When you express this change in %,  $(4-3/4) * 100 = 25\%$ . This is a case of non-transparent communication and a case of misinformation. It doesn't make economic sense to use the chemical when the rate of incidence of the disease is so little, however, the effectiveness of the chemical is communicated in such a way that it persuades farmers to use it.





Moving on to the second role, a farmer needs support to be able to identify the misinformation or non-transparent communication messages that are being communicated to him/her, verify these, and enable him/her to understand the real meaning by providing a complete picture. Misinformation is different from fake news. Fake news is something totally wrong/unproved, it is a hypothesis regarding any issue with no facts backing it, whereas, misinformation is when the correct facts and figures are used to highlight only a part of the story or to project a wrong narrative by selectively presenting the facts and hiding other things which doesn't fit the story. Misinformation is more dangerous than fake news, as it is difficult to identify and verify. Though misinformation is common in politics, it is also permeating into other fields including Agriculture.

Professor Joe Schwarcz, Director of the McGill Office for Science and Society in Montreal, Canada, in an interview<sup>1</sup> highlighted how a lot of misinformation is being spread about pesticide use in agriculture. On one hand, the pro-environmentalist group cherry pick facts and figures to project how dangerous pesticide use can be, without revealing that these effects emerge only when pesticides are used unscrupulously/inappropriately. On the other hand, pesticide manufacturers exaggerate the effectiveness of chemicals in reducing risk, while not highlighting environmental risks.

Similarly, there is a lot of misinformation regarding organic agriculture, natural farming,

zero budget farming and many more. There are stories and articles about how these technologies can be game changers. But how many of these are based on solid empirical evidence? As a scientific fraternity, have we tried to get to the root of these questions? Also, once a person starts reading stories about these on social media, they are more likely to be drawn to many more such, due to the similarity-finding algorithms embedded in social media. Repeatedly reading similar kinds of stories reinforces these beliefs. We have highlighted this issue in one of our earlier blogs too.<sup>2</sup>

### CAN WE HAVE ALGORITHMS TO IDENTIFY MISINFORMATION?

Unfortunately, no. The only way out is to scrutinize information based on the evidence and principles of science, which machine learning or algorithms can't do. The problem here is that the concept of truth is fuzzy; there is no clear distinction between what is truth and what is not, and hence classification algorithms from machine learning cannot function<sup>3</sup>(Additional reading - Prof. David Rand of MIT Sloan has authored some interesting papers on the issue of fake news and misinformation<sup>4</sup>). So, the agriculture knowledge information system, especially in the public sector, has to play a key role in vetting agriculture-related information that comes up either in mainstream media or social media. We can take a cue from existing private organizations like 'Snopes.com', Fact Checker, Hoax slayer and many other groups engaged in identifying fake news and misinformation.<sup>5</sup> Can

the public extension system remain unbiased and neutral and critically evaluate information? This is easier said than done.

First step is to identify the most believed but dangerous misinformation that are being circulated widely. Keeping a close watch on social media and mainstream media about agriculture-related information is critical. Also, WhatsApp groups where farmers share information can be a good way of tracking what information is being shared. Next step would be identifying the authenticity of the information. There are no hard and fast rules here and we call it both an art and a science. What do we mean by 'Evidence' is a question which has no simple answer! Whatever published in a journal is not necessarily true. One has to examine what the paper reports as well as the things that it doesn't report. Also, is there a conflict of interest? Who has funded the study? Has the scientific principles of experimentation been rigorously followed? Do conclusions directly stem from the design and the results? Does it align with the established scientific principles? Answers to all these questions determine what constitutes 'evidence'.

One of the most important roles of an extension professional is to provide complete information to farmers and help them make the right decision. But, for this communication needs to be transparent, and he/she should present an unbiased version of the topic including the pros and cons of an intervention so as to enable farmers to make informed decisions. However, this is not the case very often when scientists and extensionists talk about a technology, input, or a policy which is promoted and endorsed by the government. Since the policy has been promoted by the government, they are rarely debated – based on evidence – and is simply promoted widely, which is obviously not good for the science. (Related reading: Nandita and Sreekumar have discussed these issues in promotion of Zero Budget Natural Farming without scientific evidence in AESA Blog 142.) This equates to the scientific fraternity and the extension system playing an active role in generating and spreading misinformation! The direct negative effect of it is that the people lose 'trust' in both science and the extension system.

Once the misinformation is verified, communicate the complete story in clear, easily understandable language. Important points to consider while communicating scientific findings, including empirical findings, are highlighted below. Remember, providing empirical evidence in terms of numbers is important, though the information needs to be simplified.

## **SOME RULES OF THUMB IN COMMUNICATING EMPRICAL FINDINGS TO COMMON PEOPLE**

### **a) Understanding probabilities**

People usually have difficulty in understanding probabilities (Konold 1995), and simplify them as odds or chances (as discussed in Box 1). The research in this area indicates that when the numerical probability is provided with verbal probability, i.e., verbal translation in the form of text, such as 'likely', 'very likely' and so on, it increases general comprehension (National Academy of Sciences 2017; Wintle et al. 2019).

### **b) Exercise caution while using relative risks**

When expressing relative risk (comparative change in risk due to a treatment, as in Box 2), never use percentage or Relative Risk (RR). It is better to use natural frequencies in this case. One classic example of this risk comes from the field of medicine. In 1995, there was a news that new oral contraceptives have two-fold higher risk of venous thromboembolism compared to the older products. People panicked, oral contraceptive use decreased with a consequence of higher abortions and higher rate of birth. But what constituted the two-fold increase? The absolute risk of venous thromboembolism in case of old product was 1 in 7000 and that of new contraceptives was 2 out of 7000! So, when only relative risk is used, it can misrepresent the facts (Fischhoff 2012).

### **c) Use the same denominator while presenting comparisons**

Whenever percentages are given, also provide the frequency with it. And when providing different frequencies like A, B, C and D, use the same denominators (per 100 or per

1000). For example, if in treatment A, the disease incidence is 40 per 200 plants and in treatment B, the disease incidence is 30 per 180 plants, it is often difficult for people to make sense of these numbers. Instead, the numbers can be expressed as 20 per 100 and 17 per 100. Another related instance is how we are communicating Covid-related statistics. If you look at the official communications, whenever we are reporting the number of infections and number of deaths due to Covid, it is reported in percentages. (Example - less than 2% of Indians are infected by Covid-19.) Whereas, while reporting on vaccination, we use absolute numbers. (17 million doses of vaccines administered.) Therefore, transparent communication should make comparison easy and as far as possible use the same metrics while reporting.

**d) Less is more**

In Behavioural Economics, it is said that less is more (Peters et al. 2007). Many studies have proved that even in behaviour change communication, it is often beneficial to provide only the important information rather than overloading with too many trivial details.

**e) Framing Effect**

Use 'framing effect', prospect theory and other behavioural science tools to promote the desired behavioural change. According to prospect theory, humans have a tendency to associate higher value to losses than gains.

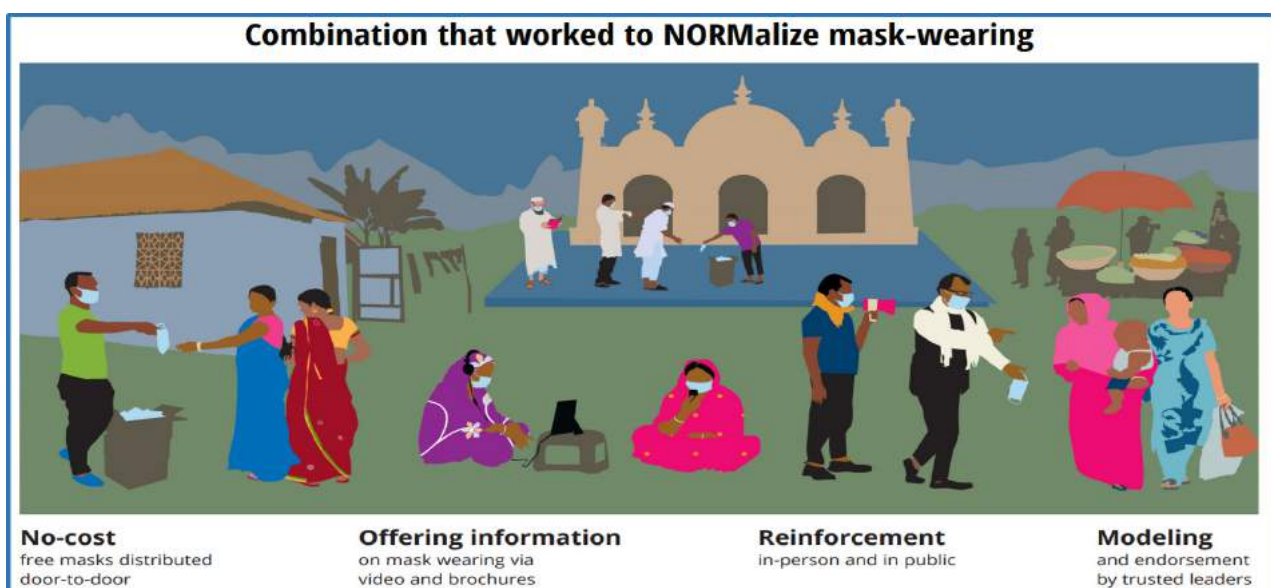
Framing effect postulates that how information is presented determines how people make choices based on that information (Tversky & Kahneman 1985). For example, using gloves and protective wear while spraying pesticide could save future health expenditure of INR 10,000, and you need to communicate this information. It is said that communication will be more effective if the same information can be reframed as 'by not using gloves and mask, you will lose INR 10,000 on future health expenses'.

**f) Using appropriate time frames**

It is important to use appropriate time frames. Farmers are more likely to be convinced of the importance of water conservation, when you communicate the risk of over extraction over a 10- year period than by explaining the short term or immediate risks of water overuse.

**g) Graphical presentations and illustrations**

Illustrations are always helpful in conveying the message in a more effective way. Take a look at this amazing illustration based on Randomized Control Trial (RCT) by JPAL and other collaborators (Abaluck et al. 2021). The RCT examined different interventions that can induce people to wear masks in 600 selected villages of Bangladesh. The results of the study indicated that this combination of strategy was most effective in normalizing mask wearing. The authors used the illustration to communicate the results, which can be easily understood by all (Figure 1).



**Figure 1: Illustration to communicate results of RCT on interventions to normalize mask wearing in Bangladesh<sup>6</sup>**

## CONCLUSION

With greater access to information, the goal post of agricultural extension has to now shift to 'ensuring farmers have access to the right kind of information' which empower them to make 'informed decisions'. Misinformation and false news can damage the credibility of science and hamper the efforts of extension professionals. As Desmond Tutu says "If you are neutral in situations of injustice, you have chosen the side of the oppressor. If an elephant has its foot on the tail of a mouse and you say that you are neutral, the mouse will not appreciate your neutrality." Similarly, being silent when misinformation is being spread is as good as spreading the misinformation, which

erodes the credibility of science. Extension professionals and scientists should learn the skill of identifying misinformation, stop it from being shared, and quell it before it reaches a large number of people. It is important to understand how this type of communication is different from scientific communication and what principles to be used. In this blog, we have tried to list a few tips, which can be helpful in communicating the results of empirical research to common people. This is by no means an exhaustive set of principles and are only an indicative set of tools. It is high time these issues find a place in the curricula of undergraduate and postgraduate degree programmes in agriculture.

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## ENDNOTES

<sup>1</sup>[\(45\) Fake news, misinformation and disinformation in agriculture – YouTube](#)

<sup>2</sup>[Blog 134- From UTOPIA to DYSTOPIA: Social Media as the Future of Agricultural Extension || Welcome to AESA \(aesanetwork.org\)](#)

<sup>3</sup>[\(45\) Understanding and Reducing the Spread of Misinformation Online – YouTube](#)

<sup>4</sup>[David G. Rand | MIT Sloan](#)

<sup>5</sup>[Watchdog Groups – News: Finding News and Identifying "Fake" News – Research Guides at Stetson University](#)

<sup>6</sup>[Normalizing Community Mask-Wearing: Evidence from a Randomized Evaluation in Bangladesh | Innovations for Poverty Action \(poverty-action.org\)](#)

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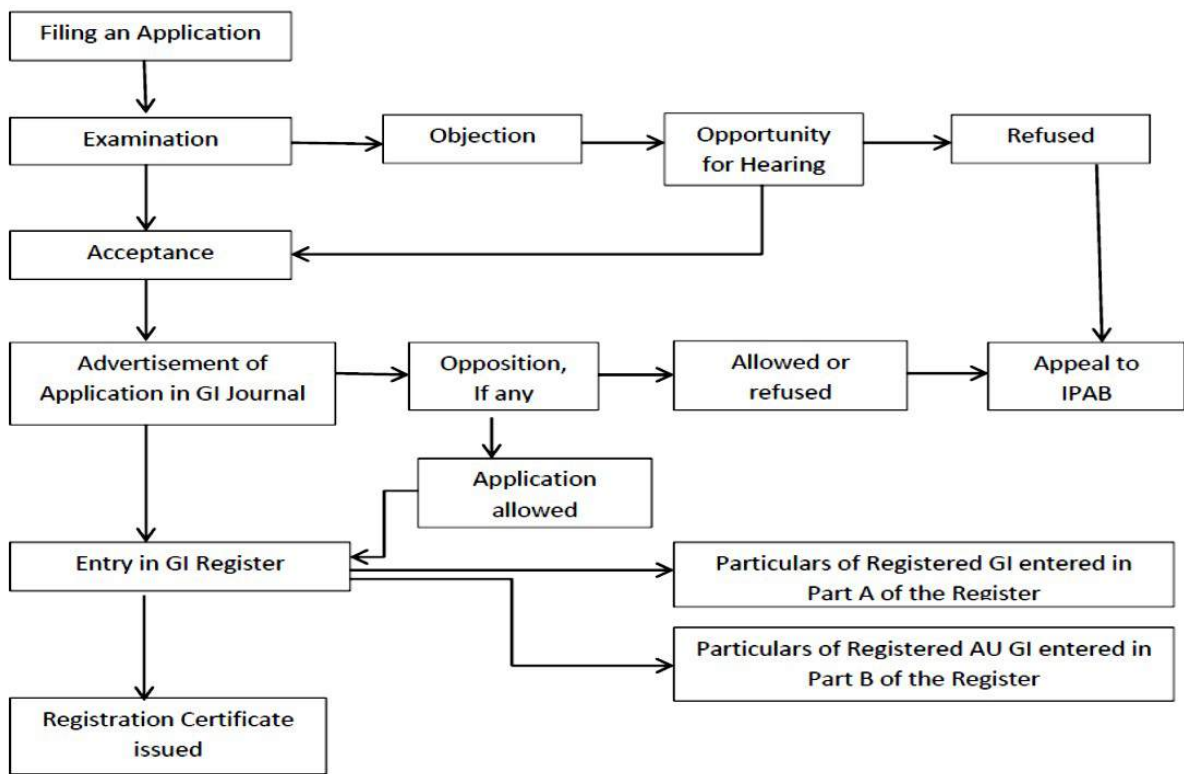
## WHY AREN'T WE TALKING ABOUT GEOGRAPHICAL INDICATIONS?

In this blog, **D. Alagu Niranjan and Sujeet Kumar Jha** elaborate on the importance of Geographical Indications (GI) in protecting producers' rights and saving consumers from deception, and what extension professionals could do to promote GI in their work with communities and manufacturers of value-added products

Geographical Indications (GI) is a relatively new concept to India as there was no such thing before 1999, when Government of India passed an Act in parliament named, 'Geographical Indications of Goods (Registration and Protection) Act, 1999'. The Act was operational after almost three years (15 September 2003) since its passing in parliament. Now, the GI Registry is working under the Ministry of Commerce and Industry and its office is located in Chennai (Tamil Nadu). The purpose of the registry is to register the agricultural, food, manufactured, natural and handicraft products which is original and unique to a specific geographical location where it is produced. Since its inception, the GI Registry is working tirelessly to register various products under the above mentioned categories. Around 370 products have been registered so far; it includes agricultural items and foodstuffs. The list of the registered products until March 2019 could be accessed from [https://ipindia.gov.in/writereaddata/Portal/Images/pdf/GI\\_Application\\_Register\\_new.pdf](https://ipindia.gov.in/writereaddata/Portal/Images/pdf/GI_Application_Register_new.pdf)



**Indian GI Logo  
(Invaluable Treasures of Incredible India)**



\*IPAB- Intellectual Property Appellate Board; AU- Authorized Users

Figure 1: Flowchart of GI Registration in India (adopted from GI Journal)

Source: <https://ipindia.gov.in/the-registration-process-gi.htm>

## HOW ARE REGISTRATIONS MADE?

The registration of GI is a legal process which can be done by any association of persons, producers, organization or authority established by or under the law who represent the interest of the producers by making an application to the GI Registry with the prescribed application fee. The registered applicant is considered as the registered proprietor of the product. The registered proprietor is responsible by law to maintain the standards of the production of products and to recommend it to the GI Registry for approving authorized user registration. The registered proprietor will constitute a committee to check the standards maintained by the producers of the region. Here further doubt arises as to who is an authorized user. Officially an authorized user is defined as one who got official inclusion of his/her product which is confined to the territory of the previously registered GI product. In other words, s/he is a person who is residing in the geographical territory and producing the same good but is not associated with the proprietor association or organization. As stated earlier, the proprietor organization is involved in the process of authorized user registration along with the GI Registry.

## SO, WHAT IS THE PROBLEM?

As an Intellectual Property Right (IPR), GI is associated with different benefits which are not fully exploited in India – that is the problem.

### Benefits of GI registration

The main benefits from GI registration is protecting producers' rights and saving consumers from deception.

Some of the direct benefits are as follows:

1. Proprietorship of the geographical region as a community right; that is, the right to produce the product stays with the producers of that geographical territory forever;
2. Exclusive right to use GI logo and product's registered logo;
3. Protection against commercial exploitation by the people from other regions. When any exploitation occurs, the exploiters can be prosecuted under GI law;
4. Using authorized user number in the package, the product can be traced from anywhere in the world.

Other associated benefits are:

1. Market benefits include high value creation (Normal orange vs. Nagpur orange; which one would you prefer?) and reduced advertisement cost;
2. Consumer satisfaction;
3. Overall development of the region.

### WHY DO THESE PROBLEMS EXIST?

1. Unfamiliarity with the GI concept: Since the concept is an unfamiliar one, we are unable to exploit the benefits. Perception that famous products do not get any additional advantage of GI registration. Hence, not enough efforts are taken to exploit these benefits.
2. Lack of awareness: Producers not aware of commercial benefits and consumers not aware of the originality of products (e.g., People visiting Bengal may assume Bengal Rasagolla as original instead of Banglar Rasogolla).
3. Absence of intervention: The duty of popularization is binding on the proprietor organization or association. But, in most cases, the proprietor organization or association remains silent (as it assumes registration itself is a big deal). This causes less authorized user registration and entry of more fake products in the geographical territory.
4. Absence of responsibility: The GI Act does not place any responsibility on either GI Registry or any other government office. Therefore, GI functions at the local level as follows:
  - a. The proprietor files an application with or without the knowledge of the producer community of a specific product;
  - b. The GI Registry registers;
  - c. The end.

Only a few products have successfully executed the post-registration aspects of GI with the help of responsible proprietors.
5. No one is legally obligated to revive a dormant GI when the proprietor loses interest (resulting in bystander effect).
6. No enforcement till there is a complaint filed, because it is law.

### These have resulted in the following:

1. Seen yet unnoticed: Most people are aware that there is an Intellectual Property (IP) called GI but very few know the details. We get deceived as we lack details. For example, we may be well aware in differentiating McDonald's from McDoland's but we are not fully aware in identifying real Banglar Rasogolla from Bengal Rasagolla.
2. The stakeholders in some of the registered GI cases (e.g., Darjeeling Tea, Alphonso Mango, etc.) are well aware of the post-registration challenges; whereas there are many registered products that do not even have a brand image and reputation in other parts of the country (Das 2010).
3. The only metric evidence available to know the performance of GI is by assuming number of authorized users under each product (i.e., more authorized users equals to more benefits to producers and consumers). The foundation of this assumption is: greater the number of authorized users greater the probability of consumers receiving original products, as the geographical territory contains more shops of the original product. For example, the probability of eating original Solapur Pomegranate in Solapur is higher than the probability of eating original Srivilliputtur Palkova in Srivilliputtur, because the Solapur Pomegranate has 646 authorized users, whereas Srivilliputtur Palkova contains zero authorized users. Around 100 of the 125 registered agricultural and food products have one or no authorized users.
4. These claims cannot be proven with scientific evidence because there is very little research on this concept. That is the reason why the blog is titled, 'Why aren't we talking about Geographical Indications?'

### WHAT NEEDS TO BE DONE?

#### Discussions on academic and administrative platforms

Holding discussions on GI-related topics will help to create awareness about the topic and help in realizing its importance. The following topics can be at the top in the list for discussions:

1. Utility and role of GI and other IPRs like PPV&FRA and Trademarks in Agriculture;
2. Farmer's/producer's rights and its influence on his/her day to day life;
3. Role of GI in sustainable development;
4. Improving awareness of the producers and the consumers;
5. Building a brand image for each and every registered product and their commercialization;
6. Improving authorized user registration;
7. Self-reliance (Aatmanirbhar) and taking local treasures to the whole world;
8. Methods to measure the impact of GI on sustainable development of the region;
9. Comparing GI registered traditional products with other non-registered traditional products;
10. Role of commodity boards in achieving GI's goal.

For example, let's take 'Improving awareness of the producers and the consumers' for a discussion. The academic discussion of this topic would result in development of GI awareness

kits, development of scales for measuring awareness of producers and consumers, identification of factors that influence producer and consumer awareness, and finally, we may fit the identified factors to a theory or will develop a new theory. The administrative discussion of this topic could result in conducting awareness programmes in a newly registered GI product territory, conducting an exhibition to differentiate original products from fake products and organizing a training programme for local youth so as to impart technical knowhow of the GI registered product in order to promote entrepreneurship in the region.

Academic discussions can take place when the university IPR cell, social sciences departments and legal experts work together and administrative discussions can take place when state departments, NGOs and other field level extension professionals work together. But, a policy is the product of both academic and administrative discussions. Hence, for a better GI policy, people from both extension science and extension service should work together.



**GI tagged Basmati Rice, Darjeeling Tea, Nagpur Orange and Mizo Chilli**

### **Organizing trainings for extension professionals**

The Government of India has established Rajiv Gandhi National Institute of Intellectual Property Management (RGNIIPM) in Nagpur, which functions under the Ministry of Commerce and Industry; and its primary function is to conduct training programmes for the public on IPR. If ICAR or Ministry of Agriculture and Farmers Welfare takes up an initiative to address the problem at the national level, we can request the RGNIIPM, Nagpur, and GI Registry, Chennai (World Intellectual Property Organization, Geneva, can also be involved) to organize a special training programme with a number of experts to build the capacity of Extension professionals in this area. The experts should come from a wide range of domains, and include the Registrar of GI Registry, legal

experts, market experts, successful proprietors and successful producers who have benefited from GI. The participants for the training may be selected from the territories of GI registered products. The trained professionals can directly start working with the proprietor of a registered product on educating the producers about GI and its associated benefits, improving authorized user registrations, establishing a strong committed inspection committee for overseeing the production process in the territory to maintain quality and standards, using GI logo and product logo on each and every package, identifying and culling out fake products available within the territory, prosecuting wrongdoers, informing consumers about the originality and maintaining similar packaging and billing processes.





**GI Kashmir Saffron Certificate**

## CONCLUSION

If you are still unable to identify the original from those two Rasogolla variants mentioned above, you should start talking about GI. GI is a community right; without community's involvement its purpose can hardly be fulfilled. As a tool, GI helps to achieve sustainable development in the region. The three pillars of sustainable development are social, economic and environmental development. Social developments associated with GI are improved social participation, cooperation and cohesiveness among the producers, empowerment of the producers, and knowledge conservation. Economic developments that GI could bring in are employment, entrepreneurship, infrastructure and tourism. And environmental developments include conservation of local seeds, planting materials and natural resources. Hence, it is the responsibility of extension professionals to talk about, research, and disseminate information about GI in order to achieve its ultimate goal: Sustainable development.

**Authors note:** The purpose of writing this blog is not for mere criticism on the agricultural extension system of India for not taking up GI and other IPR research, but to introduce the topic to professionals. As professionals in the system, we acknowledge the contributions of various State Agricultural Universities, State Departments of Agriculture, ICAR institutes, NGOs and law firms in identifying right products that are eligible for GI registration. But, registering is not enough; we have to concentrate more on post-registration activities such as taking up initiatives to help producers for authorized user registration and for knowing their rights, conducting frequent consumer awareness campaigns to save them from deception, especially in the case of non-locals, and working with the producer community to build brand image and popularization of the registered product.

**Source of Information:** Most of the numerical information provided in this article is based on the secondary data available on the GI Registry website (<http://ipindiaseservices.gov.in/GirPublic/>) together with its analysis by the authors. The subjective information given in this article is based on the experiences of the authors and the various stakeholders of some registered products.

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## AGRITOURISM: LINKING AGRICULTURE WITH TOURISM

Social Equity-based Public Private Partnership strategy for development of Agriculture and Rural Tourism has the potential to enhance rural (and farmers') economic growth. This should be implemented using Cooperatives and other farmer groups, including FPOs and FPCs, opines **Tushar Pandey**.

In India, most farmers find it difficult to cultivate land in the conventional manner, as it does not offer good economic returns. So they turn to either cultivating cash crops or selling their land. To make their efforts economically viable, an alternate revenue generation model of Agritourism can be framed that can be operated by them. Diversifying into this agribusiness model calls for much less investment and it can help farmers in gaining an additional source of income.

The combination of Agriculture and Tourism has the potential to not only develop the local economy of the farming community but also for retaining youth by creating ample opportunities for earning while safeguarding the environment and the ecology of the place as a whole. Developments on AgTech and FinTech makes synergy possible on many operational aspects of Agritourism, such as marketing, financing, insurance and other institutional mechanisms. Further prospects on enabling entrepreneurship seems plausible owing to the impetus offered by Farmer Groups, including Farmer Producer Organizations and Companies (FPO/FPC), and other forms of cooperatives. Formation of the new Ministry of Cooperatives by the Government of India is a complementary step in the development of Agritourism and must be taken up by the new ministry on a priority basis.

### AGRITOURISM

Agritourism, which falls under the category of Alternate Tourism, refers to the act of visiting a working farm or any agricultural, horticultural or agribusiness operation for the purpose of enjoyment, education, or active involvement in the activities of the farm or operation. It synergizes both agriculture and tourism by capitalizing on their best practices. Though not a new idea per se (as it is already in practice in developed countries), we need to give this an Indian

touch. Today, there are closer links between agritourism and nature-based or eco-tourism. There are many places in India that offer outstanding scenery and have national parks, wildlife and heritage buildings. Sustainable habitat management is of increasing interest to a highly urbanized population and that's why agritourism becomes important for both – the urbanized population and farmers.

The recent National Sample Survey on Agriculture (NSSO) indicates the sad reality of India's younger generation being uninterested in taking up agriculture. But agritourism could provide them an opportunity to return to their roots. And what could be better than this where you do your farming and also entertain

your guests. Tourists visiting such places can relish a combination of special interest, need and leisure, all that makes it different from conventional tourism.



**Trainees of MANAGE on a visit to Agritourism unit near Pune @MANAGE**



**Rural Homestay Camping Site in Bagheshwar District, Uttarakhnd**

## **PUBLIC PRIVATE PARTNERSHIP IN AGRITOURISM**

For the development of Agritourism agripreneurs, farmer organizations, co-operatives, funding institutions, NGOs and agribusiness companies need to come together to take up these ventures together with the help of farmers, government agencies and tour operators. Transporters and the hospitality

industry are also involved and would benefit in the process. The PPP model provides an appropriate structure for the development of such projects.

The involvement of the state government becomes very important not only in developing such initiatives but to extensively consider the benefits that will ultimately reach the local farmer community. Sustainability

monitoring also needs to be taken care of by the government. The major issue is to develop the project considering the long term sustainability of the entire area, population, carrying capacities and farmer benefit. A structured Public Private Partnership approach on Agritourism needs to be evolved after considering the following prime objectives:

- All Agritourism activities have to be sustainable;
- Focus on environmental, social, cultural and economic sustainability criteria;
- Local communities should benefit economically and culturally from tourism;
- Ecologically sustainable development;
- Minimize impact by visitors;
- Better environment and better health;
- Build environmental and cultural awareness and respect;
- Provide positive experiences for both visitors and hosts;

- Provide direct financial benefits for conservation;
- Provide financial benefits and empowerment for local people;
- Raise sensitivity to host countries' political, environmental, and social climate;
- Support international human rights and labour agreements.

A farm-based agritourism site needs to be developed on the lines of Public Private Partnership which will take into account the best possible practices and also set an example for all the stakeholders to start such initiatives. Primarily this model farm will showcase the ability of states as a brand for their agricultural produce, promote educational tours, agricultural festivals and fairs, appeals to special interest groups as an experience of the village life style, thereby creating a tremendous market for both domestic and foreign tourists.

**aesa**

March 2016



## FACE TO FACE

*"I believe that agri-tourism can be an important driver in poverty alleviation through the creation of sustainable livelihood and diversification of rural economies. Extension and advisory services could play a major role in strengthening agri-tourism. But to do this, their capacities need considerable enhancement."*

**Shri Pandurang Taware**  
**Founder & Managing Director**

**Agri-tourism Development Corporation Pvt Ltd, Maharashtra**

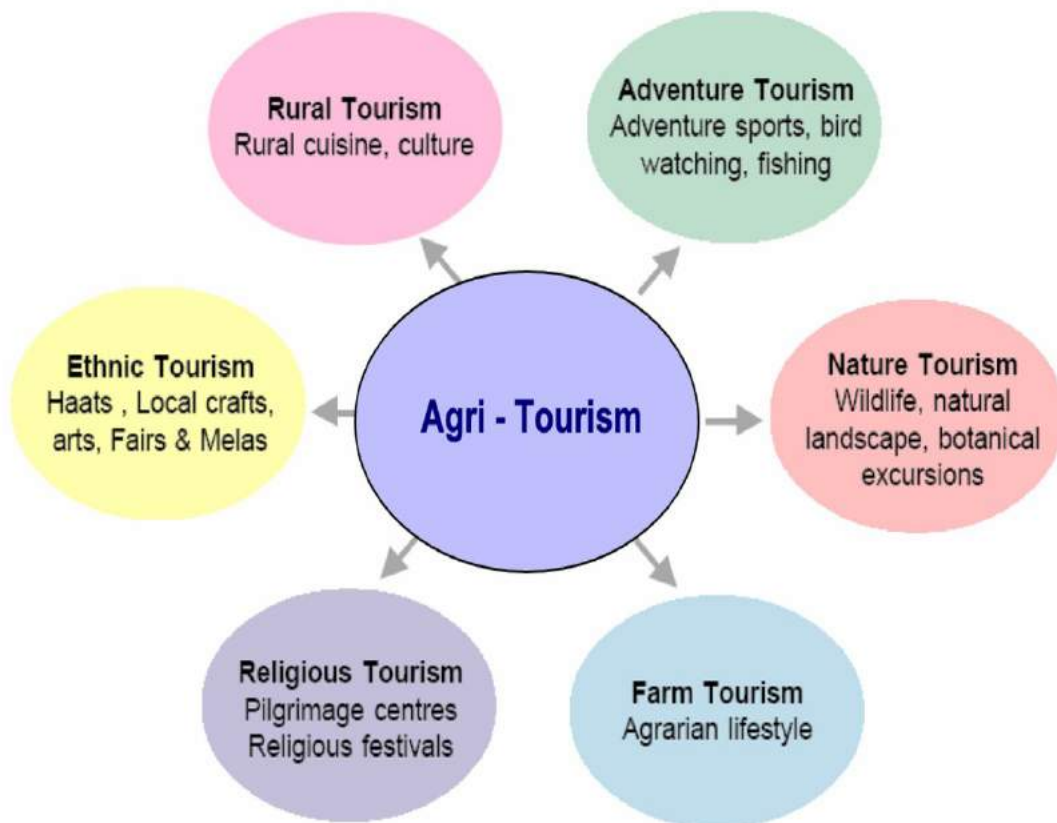
[AESA Face to Face Interview with Shri Pandurang Taware](#)



**Rural Homestay in Baghswar District, Uttarakhand**

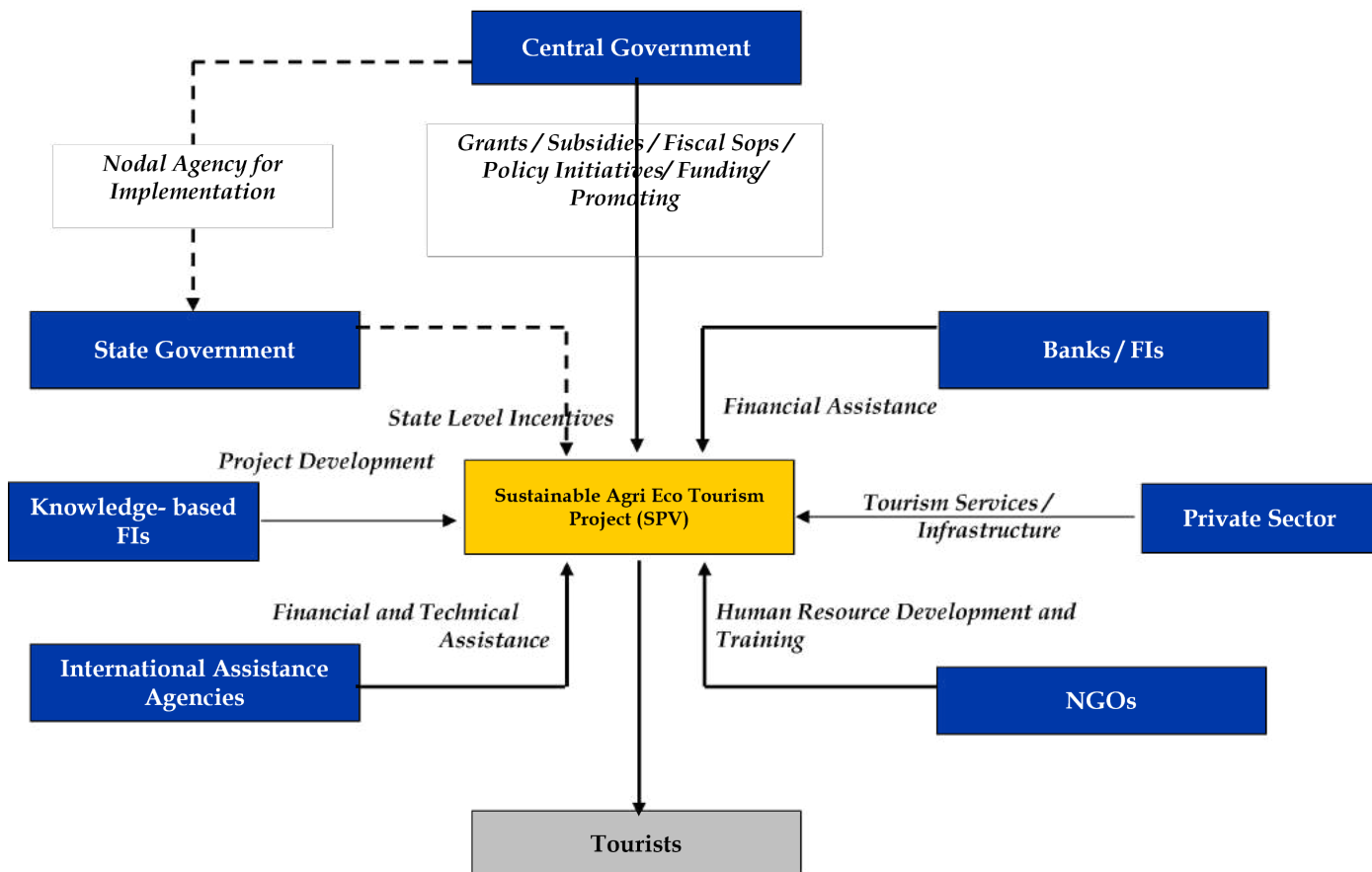
Some areas in India have been successful in developing Agritourism. These include: Maharashtra (Pune and Baramati region); Coorg and other regions in Karnataka; Sikkim, Himachal and Uttarakhand (especially on rural

homestay models). There are other isolated projects in the states of Tamil Nadu, Kerala, Chhattisgarh, MP and Orissa developed with Agritourism as a theme.



Activity based linkages of Agritourism

The SPV chart below shows the roles of all the stakeholders in the Agritourism business.



## ENDNOTE

The benefits of tourism are well known as it boosts regional development by developing infrastructure, increasing government earnings and revenues through foreign exchange, providing employment to local population, besides enabling lasting peace in conflict ridden areas. Therefore, governments should take up agritourism as a new thrust area and all the stakeholders should take responsibility to promote agritourism. The following steps are critical.

1. Agripreneurs should join hands with tourism industry for services;
2. Efforts should be made to train local manpower to enter this industry in large numbers;
3. Better sharing and dissemination of information on Agritourism through internet and satellite channels;

4. Offers made available through major tour operators. They sell it along with other holiday packages;
5. The Department of Tourism promoting India as an Agritourism destination in the international market.

The capacities of Extension and Advisory Services (EAS) in this area need to be considerably enhanced in order to identify, encourage, and support farmers and agripreneurs who could potentially initiate agrotourism enterprises. We need specific training modules and programmes for training of trainers in this area so that EAS providers can organize training and capacity building of farmer groups. When this happens we can look forward to an exciting journey where farmers become agripreneurs offering agritourism that can enhance the tourism potential of India to its fullest in a sustainable manner. This is a win-win for both the economy and society as a whole.

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## TOWARDS RESPONSIBLE INNOVATION IN AGRICULTURE: THE WAY FORWARD

In this blog, **RM Prasad** presents the case for responsible innovation in the context of smart innovations in agriculture, and highlights the need for organizing studies on responsible innovation employing the available frameworks and methodologies for effective policy planning and implementation.

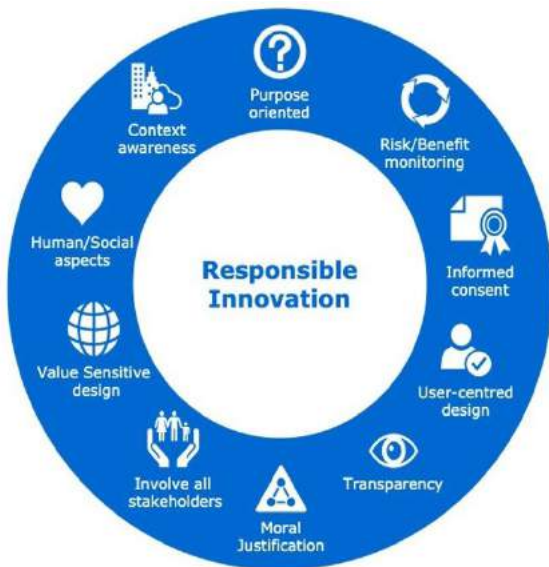
Every innovation needs to be analyzed in terms of its contribution as well as consequences on society. It should provide equitable access to products and services and shouldn't exclude anyone from the development mainstream. In other words, innovations have to be inclusive, by taking into account social and ethical aspects and balancing economic, socio-cultural and environmental aspects. Thus, an innovation can be considered as responsible only if risks, potential harms, well-being, values, needs, rights and interests of relevant parties affected by the innovation are adequately taken into consideration at a very early stage itself.

### RESPONSIBLE INNOVATION

Responsible Innovation (RI) refers to a process of innovation that meets certain procedural norms such as accountability, inclusiveness, due care and transparency to stakeholders and to all of society. This implies a responsible approach towards innovation which involves creating change that can have positive impacts on society and the environment. There is a need to recognize the role of the rural poor as co-learners and as repositories of much useful knowledge instead of looking at them as just beneficiaries or users of innovation (Raina and Das, 2020).

RI has become a prominent topic when thinking of ethical and social aspects of innovation and new technology in the last few years. But it goes beyond consideration of ethics, public engagement, risk and regulation. The public expects researchers to act responsibly, and RI creates spaces and processes to explore innovation and its consequences in an open, inclusive and timely way. It brings together researchers from different fields of study including technology assessment, science communication, and ethics of technology. Responsible innovation encourages us to think of what technologies are for, who they are serving, and who is driving the process (Crossley 2018).





Source: <http://tinyurl.com/5n7xwd8h>

## RESPONSIBLE INNOVATION IN AGRICULTURE

Responsible Research and Innovation (RRI) is an emerging field in the European research and innovation (R&I) policy context that aims to balance economic, socio-cultural and environmental aspects in innovation processes. The concept of RRI calls for ethical reflection on the nature, scope, and applicability of responsibility in innovation and innovation practices in general, and the way social and ethical issues can be applied and addressed in agriculture. Incremental innovation has always been at the centre of agriculture for many years. Incremental innovation does not create new concepts or products, as it focuses only on marginal improvements to what already exists. However, in the last few decades, agricultural research has led to many radical innovations in agriculture such as hybrid seeds, genetically modified crops, nano products, etc. These radical innovations have led to much criticism from a section of society, particularly environmental groups and animal rights activists. Though agricultural production today faces several challenges including climate change and market, there is a common understanding that environmental and animal welfare need to be protected. Farmers are urged to reorganize their practices in a responsible way under various labels such as Good Agricultural Practices (GAP), 'organic', safe to eat, healthy food, etc.

In agriculture, the concept of RI has not been widely considered, although it has much

relevance, particularly with smart farming emerging as the latest innovation in agriculture. The specifics of the smart farming revolution create challenges for responsible innovation frameworks that have largely been developed in other fields, and have not been tested/put into practice in the agricultural context.

## TECHNOLOGICAL CHALLENGES IN AGRICULTURE

Technology is a double-edged sword because it has the potential to cause harm, as well as provide benefits. In agriculture, several controversies exist over the use of chemical pesticides as well as intense debates over genetic modification in crops. In the case of smart farming, Wolfert et al. (2017) indicated that the emphasis on big data could further move decision making power from farmers into the hands of private companies who have control over such data. Carbonell (2016) also highlighted the ethics of big data in agriculture, focusing on the power asymmetry between farmers and large agribusiness giants such as Monsanto.

The smart farming approach implies that farm management tasks and upstream interactions in the supply chain are informed by collected data, enhanced by context and situation awareness, and triggered by real-time events. Both scientists and policy makers are increasingly looking to smart farming as a technological solution to address societal concerns around farming, including traceability, animal welfare in livestock industry and environmental impact of different farming practices. Although most literature on smart farming focuses on the potential for improving agricultural practices and productivity, it is also argued that smart farming will reshape the practice of farming, with less of 'hands-on' management and a more data-driven approach. This poses a big challenge given the ecology of innovations in agriculture. An ecology of innovations includes 'big' emerging smart technologies (e.g., artificial intelligence, internet of things, cloud computing, robotics, etc.) as well as 'small' farmer and/or community led innovations for low tech sustainable agricultural solutions, referred to as Grassroots Innovations (GRI). Links to several publications related to Responsible Innovation are given in Box 1.

## Box 1: Sources for further information

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### COURSE

Building Capacity for Responsible Innovation: Agri-Technology. Centre for Entrepreneurial Agri-Technology. The Australian National University, Canberra ACT 2600. <https://ceat.org.au/building-capacity-for-responsible-innovation-agri-technology/>

### TOOL KIT

RRI Toolkit. The project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no. 612393. <https://rri-tools.eu/about-rri>

## APPLICATION OF RI IN AGRICULTURE

In agriculture, the concept of responsible innovation has not been used to the desired extent, although two recent reports (Eastwood et al. [2017] on RI in smart dairying and Bronson [2018] on smart farming) are found to be useful and relevant, which are briefly explained in this blog. The widespread use of smart dairy farming technologies, including robotic milking was found to bring about varied outcomes for animals, people and the environment. Eastwood et al. conducted the study using the anticipation-inclusion-reflexivity-responsiveness (AIRR) framework, identified as the key dimensions of responsible innovation.

**Anticipation:** To enhance anticipation in science and innovation governance, actors

(scientists, practitioners, technology developers, policy makers) shall use processes to identify and minimize unintended consequences of future innovations. Potential indicators of anticipatory processes include the use of foresight exercises, horizon scanning, and scenario-building techniques.

**Inclusion:** This relates to broadening the debates around innovation from top-down governance mechanisms to bottom-up approach and the inclusion of all the stakeholders. The inclusion of stakeholder perspectives in technology development is suggested as a method for improving stakeholders' trust in the innovation process. Techniques to facilitate inclusion include citizen panels, focus groups, and user-centred design.

**Table 1: Indicators of responsible innovation in smart dairying**

Indicator	Description	Potential Activities
<b>Anticipation</b>		
<b>1. Foresight exercises</b>	Future scanning activities	Technology use surveys, Assessing farmer perception of technologies
<b>2. Scenario building of smart dairy farms</b>	Imagine potential and negative futures	Visioning of smart dairy farms
<b>Inclusion</b>		
<b>3. Involvement of relevant actors</b>	A range of end-users and citizens are involved	Seeking critical feedback
<b>4. Private sector engagement</b>	Private companies are included as partners in publicly funded research	Private companies co-fund research projects
<b>5. Encouraging transformative mutual learning</b>	Mutual learning	User-centred design; Open innovation
<b>Reflexivity</b>		
<b>6. Reflexive guidance</b>	Reflection on values around development and use of technology	Reflective monitoring
<b>7. Structures guide second order reflexivity</b>	Use of codes of conduct and standards	Creation of best practices guidelines
<b>Responsiveness</b>		
<b>8. Potential to adapt changes</b>	Change direction based on stakeholder feedback	Mid-project revisions; Milestones
<b>9. Open research process and access to research data</b>	Transparent smart farming design	Open data exchange, open access to data points

**Reflexivity:** Being more reflexive involves researchers assessing their own motivations and assumptions (e.g., social, ethical, and political norms and values) and acknowledging the perspectives of other actors (e.g., the public, companies, etc.) on particular issues. Certification and standardisation and codes of conduct have been identified as ways for public and private institutions to communicate their norms.

**Responsiveness:** Responding to societal needs entails an ability to change direction in the innovation process in light of emerging knowledge and perspectives. Since societal challenges, perspectives, and norms are likely to change over time, responsible innovation also calls for the capacity to change direction. Open access to research processes and results, along with declarations of conflicts of interest, are potential responsive approaches. The study identified changes to the nature of farming and human-animal relations as socio-ethical dilemmas, potentially leading to farmers and society rejecting smart farming technology-based applications. By applying the AIRR framework to a case study of smart dairying in New Zealand, Eastwood et al. also identified lessons for the application of smart farming technologies to farmers in the future. Proposed indicators of responsible innovation activities in smart dairying as discussed by Eastwood et al. (2017) are given in Table 1.

Similarly, Bronson (2018) studied smart farming innovation in Canada and portrayed the scenario of John Deere fitting each of its 'precision' tractors with sensors that collect data about soil and crop condition. The software used in John Deere's tractor is proprietary and the data it collects are not openly accessible. Farmers have to subscribe and pay for access to the information it generates from aggregated datasets, which is accessible using a 'My Farm Manager' mobile application. The proponents of precision tractors suggest that the tools introduce incredible business efficiency into farming.

It was observed that corporates recognize the economic potential in smart innovations applied to agricultural production. In 2013, Monsanto after purchasing the digital tool developer

'Climate Corporation', under a platform called Integrated Field Systems (IFS) released in 2014, offers farmers a suite of digital tools for collecting and analysing farm data. Monsanto uses farm-led data to promote its proprietary chemicals and farmers' data to drive its R&D. Here, whether the individual farmer benefits commensurately with the corporate party is an ethical question.

Bronson indicated that smart farming innovation in Canada has a blind spot in relation to the needs and concerns of small and medium sized labour intense farms. Smart innovations work to the advantage of already powerful players in the food system in Canada, which is a market reality, but it is simultaneously a democratic problem. Technological equity and broad social progress has to be secured through careful and ethical decisions taken by key players in the innovation ecosystem. The inclusion of right holders in broad, value-based inquiries related to technology development is suggested as a solution for improving outcomes and also for improving trust in the innovation process.

There is an indication that innovation in big data and machine intelligence may enable by their very design, consolidation of power among the agribusiness companies. For instance, Monsanto's Field Support, a platform for integrating farm level big data, makes use of a proprietary algorithm to arrive at a 'prescription', which is completely opaque, protected as corporate intellectual property, and there is lack of transparency around the profit generating uses of Field Support big data.

Though corporates have a legal mandate to maximize profit, the government has a democratic mandate to ensure that the technologies it helps to develop contribute to the goal of society as a whole and not just to the interests of the already rich and powerful classes. Value-based questioning ought to be foregrounded, as a normative matter, in the inclusive process of decision making related to smart agriculture.

In their study, Eastwood et al. (2021) reported that the digital revolution has differing potential trajectories for livestock sectors. Benefits of

more data and better technologies include more accurate and proactive decision making, and productive and enjoyable workplaces. However, risks involve greater consumer and public perceptions of industrialized farming, disconnection with traditional animal husbandry and the meaning of being a farmer, and commodification of farm data. Possible trajectories identified are technology-driven livestock systems, technology-enabling amended versions of current systems, and technology-augmented livestock systems that address future needs.

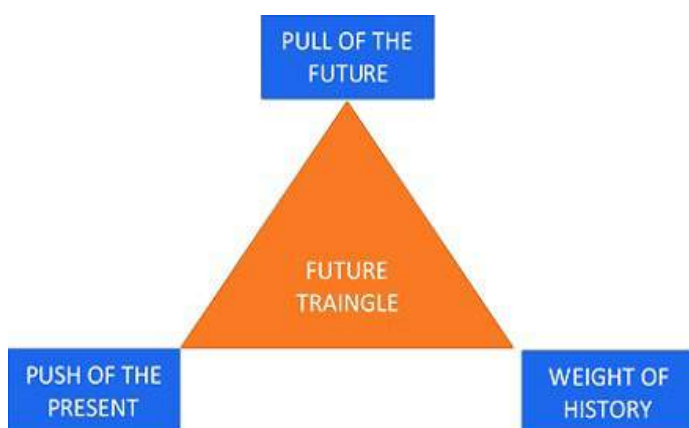
One recent process used to conceptualize technology transitions, and explore potential future trajectories, is the 'Futures Triangle', which examines both the drivers of, and constraints to, change (Fergnani 2020).

The three aspects to the triangle are: 'weight of the past', 'pull of the future', and 'push of the present'.

**Weight:** The first aspect (weight) relates to examining traditional resistance to technological change, the potential obstacles/barriers, and social or innovation system structures that resist change (e.g., regulation or national policies).

**Pull:** The second aspect (pull) involves imagining future possibilities, innovations, or aspirations that may not yet be a reality. In this aspect of the triangle, the drivers of change.

**Push:** The third aspect (push) is concentrated on the current reality and examines what is happening, and what the current drivers of change are (e.g., demographic change and societal expectations).



Source: <http://tinyurl.com/m2p6ak27> (with slight modification)

The findings of the study by Zhang et al. (2021) highlight that, to seize the opportunities of sustainable agriculture through applying big data technologies, significant value propositions for farmers need to be created so as to provide a reason for farmers to share data; and a higher level of trust between farmers and stakeholders, especially technology and service providers, needs to be established.

## WAY FORWARD

It is said that smart farming in India is going to be the future of agriculture. With smart devices, multiple processes can be activated at the same instant and automated services enhance product quality and volume. NITI Aayog and other policy bodies in India are pushing this innovation in a big way. However, there are many challenges and issues which need to be addressed. How far the small and marginal farmers can access and utilize the smart farming innovations is a big question. Another important challenge lies in transforming the smart standalone devices and gateways into holistic, farmer-friendly platforms. Both the digital and physical infrastructure need to work together, but small farmers in villages and cities face difficulty in pairing the two. It is expected that Agri start-ups can reach out to all these farmers and make it a viable and cost-effective solution. In light of controversial agri-tech precedents such as GM crops, it is probable that smart farming will also result in a similar controversy. The digital divide existing in the country is also likely to be widened.

Normally, extension scientists are involved in studying the extent of adoption of innovations and the associated factors (ex-post). They have also a definite role in reviewing and analysing the proposed innovations (ex-ante), and critiquing innovations in terms of equity and its impact on the environment in relation to sustainability. In agriculture, unfortunately, extension scientists are not serious about ex-ante studies and evaluations, which therefore, needs to be strengthened.

Against this background, it is felt that extension scientists need to take an important role in identifying the real issues and concerns of various stakeholders in emerging innovations by

conducting responsible innovation studies using the available frameworks and methodologies to provide useful insights and valid suggestions to policy makers. I strongly urge our young and competent extension researchers to get involved in policy studies related to digital

innovations in agriculture. How the AIRR framework of Responsible Innovation can be applied in implementing the IDEA (Indian Digital Ecosystem of Agriculture) of the Ministry of Agriculture, GoI, can be a good case for analysis.

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# 50

## STEERING INNOVATION IN AGRICULTURE: THE DUTCH WAY

The Netherlands offers several lessons on organizing agricultural research, education and extension systems to stay competitive and relevant steer innovation for Agriculture. In this blog, **Sreeram Vishnu** shares his insights on how the Netherlands is steering innovation in agriculture which other countries could emulate.

Climate change, food security and sustainability are some of the prominent challenges faced by the farm sector across the globe. Technology is the key to addressing these challenges. And when it comes to innovations and technologies that have spurred agricultural transformation, the Netherlands instantly comes to mind. This tiny European country with a land mass and population of just 1.26% of that of India has plenty to show by way of such innovations.

About 17% of the Netherlands is reclaimed from the sea. Primary agriculture and horticulture account for about two-thirds of the land. Interestingly, half of its land lies below sea level and is protected by dikes to prevent flooding. Yet, the country is one of the world's largest agricultural producers, exporting €65 billion worth of vegetables, fruit, flowers and dairy products each year. So diverse are the Dutch food and agricultural sectors that they are key partners in global agro-food chains.

This blog provides insights into how the country could achieve this commendable feat, the unique features of its agriculture and how it contributes to the country's competitiveness in global markets, based on interactions with experts and farmers during a training in the Netherlands (Box 1), supplemented by relevant publications.

### Box 1: Training at the Center of Excellence in the Netherlands

My opportunity to visit the Netherlands came in May 2022, as part of an official training in connection with the implementation of a project titled 'Center of Excellence for Vegetables and Flowers' (CoE) in Kerala. The project is envisaged to enhance the prospects of hi-tech farming in the state to promote the cultivation of horticultural crops, under which a hi-tech demonstration centre for vegetable and flower production and transfer of technologies are planned.



**The CoE team deputed for training in the Netherlands**

The project is being undertaken jointly by the Government of India, through the National Horticulture Mission with technical support from the Government of Netherlands. Kerala Agricultural University (KAU) and the state Department of Agriculture and Farmers Welfare (DoA) are the other local partners in this project. A month-long training on 'Horticultural Value Chain' was organized for the members of the partnering institutions in the Netherlands, comprising field visits, visits to international agri-food firms, lectures and hands-on sessions, providing us a deep understanding of how farming in the country works.



**Tulip Field in the Netherlands (Source: Google Images)**



## UNIQUE STRENGTHS OF THE DUTCH AGRICULTURE SECTOR

The Dutch agriculture sector has six unique strengths:

- The role of green education institutions in developing human resources
- Participatory research involving multi-stakeholders
- Role of growers in steering the research agenda and mobilizing support services
- Novel institutional arrangements and policy support for the green sector
- The pivotal role of Wageningen University & Research (WUR) in driving agricultural research
- Reorganization of agricultural extension and advisory services.

### Role of green education institutions in developing human resources

Netherlands' primary sector comprising of agriculture, animal husbandry and fisheries along with food processing, environment and rural affairs is known as the green sector. It is believed that the success of Dutch agriculture largely hinges on the quality of agricultural education, generally known as green education. Green education institutes serve stakeholders ranging from rural farmers, vocational

education learners to students of professional graduate courses. Green education is offered at secondary, vocational and higher education levels. Secondary agricultural education (provided by comprehensive secondary schools and agricultural training centers) and higher vocational agricultural education (provided by universities of applied sciences) in the Netherlands are also known for their excellent quality. Research Universities (WO) and Universities of Applied Science (HBO) offer higher education. While the WOs (such as WUR) are focused on advanced research programmes, HBOs provide specific professional education programmes that are more practical oriented. In addition, private organizations like Practical Training Centers (PTC+) complement green education efforts by delivering supplementary and specialist education in specialized areas like horticulture, livestock, etc. Further, agricultural schools from vocational to higher education work closely together with the agriculture industry to make education more demand driven. Thus, this robust green education system not only ensures a supply of actors (researchers, extension officers, growers) with relevant technical skills but also influences the performance of the sector by facilitating the quick uptake of various technologies.



Wageningen University & Research (Source: Google images)

## **Participatory research involving multi-stakeholders**

Agricultural research in the Netherlands can be traced back to the 1840s when Provisional Agricultural Societies were established for information exchange. Later on, specialized horticultural schools and experimental stations were set up with financial support from the government. Most of them were set up at demonstration farms owned by private growers. Though the experimental stations initially focused on basic farm research such as varietal trials and experiments in plant physiology, the focus shifted to commodity-specific strategic research. The governing body of the experimental stations that sets the research priorities comprised of growers, representatives of Commodity Boards and extension service. A majority of research institutes extended technical support to these experimental stations. The agricultural extension service cooperated closely with the experimental stations, resulting in the well-known association, Education-Extension-Research (EER) triptych. Subsequently, these experimental stations were merged with agricultural research institutes. In 1957, the National Council for Agricultural Research (NRLO) was established by the Dutch Government by bringing together various stakeholders -- knowledge institutions, private firms and NGOs -- to prioritize research. Though this body was later dismantled, the involvement of the private sector in agricultural research was ensured through multiple measures such as specific subsidies, opportunities for co-financed programmes and dedicated R&D facilities within the universities. As a result of this cooperation, agricultural research became demand-led, meeting the information and technology needs of various stakeholders like commercial growers and private firms. While fundamental research carried out at WUR was funded by the government, applied research gets support from the private sector as well as the government. This system was instrumental in making agricultural research more demand driven.

## **Role of growers in steering research agenda setting and mobilizing support services**

It is interesting to note that farmers in the Netherlands are actively engaged in organizing advisory and support services, such as

demonstration farms in centers of production of horticultural crops and grower-led study groups for knowledge exchange. The experimental stations started in these demonstration farms at a later stage helped commercial growers articulate their field problems through these research units. Besides, growers directly contact universities for technical support. This led to the emergence of applied research centers for potential areas of concern such as flower bulbs and potatoes. Another remarkable feature is the concept of Care Farms that combines agriculture with health and social services.

Farmer organizations too played a key role in organizing vocational and adult education in the farm sector and providing support services to farmers, such as inspection services for the quality control of planting materials and the setting up soil and plant and soil analyses laboratories.

The prominence of cooperatives associated with various agricultural commodities is a unique feature of Dutch agriculture. Over the last decade, the consolidation of growers and grower associations into cooperatives became necessary to deal with challenges such as the decline in farmlands and farmers. At present, the market share of agricultural cooperatives is about 70% with their dominant role visible in most farm commodities. The success of these farmer cooperatives is rooted in their ability to adjust to changes in policies, market conditions and technologies. Most importantly, the cooperatives were instrumental in transforming agriculture from a semi-subsistence to commercial system by supplying farm inputs and farm credit and organizing the sale and processing of farm products. In most sectors, the aggregation of grower cooperatives led to the emergence of larger cooperatives with a global outlook.

## **Novel institutional arrangements and policy support for the green sector**

The Netherlands has set up successful institutional mechanisms enabling its agriculture to flourish. In the early 1990s, the practical research centers of the Ministry of Agriculture and the public extension system were privatized and national research funding was gradually phased out. New forms of institutional

arrangements were tried out to channel funding for agricultural research and extension (Box 2). For instance, the starting of Green Knowledge Cooperative (GKC) was such a response. This inter-institutional organization connects green education and research institutes with business companies and communities on green

knowledge dissemination and utilization (WUR, 2013). Under the GKC initiative, the Green Table is a forum with representatives from various educational institutions who work jointly to maintain a good connect between education and the labour market.

## Box 2: Innovative institutional platforms in the Dutch green sector

Farming with the future (FwF) develops more sustainable plant production systems in arable farming by creating specific platforms for interaction among multi-stakeholders including farmers, researchers and advisors. Under the project, platforms were created for interaction among these partners. These platforms include regional networks, experience sharing venues, working groups, conferences and evaluation meetings. Results showed considerable improvement in the nutrient management practices of the growers due to the intensive interaction and better learning outcomes.

Food Valley consortium is a network for innovation and business involving companies, research institutes, experimental facilities, incubators and public-private-partnership-based R&D programs. The focus is on food, health and nutrition. The services offered include coaching by means of connecting early-stage start-ups with experienced companies for advice and support, financing potential entrepreneurs to translate a business opportunity into a business plan, facilitating the infrastructure for product development with reduced fees and providing professional assistance for patenting novel ideas. Along with the WUR, this consortium is engaged in many joint research initiatives co-financed by industries, the government and research institutes to increase the competitiveness of the Dutch economy.

Wageningen University & Research offers Academic Consultancy Training (ACT) to promote demand-driven research. Start-ups, companies, government institutions and non-profit organizations can collaborate with Masters students on consultancy projects at relatively low cost and with little investment. A group of five to seven students from various disciplinary backgrounds can use their academic knowledge, skills and creativity to find a solution to a real-world problem. An example of this can be found at [https://youtu.be/rd\\_v7cNcCaQ](https://youtu.be/rd_v7cNcCaQ). Another interesting example is the Education-counter through which an external party can contact the university to ask practical questions which are then translated into assignments in relevant courses.

Within the broader domain of agriculture, every sub-sector has grower representative firms to promote innovation and global trade. For instance, the Dutch Federation of Agriculture and Horticulture with more than 35,000 agricultural entrepreneurs and employers represents their interests at the local, regional, national and international levels. Other examples include the Netherlands Crop Farming Union, Netherlands Poultry Farmers Union and European Multi-functional Farmers' Network.

The green sector also draws policy support to strengthen research by partnering with private players. Policy measures like the Top Sector policy framework (2011) (topsector enbeleid) bolstered this collaboration since it supported cooperation between knowledge institutions, businesses and government. The organizations representing key sectors (such as agriculture and food) are eligible to receive incentives like a Public Private Partnership Grant by entering

into joint projects with private companies. . To operationalize these projects, Top Sector Consortia for Knowledge and Innovation (TKI) were formed to facilitate the developing of innovation contracts (innovatie contracten) with the government in order to develop innovative concepts and products. These developments led to industry-driven research, public-private partnerships and networking at the sub-sector and regional levels, and illustrate the changing view on knowledge management in the green sector. Further, there are policy measures to support growers financially. The Green Direct Payment is provided for adhering to sustainable production practices while the Young Farmer Payment is a financial incentive for promoting more youth engagement in agriculture.

### Pivotal role of WUR in driving agricultural research

Wageningen University & Research is a global center of excellence in agricultural science.

The varsity is involved in both fundamental and applied research and has more than 10,000 students from over 100 countries and 6500 staff working in diverse areas of food and environment for the Dutch Government and business community at large. The famous Wageningen Approach is all about closer collaboration of natural, technological and social sciences to translate scientific breakthroughs quickly into education and practice. Interestingly, the university receives funding both from the government as well as from other parties including private industries and global institutions. This ensures a shared stake in the research programmes carried out by the university by these parties and making it demand led. In addition to its own applied research programmes, WUR also attracts private firms to its campus for research collaborations. The formation of the foundation Food Valley within its campus was such an attempt. The move led to the flow of investment and R&D activities of agro-industries within Wageningen and the necessary laboratory facilities of the university offered back in return. Today, WUR is in the forefront of research in the cutting-edge areas of agricultural science, including the application of robotics and data-driven farming, nature inclusive transitions, climate neutral agriculture, etc.

### **Reorganization of agricultural extension and advisory services**

The Research-Education-Extension triptych which successfully transformed the Dutch agri-sector was privatized since 1990s. This led to changes such as the organization of extension and advisory services and funding mechanisms and service providers. The government extension machinery has metamorphosed into commercial consultancy firms to provide technical and advisory services to growers. However, most of the extension agents could not offer client-oriented services and were gradually replaced by other actors. This led to the emergence of new players like private consultants and agrochemical companies who offered agro-advisory services. As a result, knowledge became a market product that needs to be purchased and services were commercialized. Systematic financing of the experimental farms by the grower associations disappeared and it became more contract based, subject to competition. Agencies like Innovation Networks and Transforum were formed to facilitate networking and knowledge dissemination among multi-stakeholders in the farm sector. Most notably, under the new regime, the role of growers became much more diversified from mere beneficiaries to clients, sponsors and stakeholders with regard to knowledge generation and dissemination.



**Windmills at Zaanse Schans, Netherlands (Photo credit: ©Sreeram V)**

## CONCLUSION

There are many other factors that contributed to the robust development of Dutch agriculture, such as its strategic geographic location, well-connected transport network, stable weather and flat land areas that are well suited for farming, among others. However, the Netherlands' resounding success in modernizing agriculture with a sustainable outlook is unparalleled. If there is a key word to describe Dutch agriculture, it should be technological excellence, credited to a range of factors such as the continuous pursuit of innovation, collaboration among a network of actors including private firms and entrepreneurs and the dynamic role of grower associations in securing/offering various services. These factors are reinforced with a futuristic policy perspective which is regularly revised and updated. The Dutch have done away with viewing knowledge as a public good and instead embrace the concept of a knowledge market. Each grower accepts and undertakes the responsibility to invest in the production of technical knowledge and services necessary

for their enterprise. Similarly, other factors for such a transition, such as partnerships, forms of institutions and modes of funding and knowledge generation are redefined or repurposed. In short, the Dutch case is a great example to follow for any country in the world aspiring to become an agri-super power.

## ENDNOTE

This blog covered only a few notable features of the Netherlands' farm sector, mainly focusing on the diversity of actors, systems to stimulate innovation, governance mechanisms and organization of extension systems. How the Dutch experimented to make deliberate changes in organizing agricultural research, education and extension systems with the changing times to stay competitive and relevant is worth emulating. So is their ability to develop an enabling environment to stimulate innovation, partnerships and knowledge production at various levels. It also demonstrates the growing significance of private extension systems and the role of growers in organizing them.

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## INSTITUTIONAL INNOVATIONS FOR IMPROVED AGRICULTURAL WATER RESOURCE MANAGEMENT IN INDIA

Amidst the rising scarcity of water resources and sub-optimal technology adoption, institutional innovations assume a key role in sustainable water management in the agriculture sector in India.

**S K Srivastava and Darshnaben Mahida** in this blog provides an overview of the institutional arrangements and recent community-based institutional innovations adopted by different state governments for sustainably managing water resources.

India is endowed with rich water resources. Agriculture is the largest consumer of fresh water, constituting about 85% of total water use. It bears prime responsibility for sustaining the dwindling water resources (Box 1). Although modern technologies such as onsite reuse, automated canal irrigation, nano-technology infiltration, smart techniques of drip and sprinkler irrigation and artificial groundwater recharge, are available in the country for efficient water management, they are primarily restricted to laboratories or limited areas.

### Box 1: India's water scenario

The utilizable water resources in the country are estimated at 1,121 billion cubic meters (BCM), 73% of which is used for different purposes. Due to the burgeoning population, per capita availability of water declined from 5,178 m<sup>3</sup>/year in 1951 to 1,441 m<sup>3</sup>/year in 2015, which is lower than the water-stressed norm of 1,700 m<sup>3</sup>/year. Further, there are wide regional and seasonal variations in water availability in the country. On the other hand, the demand for water has been growing due to rising economic activities, an inclination toward water-intensive food habits and lifestyles, rapid urbanization, etc. This rising demand is expected to exceed the utilizable supply, and several parts of the country have started witnessing water scarcity. Presently, about 60% of the Indian population has access to less water than the scarcity threshold of 1,000 m<sup>3</sup>. Climate change is expected to further aggravate the scarcity of water resources, underlining the dire need to sustainably manage water resources through improvised policies, vigilant implementation, awareness, and accessibility to advanced technologies, institutional innovations and effective governance.

For instance, despite having been promoted since 1991, micro-irrigation covers only about 10% of the total irrigated area in India. Moreover, the irrigation supply through canals is inefficient and faces challenges of inequitable distribution, conflicts, inadequate utilization of water potential

created and environmental externalities. Since most of these challenges are embedded in the weak institutions of technology dissemination and water resources management, institutional arrangements and effective governance play a critical role in their efficient and sustainable management and also greatly influence the welfare outcomes for the rural masses.

## WATER INSTITUTIONS IN INDIA

Conceptually, institutions are defined as “humanly devised constraints that shape the human interactions” (North, D.C. 1990). Institutional arrangements help define the operational rules and regulations describing the relationship between co-users and between users and the natural resource, water in this case. The institutional structure governing water has three major dimensions, i.e., water policy, water law and water administration (Box 2).

### Box 2: Institutional structure governing water

Policies are the broad guidelines and intended approaches stated by the state and central governments for decision-making in water management. Laws are legally enforced rules binding on the parties or individuals concerned. According to Saleth and Dinar (2004), law and policy need reciprocal revisions over time for improvisation and implementation. The Indian water policy evolved from the National Water Policy in 1987 by the National Water Resource Council (NWRC), and has since been revised in 2002 and 2012. It mainly covers cost recovery, project selection criterion, water pricing policy and participation and privatization. The water laws in the country include legal provisions in the form of constitutional provisions, irrigation acts, central and state-specific laws, customary law and penal codes and criminal procedures. To ensure legal uniformity and proper management of water resources across the states, a draft National Water Framework Law has been prepared by the central government. It embraces facets of water rights, inter-governmental responsibility and regulatory and accountability mechanisms. The administrative component of water institutions is basically an execution of water-related laws and policies.

The Indian Constitution extends a superior role to states in the management of water resources. The central government is entrusted with formulating model policies and laws, resolving inter-state water disputes and sponsoring

water-related infrastructure and schemes. The final legislative power to the states often leads to legal and administrative issues such as poor integration of central and state level water policies, fragmented administrative and management power to multiple ministries and departments dealing with water, inadequate implementation of policy recommendations by the states, intractable inter-state disputes, etc.

The administrative structure of water institutions at the state level comprises of regulatory authorities, water/irrigation departments, the Panchayat Raj system and Public Works Department for the storage, supply and distribution of water. Policy formulation, administration and mobilization of water in coordination with the center are carried out by the upper level of administrative hierarchy, while implementation, monitoring and maintenance are performed by the three-tiered Panchayat Raj system in rural areas and by the district and municipalities in urban areas (Ahmed and Araral 2019). At field level, various institutions are involved in distributing the irrigation water from canal/surface water bodies/groundwater sources to the farmers’ field. These institutions are either formal institutions managed by public or local communities such as warabandi system, water users’ association, government wells, etc or informal institutions such as groundwater market, private wells, etc. These institutions are intended to ensure equity and efficiency in water distribution and usage.

**Recent community-based institutional innovations** Community-based institutional innovations in water management can be seen as people coming together to address their local water-related issues. Local communities are the best guide to manage their local resources and hence, it demands awareness and empowerment among them to understand and resolve their local challenges. Experience has shown that civil society initiatives and organizations have a vital role to play in facilitating community participation. They do so by enabling the evolution and development of community-based water management models which are economically and ecologically more viable. A few recent community-led initiatives by different state governments for effectively managing scarce water resources in agriculture are presented in Table 1.



**Table 1: Community-based institutional innovations for managing water resources in agriculture in different states of India.**

Place	Objective	Interventions	Outcomes
Maharashtra (initiated in 2017)	Desilting waterbodies to restore water storage capacity and improve percolation potential under the "Gaalukt Dharan and Gaalyukt Shivar" (GDGS) scheme	<ul style="list-style-type: none"> <li>-Excavation machines were hired by community contributions or by the source of humanitarian funding</li> <li>-The fuel cost to run the machine for excavation was borne by the government</li> <li>-Farmers could have silt free of cost (carting it at their own expense)</li> </ul>	<ul style="list-style-type: none"> <li>- Till 2021, 5,270 waterbodies were desilted, increasing the water storage capacity by about 32,300 thousand M3</li> <li>-Excavated silt was spread across more than 54,000 acres benefitting over 6.4 million farmers by improving farm productivity by 2-4 times</li> </ul>
Chhattisgarh (Uttar Bastar Kanker district) (2018)	A water sufficient and poverty-free gram panchayat and to ensure women's education and participatory planning in watershed management (NITI Aayog 2021)	<ul style="list-style-type: none"> <li>-Trainings and visits were conducted with the active participation of village organizations and SHGs</li> <li>-Social and resource mapping and livelihood-focused planning</li> <li>-Communities were linked to government schemes</li> </ul>	<ul style="list-style-type: none"> <li>-Farm ponds were deepened to ensure water availability for longer periods</li> <li>-Fishery emerged as a new source of livelihood</li> <li>-Shift in cropping pattern toward vegetables</li> <li>-Higher yield and production of paddy</li> </ul>
Andhra Pradesh and Telangana (2011-13)	To bring farmers together for a sustainable model of water sharing and groundwater management by using shared networks of borewell pooling	<ul style="list-style-type: none"> <li>-Identification of farmers with borewells and building a collective of borewell owners and non-owners</li> <li>-Establish norms and capacity building to map aquifers, borewell and rainfed areas and hydrogeology training</li> <li>-Formulation of groundwater sharing norms and a system for their enforcement and maintenance</li> <li>-Mapping of agricultural land and connecting borewells to design a borewell network</li> <li>-Promotion of soil conservation practices</li> </ul>	<ul style="list-style-type: none"> <li>-Rise in groundwater level which reduced pumping time and increased water availability</li> <li>-Soil conservation together with micro-irrigation practices improved crop productivity, improved livelihood and reduced migration</li> </ul>
Jharkhand (2017)	Installation of Solar Power Lift Irrigation System (SPLIS) through community led-co-investment (supported by Syngenta Foundation of India) to ensure higher conveyance efficiency by reducing seepage loss (CGIAR 2020)	<ul style="list-style-type: none"> <li>-Farmer collectives bore 40% of the total capital cost and provided human resources for installation and the remaining 60% of the cost was contributed by SFI</li> <li>-Ownership of the pump to all those who paid for it</li> <li>-SFI provided technical guidance and support in laying the pipeline for the water supply system for pumping and distributing water from the nearby river</li> <li>-Aftercare and maintenance was managed by the community</li> </ul>	<ul style="list-style-type: none"> <li>-Increased area under irrigation</li> <li>-Shift in area under rice to vegetables and fruits</li> <li>-Increased income and enhanced lifestyle of the farmers</li> <li>-Many children moved to private schools seeking better education</li> </ul>

Madhya Pradesh (Betul district) (2017)	SHG initiative to increase access to clean, reliable and cheap energy sources through portable solar powered irrigation systems (SPIS) via Custom Hiring Centers (CHCs)	-SPIS owned and managed by CHCs were operated by women SHGs with the support of BAIF development research foundation -20% of the capital cost was borne by SHGs and the rest by SFI -Renting out portable pumps at the rate of Rs. 50 per day for drinking and irrigation	-The mean earnings of all the five groups formed for the Rabi season 2018-19 was Rs. 2,000 and Rs. 1800 for irrigation and drinking purposes, respectively -Small farmers have increased accessibility to power and can afford it
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Undoubtedly, technology plays a critical role in addressing water-related issues, but water being a social good, civic participation becomes equally important to guarantee access and equity to water resources. Although existing water policies explicitly mention the involvement of local communities in water management, its adoption and performance vary greatly across regions due to various socio, cultural and political factors.

## CONCLUSION

India has multi-tier and complex institutional arrangements for managing its water resources. Although their roles are clearly defined, a multitude of challenges and poor integration among the institutions often lead to sub-optimal management of scarce water

resources. There is large-scale inefficiency in the distribution of irrigation water to farmers. Transferring the distribution and management of water to local communities has been recognized as a major institutional intervention in existing water policies. But the wide inter-regional variation in the adoption of community-led institutions (e.g., water users' associations) and their performance necessitate a deep understanding of the social dynamics and community behaviour. Among others, the application of tools of behavioral experiments can be leveraged to develop and mobilize community institutions to address emerging water management issues. Further, successful models developed in different parts of the country need to be evaluated and promoted in other regions with similar agro-ecological and socio-cultural conditions.

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# Nutrition Sensitive Extension

08

# 52

## Local Food Systems for Food and Nutrition Security: Implications for Extension and Advisory Services

As the National Nutrition Month draws to a close, **Salome Yesudas** illustrates the need for considering the local food systems for achieving food and nutrition security, especially among the most vulnerable communities. Extension and Advisory Services could play a very important role in promoting local food systems, she argues.

*“India is my country and all Indians are my brothers and sisters. I love my country and I am proud of its rich and varied heritage. I shall always strive to be worthy of it.”* During my school days – that means for 10 years every day – we used to repeat the pledge in English and Telugu.

‘Rich and varied heritage’ talks about the diversity of India, its people, cultures, languages, and of course, food. Today sadly the picture of diversity is fading. As a community nutritionist and a researcher, I observe that food diversity is reducing day by day and monotonous insipid substitutes are cropping up for nutrition and food security. Given the rich and varied diversity in agriculture, uncultivated foods and forest foods, India should never suffer from dietary monotony or be one of the last in the nutrition and health index (Box 1).

## Box 1: India's Nutrition Situation

India has been engaged in an age-old battle to combat the issue of malnutrition. Even seven decades after Independence, despite having several policies and programmes aimed at reducing malnutrition, India's performance in this area has been consistently poor. The UNICEF report, *The State of World's Children, 2019*, noted that 69% of the deaths of children below the age of five in India is due to malnutrition, and every second child in that age group is affected by some form of malnutrition (stunting, wasting, overweight). The report finds that 35% of the children suffered from stunting, 17% from wasting, and 33% from underweight. Devastatingly, wasting among children under five years of age rose to 20.8% in 2019 from 16.5% in 2010, according to the Global Hunger Index (GHI) released in October 2019. The report also noted that 'India ranked 102 on the index among 117 qualifying countries with a score of 30.3'. Only 42% of children between the ages of six and 23 months were fed at an adequate frequency, while only 21% received an adequately diverse diet. Moreover, every second, a woman was found to be anaemic, while 40.5% of children were also found to be suffering from the same condition (EPW, 2019).

Recognising that multifactorial interventions are required to address malnutrition in the country, the Poshan Abhiyan or National Nutrition Mission launched in 2017-18, work towards 'mapping of various schemes contributing towards addressing malnutrition' and 'introducing a very robust convergence mechanism'. However, in the first three years of its implementation, the focus seems to have been largely on setting up the ICDS\_CAS (common application software) mechanisms for real-time monitoring of anganwadi services and on conducting public awareness campaigns on malnutrition. While this has helped bring the issues to the forefront, a comprehensive response to malnutrition call for much more (Sinha, 2020).

## LOCAL FOOD SYSTEMS

Especially during the COVID-19 situation local foods are the best option where there is limited mobility and suspicion about infection sources, and uncertainty with regard to safety measures in the absence of clear evidence-based guidelines. Every step outside the home is scary but necessary as the poorest of poor families are most affected by COVID-19 restrictions.

According to Bioversity international, 'When looking at diet quality and diversity, it is important to consider food systems as a whole. This means considering all the complex dimensions of a food system not just what is in a diet: production to processing; the marketability of local foods; natural resource management; and resilience to external stresses such as climate change. Taking this perspective means you are better able to understand how interventions can contribute to food systems in a sustainable and healthy way.'

Local foods include not only that from farms but also from fences, hedges, neighbourhoods,

forests, ponds, rivers, streams and also the plants that grow along with main crops and weeded systematically two to three times per season in all crops. These plants which are termed as weeds are often collected by women for food, fodder and medicinal purposes. Some of these plants are incredibly rich in micronutrients. These plants are available round the year – both in rainfed and irrigated fields.

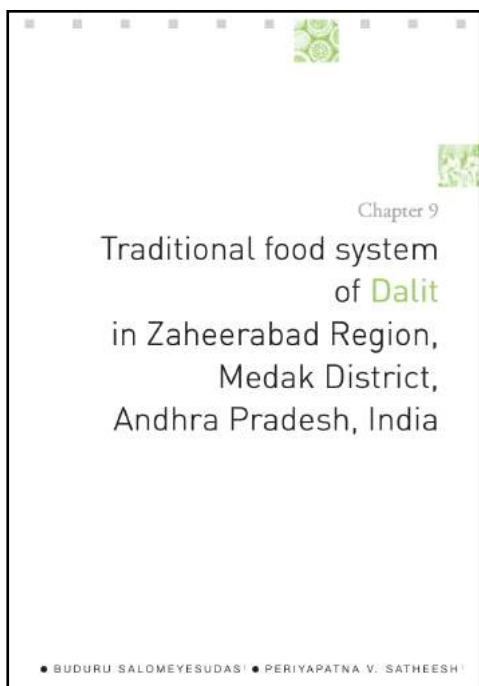
When we are looking for opportunities to enhance nutrition security, 'Forest foods and Uncultivated foods' should take priority in recommendations, but today sadly hybrid seeds, vegetable packets, packed foods, and ready to eat foods are most recommended which easily allow the junk food industry to thrive. Dr Shatrugna from the ICMR-National Institute of Nutrition (NIN), noted with concern that "beneficiaries of the anganwadi are led to believe that only what is packaged is good for children and anything prepared at home or which is traditional is not healthy and nutritious. It will delegitimize our rich food diversity, preparing our children for hamburgers, pizzas and colas" (Misra 2015).

**Note:** Stunting refers to moderate and severe - below minus two standard deviations from median height for age of reference population, whereas wasting refers to moderate and severe - below minus two standard deviations from median weight for height of reference population.

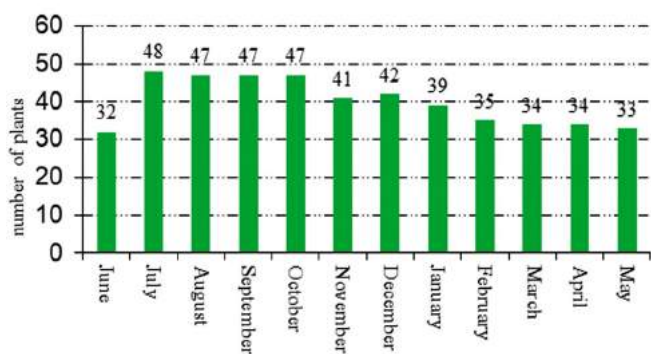
The GHI calculated hunger level and under nutrition worldwide by considering four indicators - undernourishment, child wasting, child mortality and child stunting.

In public food programmes it is important to provide children with natural and culturally-native foods, which can also be prepared with the same levels of nutrition and hygiene as packaged mixes. Deliberately during formative years children should be introduced to the local food basket rather than the junk food dustbin.

In rural areas, before spraying pesticides weeding is done across the rainfed and irrigated fields irrespective of the crops grown. While weeding, women with precision collect weeds for food, fodder and medicinal uses. From late June till next March one plant or the other from cultivated fields will be available for cooking. These greens are delicious, some are seen as auspicious, and almost all are packed with micronutrients. (For more details, kindly see Yesudas et al. 2009.)



Uncultivated Greens Calender Rainfed Farms



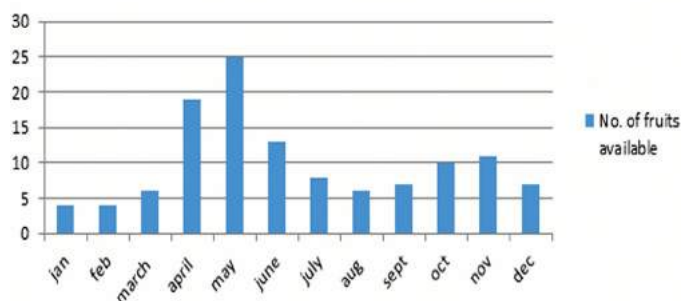
Source: Yesudas et al. (2009.)

Same is the case with Forest foods as found from a study carried out in Odisha in two districts. Even today, in spite of so much

destruction of forests, still the tribal food basket contains 12% to 24.8% forest foods around the year. The richness in forest food diversity is mind-boggling – just based on the data from 6 villages we found 21 varieties of wild edible fruits, 33 greens, 13 roots and tubers, 20 mushrooms, and about 11 other foods such as Red Ant Egg, etc. This study, 'Living Farms', Odisha, points out how uncultivated foods are not only safe, but also diverse and nutritious. Focussed on select villages of Rayagada and Sundargarh districts, the study also dwelt on socio-economic changes that are making it difficult to access the forest produce due to shrinking tree cover.

Apart from all these merits their nutrient content is mind blowing – rich in iron, calcium, zinc, magnesium, vitamin C, and beta carotene – and it is also very safe, free from human adulteration and chemical contamination. These foods can be easily accepted and accessed in villages. Therefore it's high time we include them in all government/public food systems, especially where vulnerable groups are the beneficiaries.

Forest Fruit calendar



Source: Deb et al. (2014.)

The use of forest foods is very common and makes a substantial contribution to the food and nutritional security of tribal people. It is important to undertake extensive education about their importance as a nutritionally balanced food and as a direct and indirect source of income. Many of the forest foods may not be available in future due to habitat destruction and various other calculated developmental reasons. So efforts must be taken to protect the ecosystem rather than just protecting one or two species as super foods. It is important, and the responsibility of older generations to transfer knowledge to younger

generations for continuous conservation and consumption. These foods are a community's wealth (treasure) which are also threatened very much due to human greed and intervention. To be worthy of this food wealth we should honestly strive to protect it so as to enhance not only our health and nutritional status but also the health of the entire ecosystem for the wellbeing of all humanity.

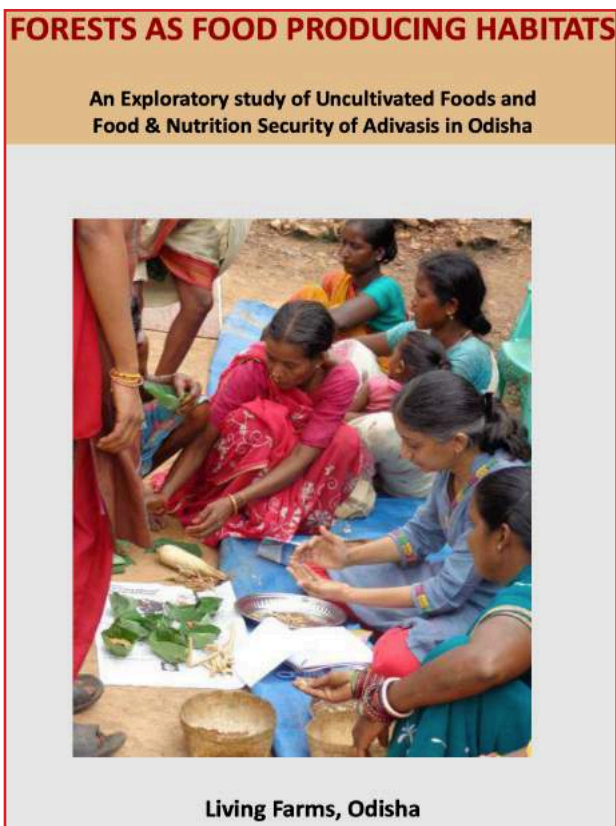
Another equally important portion of the pledge is *"I shall always strive to be worthy of it"*. If all of us, as responsible Indians really believe in this pledge, our food and nutrition security would have put India in the first five places of the index.

- knowledge providers and all rights should be with villagers;
- General trend is 3-Cs: Consumption, Conservation and Commercialising, but end up with exhaustive commercialisation leading to destruction of the source itself;
- Prepare dietary diversity registers, including cultivated foods for each Panchayath, that become their official document for future reference;
- Ensure the maintenance of uncultivated food sources in and around the immediate environment as common resources accessible to the community.

## IMPLICATIONS FOR EXTENSION AND ADVISORY SERVICES

To bring back these foods into the mainstream nutrition programmes, Agriculture Extension and Advisory Services (EAS) have a key role to play.

1. At the district level, the KVKs, ATMA and district level extension centres (e.g., DAATT centres in Telanagana and Andhra Pradesh) should conduct a survey on uncultivated foods and forest foods available locally, and promote these foods by organizing extension programmes. They have an advantage due to their familiarity with local surroundings, including people.
2. Agriculture and allied courses should include 'Uncultivated foods & forest foods' in their curriculum.
3. Capacity building programmes on uncultivated foods and forest foods should be a priority for Extension Education Institutes (EEIs), SAMETIs, and University Departments dealing with Nutrition.
4. All the extension institutes should include the realisation of nutritional security in their mandate so as to help achieve nutrition secure and healthy communities.
5. Several NGOs, such as Dhan Foundation, Deccan Development Society, Living Farms, Social Action for Community Alternative Learning (SACAL) have developed information, education and communication materials on these aspects, and their expertise should be used for strengthening training in this area.



Let us see how we can strive to be worthy of it.

- Recognize and protect all sources of food;
- Minimize forest diversions (total withdrawal from commercial utilisation may be the best option);
- Food composition analysis of all uncultivated foods and forest foods that are consumed frequently should be done;
- Other than food and nutrition, other values associated with Uncultivated foods & Forest foods should be documented for local use;
- Researchers and research institutions should be made accountable to local



# Balanced Diet for Rainy Season



## Energy Rich Food

### Cultivated

Grain- Finger Millet, Little Millet, Foxtail Millet, Sesame, Sorghum, Maize, Pearl Millet, Kodo Millet, Ramdana, Rice, and Barnyard Millet etc.  
Sugar, Jaggery, and Oil etc. .



### Uncultivated

Honey, and Mahua Oil etc.  
Mushrooms



## Protein Rich Food

### Cultivated

Pulses- Black gram, Cow pea, Green Gram, Pigeon pea, Niger, and Horse gram etc.



### Uncultivated

Non- Veg- Pigeon meat, Gunduri Chadhei, wild chicken, Rat meat, fish, crab, snails Wild chicken, & Chicken egg, and Pig meat etc.



## Protective Food

### Cultivated

Vegetable- Bitter gourd, Beans, Jack fruit seeds, Brinjal, Cucumber, Mushroom, Ivy gourd, Okra, Bitter gourd, Ridge gourd, and Pumpkin etc.



### Uncultivated

Greens- Barada Saga, Gandiri Saga, Patili Saga, Curry leaves, Colocassia leaf, Chakunda Saga, Sunusunia Saga, Drumstick leaf, Kanisiri Saga, Gurudi Saga, Musakani Saga, Kalama Saga, and Bamboo Shoot etc.

Fruits- Guava, Fig, Papaya, and Banana etc.



# Balanced Diet for Winter Season



## Energy Rich Food

### Cultivated

Grains - Finger Millet, Little Millet, Maize, Foxtail Millet, Sorghum, Ramdana ( *amaranthus* ), Barnyard Millet, Pearl Millet, Kodo Millet, Rice, and Sesame etc.  
Sugar, Jaggery, and Oil etc. .



### Uncultivated

Tubers - Pita Kanda, Yam, Phala Kanda, Bhata Kanda, Mundi Kanda, Cherenga Kanda, Colocassia, Katha Kanda, Rani Kanda, and Tapioca etc.



Mushrooms

Honey, and Chakunda Tela etc.

## Protein Rich Food

### Cultivated

Pulses - Black gram, Cow pea, Pigeon pea, Niger, Green Gram, and Horse Gram etc.



### Uncultivated

Non-Veg - Pigeon meat, Gunduri Chadhei, Wild chicken, & Chicken egg, Pig meat, and Rat meat etc.

Fruits - Fig,



## Protective Food

### Cultivated

Vegetables - Beans, Brinjal, Cluster beans, Cucumber, Papaya, Okra, Ridge gourd, Bitter gourd, Pumpkin, Tomato, Indian Spinach, Coriander leaves, Radish leaves, Amaranthus, and Radish etc.



### Uncultivated

Greens - Barada Saga, Gandiri Saga, Chakunda Saga, Sunusunia Saga, Curry leaves, Musakani Saga, Gurudi Saga, Colocassia leaves, Drumstick leaves, and Kalama Saga etc.


Fruits - Amla, Custard apple, Amla small, Sal Seeds, Banana, Guava, and Zizyphus etc.




Balanced Diet for Summer Season

Energy Rich Food

**Cultivated**  
**Grain** - Finger Millet, Little Millet, Foxtail Millet, Sesame, Sorghum, Maize, Pearl Millet, Kodo Millet, Ramdana, Rice, and Barnyard Millet etc.  
 Sugar, Jaggery, and Oil etc .




**Uncultivated**  
 Honey, and Mahua Oil etc.  
 Mushrooms




Protein Rich Food

**Cultivated**  
**Pulses** - Black gram, Cow pea, Green Gram, Pigeon pea, Niger, and Horse gram etc  
**Fruits**- Fig..




**Uncultivated**  
**Non-Veg** - Pigeon meat, Gunduri Chadhei, Wild chicken, & Chicken egg, Pig meat, Rat meat, and Red ant's egg, etc.




Protective Food

**Cultivated**  
**Vegetable**- Brinjal, Drumstick, Cucumber , Ridge gourd , Ivy gourd , Bitter gourd ,Okra ,Pointed gourd , and Tender jackfruit etc.



**Uncultivated**  
**Greens**- Barada Saga, Kalama Saga, Musakani Saga, Gandiri Saga, Colocassia leaf, Curry leaves, Drumstick leaves, and Chakunda Saga etc.  
**Fruits**- Mango, Wild cashew, Black berry, Jack fruits, Kendu, Date palm, Banana, Kusum Koli, Siali Seeds, Mahua Flower, Mahua fruits, Tamarind, Papaya, Char koli, and Pineapple etc.



Source: <https://livingfarms.co.in/>

## END NOTE

Addressing nutritional security, especially of those groups that are highly vulnerable to malnutrition, is an important priority for India. Uncultivated foods and forest foods can definitely play a key role – if they are

included in mainstream nutrition programmes, especially those focussing on nutrition sensitive agriculture. Concerted efforts to develop capacities of extension staff in the agriculture, nutrition and health sectors, on the importance and use of uncultivated foods and forest foods are critical if we are to be serious about addressing malnutrition.

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## WILL THE INTEGRATION OF NUTRITION INTO AGRICULTURE EXTENSION SERVICES HELP INDIA FIGHT ITS BATTLE AGAINST MALNUTRITION?

If we are serious about addressing malnutrition, we should also exploit the potential of agriculture and strengthen the capacities of Extension and Advisory Services (EAS) to promote Nutrition Sensitive Agriculture. This would necessitate going beyond distributing vegetable seeds and organising a meeting with women farmers during POSHAN Maah (September), argues **Tejaswini Kaja** in this blog.

India has come a long way since Independence from being food deficient to becoming a food surplus nation. Prior to the 1970s, staple food availability and price stability were major concerns which led to an emphasis on self-sufficiency in food grain production. Today, the country is not only self-sufficient in rice and wheat, it also produces over 260 million tonnes of food grains. On the other hand, direct nutritional interventions are well-established and operational through flagship programmes such as Integrated Child Development Scheme (ICDS), National Health Mission (NHM) – including Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH + A), Swachh Bharat – and others such as Pradhan Mantri Matri Vandana Yojana (PMMVY) and Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (SABLA). However, the Global Hunger Index, 2019, gives India a score of 30.3 with an alarming level of food insecurity, and a global ranking at the 104th position (out of 117 countries). Nearly 35% of the children are stunted, and 17% are wasted. Even on the subject of anaemia, we are very low with 41% and 53% of children and women, respectively, marked as anaemic.

### FOOD SECURITY AND NUTRITION SECURITY

The Food and Agricultural Policies in India have, for a very long time, been centred on calorie consumption as the primary means of achieving food security. Focus was on achieving self-sufficiency and subsequently ensuring food access at the household level. The operational tools to achieve this policy objective are procurement of food grains from farmers at assured Minimum Support Prices (MSP) and their distribution at subsidized prices to poor consumers through the Public Distribution System (PDS). With easy availability of rice and wheat through the PDS and the open market, the consumers' preference moved to refined and processed food grains, and in this process, it adversely affected the

production and consumption of more nutritious grains that have been providing more balanced nutrition. Since the COVID-19 lockdown, the last mile delivery services of nutrition via Anganwadi centres and the School Mid-day Meal programmes have been suspended in most cases,

and is partially running in only a few places. With interruptions in nutrition and other essential services and socioeconomic shocks created by the pandemic, more children are becoming malnourished due to the deteriorating quality of their diet (Headey et al., 2020).



A day at an anganwadi center in Ambedkar Nagar -B, Musheerabad Mandal, Secunderabad.

## ADDRESSING MALNUTRITION

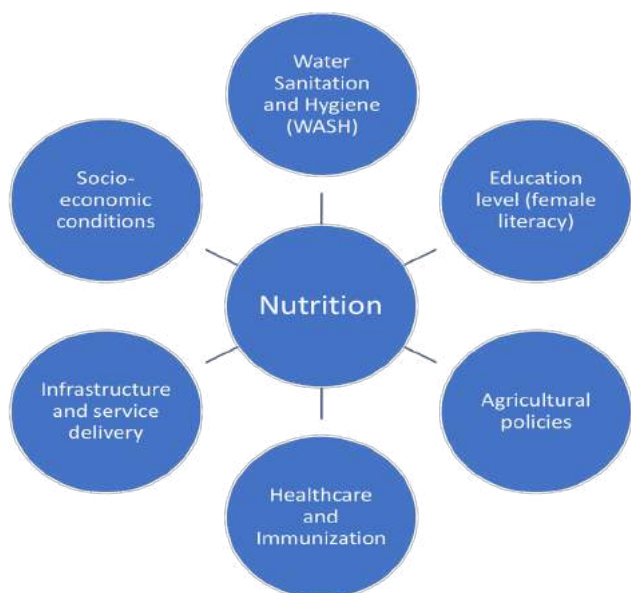
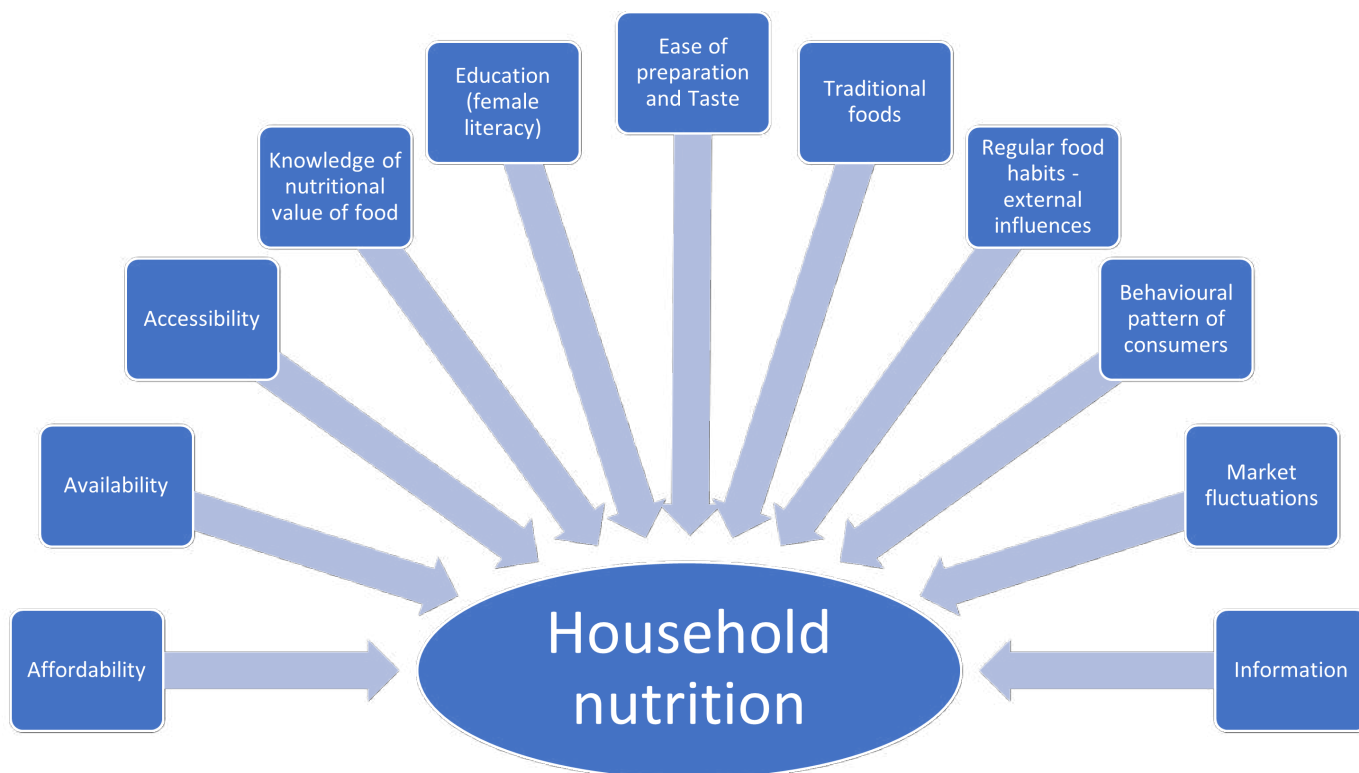


Figure 1: Factors influencing nutrition outcomes

Malnutrition is a complex, multi-dimensional issue, impacted by a number of socioeconomic factors such as poverty, inadequate food consumption caused by problems of access and availability, inequitable food distribution, improper maternal, infant and childcare

practices, inequity and gender imbalances, poor sanitary and environmental conditions, and restricted access to quality health, education, and social care services. It needs a multi-sectoral and multi-pronged solution. One sector, one organization, or one scheme alone cannot tackle this problem (Sahasrabudde, 2020). Addressing malnutrition and progressing towards targets achievement is interlinked with several other factors (see Figure 1). All these factors are mutually dependent and have to be given equal importance.

At the household level, nutritional outcomes are influenced by several factors (Figure 2). Household nutritional security depends not only on the availability, accessibility, and affordability of food but also on the knowledge of the importance of nutritional value of the food consumed. Deficient or highly variable income is one cause of food insecurity and malnutrition. Despite higher incomes, poor eating habits, lack of knowledge about good nutritional practices and limited access to diverse food items are also important determinants (Kachelriess-Matthess et al., 2016).



**Figure 2: Factors affecting household nutrition**

### Box 1: Different ways of addressing nutrition

Nutrition-specific interventions or programmes are those that address the immediate determinants of foetal and child nutrition and development — adequate food and nutrient intake, feeding, care giving and parenting practices, and low burden of infectious diseases. The nutrition-specific interventions highlighted in LANCET series (June 2013), included adolescent and maternal nutrition, promotion of optimal breastfeeding and Infant and Young Child Feeding Practices, food and micronutrient supplementation programmes for young children and in pregnancy and lactation, prevention and management of severe acute malnutrition, and disease prevention and management.

Nutrition-sensitive interventions or programmes are those that address the underlying determinants of foetal and child nutrition and development — food security, adequate caregiving resources at the maternal, household and community levels, access to health services, and a safe and hygienic environment — and incorporate specific nutritional goals and actions. Nutrition-sensitive interventions reviewed included agriculture, social safety nets, early child development and schooling.

Source: Ruel and Alderman (2013).

### Box 2: POSHAN Abhiyaan

The Prime Minister's Overarching Scheme for Holistic Nutrition (POSHAN) Abhiyaan or National Nutrition Mission, is the Government of India's flagship programme to improve nutritional outcomes for children, pregnant women, and lactating mothers. Launched in 2018, the programme directs the attention of the country towards the problem of malnutrition and addresses it in a mission-mode to significantly reduce malnutrition by 2022. NITI Aayog has been entrusted with the task of closely monitoring the POSHAN Abhiyaan and undertaking periodic evaluations.

POSHAN Abhiyaan has a four-point implementation strategy/pillars:

- Inter-sectoral convergence for better service delivery;
- Use of technology (ICT) for real time growth monitoring and tracking of women and children;
- Intensified health and nutrition services for the first 1000 days of a newborn's life;
- Jan Andolan.

Source: <https://niti.gov.in/poshan-abhiyaan>

The Government of India took a step to tackle malnutrition by launching the National Nutrition Strategy (POSHAN Abhiyaan). The POSHAN Abhiyaan recognizes the need for multi-stakeholder coordination, and calls upon multiple sectors to combat nutrition and food insecurity in the country. It aims to synergize resources, departments, and frontline workers by leveraging technology to achieve the desired goals.

Since 2018, the month of September is being celebrated in India as Rashtriya POSHAN Maah. In 2019 during the POSHAN Maah the focus was on complementary feeding, treatment, and preventing infections in children.

The Rashtriya POSHAN Maah in 2020 has two major activities at the grassroots level – identification and tracking of children with Severe Acute Malnutrition (SAM) and plantation drives to promote kitchen gardens. In recent announcements, as part of the 'POSHAN Maah' celebrations the AYUSH Ministry has also been included and nutrition solutions based on traditional healthcare wisdom will become an integral part of the POSHAN Abhiyaan.

However, in the implementation of POSHAN Abhiyaan, the focus seems to have been largely on setting up the ICDS-CAS (common application software) mechanism for real-time monitoring of anganwadi services and conducting public awareness campaigns on malnutrition (Sinha, 2020). While this has helped bring the issue to the forefront, POSHAN Abhiyaan needs to be made more comprehensive by ensuring convergence of services and functioning as a platform where multi-sector interventions, including agriculture and food systems, gender and childcare can be regularly monitored at a decentralized level, along with nutritional outcomes.

## **MAKING AGRICULTURE NUTRITION-SENSITIVE**

Currently, there is increasing recognition on the need for making agriculture nutrition-sensitive. FAO has defined Nutrition-sensitive Agriculture (NSA) as a food-based approach to agricultural development that puts nutritionally rich foods, dietary diversity, and food fortification at the heart of overcoming malnutrition and micronutrient deficiencies (FAO, 2014). This approach stresses the multiple benefits derived

from enjoying a variety of foods, recognizing the nutritional value of food for good nutrition, and the importance and social significance of the food and agricultural sector for supporting rural livelihoods. The overall objective of nutrition-sensitive agriculture is to make the global food system better equipped to produce good nutritional outcomes.

Ruel and Alderman (2013) identified six pathways through which agricultural interventions can impact nutrition:

1. food access from own-production;
2. income from the sale of commodities produced;
3. food prices from changes in supply and demand;
4. women's social status and empowerment through increased access to, and control over, resources;
5. women's time through participation in agriculture, which can be either positive or negative for their own nutrition and that of their children; and
6. women's health and nutrition through engagement in agriculture.

In India, several organisations are involved in addressing nutrition (Table 1), each one of them approaches nutrition from a different perspective. However, all these organisations are not fully realising the potential of agriculture in nutrition interventions.

In India, MS Swaminathan Research Foundation (MSSRF) proposed a Farming System for Nutrition (FSN) approach to contribute towards enhancing food security and nutrition for large sections. At its core, the approach calls for improving agricultural production diversity by incorporating an integrated farming system involving crops, livestock, and aquaculture in the field or in the homestead. Other core domains that can directly improve the local availability of deficient nutrients include agricultural production, biofortification, and agricultural value chains. Indirect or non-core domains that supplement the food related processes include nutrition-education, women's empowerment, sanitation, hygiene, safe drinking water, and natural resource management. MSSRF has been engaged in advocacy for a FSN approach in Andhra Pradesh, Bihar, Maharashtra, and Odisha (MSSRF, 2018).

**Table 1: Nutrition interventions in India**

No	Nature of intervention	Organisations involved
1.	Supplementary Feeding	ICDS/Anganwadis (Department of Women and Child Welfare), Department of Tribal Welfare
2.	Mid-day Meals	Department of Education
3.	Vaccination, Immunization, First Aid, Distribution of tablets, Health Extension	Commissionerate of Health and Family Welfare- PHCs/ ASHA Workers
4.	Research (Technical and Socio-economic)	ICMR-National Institute of Nutrition (NIN), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Agriculture Universities
5.	Nutrition Education	ICMR-NIN, Agriculture Universities, KVKs, NGOs
6.	Varietal Improvement Fortification	ICAR-Indian Institute of Millets Research (IIMR), ICRISAT, Agriculture Universities, ICAR-Indian Institute of Rice Research (IIRR)
7.	Incubation/Enterprise promotion	ICAR-IIMR, ICRISAT, National Institute of Agricultural Extension Management (MANAGE)
8.	Value Addition/ Development of new products	ICAR-IIMR, ICRISAT
9.	Advocacy	UNICEF
10.	Capacity Development of Staff	Agriculture – MANAGE, SAMETI, EEI Nutrition/Health – ICMR-NIN, Agriculture Universities Rural Development – National Institute of Rural Development and Panchayat Raj (NIRD&PR)
11.	Handholding support/Programme strengthening	UNICEF, TATA Trusts, UN-FAO
12.	Crop Diversification (Advice/Training/Demonstrations)	State Department of Agriculture (DoA), State Department of Horticulture (DoH), Krishi Vigyan Kendra (KVKs)
13.	Millet Promotion	DoA/NFSM-Nutricereals, ICRISAT
14.	Distribution of Seeds/seedlings	DoA, DoH, KVKs
15.	Policy Engagement	UNICEF, UN-FAO, TATA Trusts
16.	Kitchen Gardens	Ministry of Human Resource and Development

Source: FAO and GFRAS (2022)

## MAKING EAS NUTRITION-SENSITIVE

'Extension workers are often thought of as the vehicle to the improved nutritional health of rural communities because they reach and interact closely with farmers in different settings. Furthermore, they act as significant service providers of crop, livestock, and forestry aspects of food security, consumption, and production. It is often thought that service providers within agriculture should focus on aspects of nutrition, and service providers within health should focus on factors around malnutrition' (Fanzo et. al., 2013).

'EAS, with their established infrastructure, provide a unique opportunity for nutrition interventions to be implemented at scale with significant reach' (ibid. 2). The rationale to address nutrition through EAS is to leverage the strengths of the existing infrastructure of the EAS as they have reach; have an established infrastructure and have community trust and cultural awareness to a certain extent. In most cases, EAS also lack understanding of the food consumption pattern of its clients. 'The nutrition training of extension agents is often inadequate, particularly in the realm beyond technical agricultural skill. Additionally, a lack of career

opportunities discourages EAS agents from engaging with nutrition integration' (ibid. 3).

In India, the EAS are not addressing nutrition in their work. By and large the core expertise of the public sector EAS has been on production of food crops (mainly cereals) and export crops in which the governments are interested. The field level extension personnel of the state departments of agriculture are mostly engaged in implementation of government schemes. Addressing malnutrition is not a mandate for most of the Departments of Agriculture in India. (Recently the state of Odisha has made achieving nutrition security one of its mission directives under its new Agricultural Policy 2020.)

Training on Nutrition Sensitive Agriculture is not a part of the staff training of the Department of Agriculture in many states. In the case of KVKs, nutrition is considered as the responsibility of the SMS (Home Science) but they struggle to do meaningful work given the limited budget they have. During Poshan Maah 2020, all KVKs in India organised a one-day training programmes for ICDS/Anganwadi workers and farm women and distributed seeds and seedlings of vegetables to establish nutri-gardens.

Only recently, has there been a renewed focus on addressing the issue of malnutrition in India through agricultural interventions (for example: Millet Mission, policies to improve the nutrient content of processed foods, etc.). The Indian Council of Agricultural Research and the Agricultural Universities have introduced several biofortified varieties to combat micronutrient deficiencies. 'However, farmers are not eager to grow such crops as there is no remunerative price for biofortified grains in the market. Strengthening the seeds chain to produce and supply good quality seeds is an important step for the popularization of biofortified varieties of different crops' (Yadava et al., 2018).

The private sector, whether it is input companies or those engaged in agri-business, is more focused on input and output markets and nutrition is not their focus. Only very few NGOs, especially those working with smallholders and women, have some interest in this theme and there is a lot to learn from them. These examples are discussed below.

In its endeavour to improve nutritional security, the Reliance Foundation has supplemented the nutritional intake of rural households through promotion of small kitchen or backyard gardens, known as 'Reliance Nutrition Gardens' (RNGs). These RNGs help improve the nutrition status of small and marginal farmers and their families, providing them with a diverse mix of vegetables, fruits and medicinal plants throughout the year so as to meet the balanced dietary requirements of marginal rural households. Till date, more than 29,000 RNGs have been established. The RNG model has witnessed remarkable success and have actively helped reverse malnutrition trends in 26 programme operational clusters, improving the health and immunity of the community, especially women (Nutrition Security - Reliance Foundation 2020).

In Odisha, Living Farms, an NGO – with the support of Azim Premji Philanthropic Initiatives – addressed the underlying causes of malnutrition using a model that interlinked agriculture, food security and natural resources, which are usually seen as independent of each other and not linked to nutrition. The programme was called 'Participatory Learning and Action - Linking Agriculture to Nutrition and Natural Resources' (PLA-LANN). It aimed to improve dietary diversity and nutritional outcomes in eight blocks of Rayagada and Kalahandi districts in Odisha State. The project used a participatory approach, including community meetings, group counselling, individual home visits to target groups, and supply of garden inputs (seeds) to achieve a balanced and diverse diet for approximately 300,000 Adivasis. A study conducted to assess the impact of the programme showed statistically significant impact in the key indicators of maternal dietary diversity, Infant and Young Child Feeding (IYCF) practices, and nutrition outcomes (Verma and Sarangi, 2020).

In Telangana, Society for Elimination of Rural Poverty (SERP) and Centre for Sustainable Agriculture (CSA) are implementing the 'Half acre model' in a partnership mode to meet the nutritional requirements from vegetables (recommended intake – 325 grams of vegetables per day per person) for the poorest of the poor in select villages in Telangana.



The purpose of this programme is to help women farmers meet their own nutritional requirements from vegetables, and for creating an opportunity for a regular source of income for women farmers who adopt this half-acre model. The training on technical aspects is provided by CSA. The vegetables grown on the plot are based on what is locally feasible (suitable and locally consumable) and on a staggered production design and handling that provides a regular income throughout the year for the entrepreneur from selling the surplus vegetables in the village after self-consumption. The half-acre model is agronomically designed to prevent production problems, reduce risks, and avoid drudgery for women in the production process. So far the project has reached 23 households in 23 villages in the year 2019. It plans to scale this programme to 1700-1800 households (one person from one village) in the next stage.



**Staggered vegetable production for regular supply of vegetables by CSA**

A study in eight villages of Medak district of Andhra Pradesh (now Telangana), assessed the impacts of introducing a homestead garden and backyard poultry (BYP), an intervention linked to the Integrated Child Development Services (ICDS), over a period of three years.

The goal was to address the issue of micronutrient deficiency in diets through health and nutrition education, introduction of homestead gardens and backyard poultry with high egg-yielding birds in a rural community. The target was pregnant women and mothers with pre-school children aged 6–24 months registered with the 11 Integrated Child Development Services (ICDS) centres. The Knowledge, Attitude and Practice (KAP) survey responses showed that the percentage of families raising homestead gardens increased

from 30% initially to over 70% finally. Weekly mean frequency of cooked green leafy vegetables (GLV), increased from 1.9 to 2.4. The percentage of households cooking GLV more than three times per week increased from 21 in the initial survey to 45 in the final survey. Weekly frequency and quantity of eggs consumed, among households who set up BYP, more than doubled. ICDS records showed gradual decline in percentage of 6 to 24-month-old children suffering from moderate-to-severe malnutrition, over the three-year experimental period (Murty et al., 2016).

All these examples show how EAS can address nutrition. The key opportunities for integration of nutrition into EAS involve engaging communities, creating a demand for nutrition, use of innovative communications, and education on general nutrition, food groups, food hygiene, and food preparation.

For effective implementation of EAS, there is a dire need to do the following:

- Strengthen training on Nutrition Sensitive Agriculture through extension training centres (MANAGE, EEIs, KVKs);
- Support development of training modules on Nutrition Sensitive Agriculture for field extension workers;
- Mandate KVKs and the state Department of Agriculture to strengthen school nutrition gardens as proposed by the MoHRD, 2019.;
- Map locally available nutritious food and promote these (Yesudas BS, 2020);
- Formulate a policy on Nutrition Sensitive Agriculture at the state level;
- Organise nutrition education programmes for rural women;
- Organise training for the staff of anganwadis on how agricultural interventions can address nutrition challenges of their clients.

## CONCLUSION

We are at a stage where we all understand and agree that a holistic and systematic approach is required to address the challenges of global hunger and malnutrition in a sustainable way. It is widely accepted that an investment in food-based solutions for communities can ensure security and offer better outcomes.

At the organizational level, many organisations lack capacities to engage in joint/collaborative action with other agencies working in the area of nutrition. EAS can better address the issue of under-nutrition, if for instance, the Department of Agriculture could collaborate with the agencies involved in Health, Nutrition, Women and Child Development as well as Education. 'Systematic reviews indicate that cross-sector approaches requiring collaboration among and across a range of stakeholders can lead to better nutrition and health outcomes' (USAID, 2016).

At the individual level, Agriculture Extension Service providers should be equipped with

enough knowledge and resource materials to give appropriate advice to farmers. There is a dire need to focus on the capacity building of agriculture extension workers on the nutrition dimension. With the increased attention on, and investment in, nutrition-sensitive agriculture, EAS is an important potential contributor for delivering effective nutrition to rural farming communities. Utilising the EAS and making agriculture more nutrition-sensitive requires the identification of critical points where nutrition goals could be incorporated. It also requires a new way of thinking, planning, implementing, and partnering, as well as the active engagement of a variety of stakeholders from multiple sectors.

**NOTE 9: Integrating Nutrition into Rural Advisory Services and Extension**  
Compiled by: Susana Fanzo, July 2013

There is plenty of information available in the public domain that covers various aspects of extension and advisory services, and many practitioners for implementation. However, this note aims to offer a focused and practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to integrate nutrition into their work. This note is intended to be used as a reference tool for extension workers, rural advisory service providers, and others who are involved in rural advisory services.

**Introduction**  
There is a recognized need to address the nutritional status of rural populations, and to improve the nutritional status of rural populations. This note provides a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to integrate nutrition into their work.

**Extension workers**  
Extension workers play a key role in providing information and advice to rural populations. They are responsible for identifying the needs of rural populations and providing them with the necessary information and advice to meet those needs.

**Philosophy**  
The philosophy of this note is to provide a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to integrate nutrition into their work.

**NOTE 25: Promoting Nutrition-sensitive Extension Advisory Services**  
Compiled by: Martha Kachandira Muthoni, Annawara Mathoth, Anne Uthman, Ben Agyemang, and Ernest and Chere Ababu, September 2014

The Global Good Practices Initiative aims to facilitate access to information and know-how on agricultural extension for a wide range of practitioners. It does so by providing Good Practice Notes, which are descriptions of key concepts, approaches, and methods in an easy-to-read and user-friendly format. This note is one of the many outputs of the initiative, and is intended to be used as a reference tool for extension workers, rural advisory service providers, and others who are involved in rural advisory services.

**Introduction**  
The purpose of this note is to provide a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to promote nutrition-sensitive extension advisory services.

**Philosophy and principles**  
The philosophy of this note is to provide a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to promote nutrition-sensitive extension advisory services.

**Key messages**  
The key messages of this note are to provide a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to promote nutrition-sensitive extension advisory services.

**NOTE 26: Involving Men in Nutrition**  
Created by: Philip Dick Dixon, Cathy Beal Parworthy, and Nelson Banda, September 2016

The Global Good Practices Initiative aims to facilitate access to information and know-how on agricultural extension for a wide range of practitioners. It does so by providing Good Practice Notes, which are descriptions of key concepts, approaches, and methods in an easy-to-read and user-friendly format. This note is one of the many outputs of the initiative, and is intended to be used as a reference tool for extension workers, rural advisory service providers, and others who are involved in rural advisory services.

**Introduction**  
The purpose of this note is to provide a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to involve men in nutrition.

**Philosophy and principles**  
The philosophy of this note is to provide a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to involve men in nutrition.

**Key messages**  
The key messages of this note are to provide a practical guide to help extension workers, rural advisory service providers, and others who are involved in rural advisory services to involve men in nutrition.

**GFRAS Global Good Practices on Nutrition Sensitive Extension**

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# 54

## CONVERGENCE STRATEGIES TO STRENGTHEN AGRICULTURE-NUTRITION LINKAGES

Strengthening the agriculture-nutrition linkage is critical for addressing malnutrition in India. In this blog, **Surjit Vikraman** illustrates the importance of convergence of agriculture and nutrition-related interventions at the Panchayat level, if we want to be successful in addressing malnutrition at the earliest.

The nutritional status of a population and the ways and means to improve it has to find a place in the agenda of national governments and various international agencies. Our understanding of the nutritional status of human population, its geographical and socio-economic diversity, and the pathways and determining factors of nutritional outcomes among various communities have improved immensely in the last few decades. The recently launched report of The Global Panel on Agriculture and Food Systems for Nutrition: Foresight 2.0 presents us with the alarming state of the nutritional status of our population. Now the recent challenges on the public health front with the COVID-19 pandemic has accelerated the associated vulnerabilities and affected the slow progress mankind was making on the nutritional front. It states *'In 2019, an estimated 26% of the world's population experienced hunger or did not have regular access to nutrient-rich and sufficient foods. More than 200 million children under five face a life with insufficient food, a situation likely to get worse due to COVID-19'*.

### INDIA'S NUTRITIONAL CHALLENGES

#### **Agriculture-nutrition linkages as the key strategy**

Across the globe, Asia faces the biggest nutritional challenge among all the continents in terms of malnutrition levels among the population, diversity of issues and complexity of the pathways that influence nutritional status. The dominant role played by the agriculture sector in terms of employment generation and livelihood support for its large population makes interventions focusing on agriculture-nutrition linkages very critical for improving nutritional status. In India, nearly 60 per cent of the population is dependent on agriculture for their livelihoods. Hence emphasis on agriculture-nutrition linkages is very important for effective implementation of both supply side

and demand side factors that influence nutritional outcomes. There has been several programmes aimed at improving the nutritional status of India's population of various age groups, with special focus on women and children. The Integrated Child Development Services (ICDS) programme, Mid-Day Meal Scheme and the health care programmes of the National Health Mission were designed to address this developmental challenge. Although these programmes focus on supply side factors and is less sensitive to demand side determinants of nutritional outcomes, they have played a major role in the progress the country has achieved on the nutritional front.

### Diversity and Complexity of Institutional architecture of nutrition programmes

The institutional infrastructure and arrangements made for implementing these flagship programmes to combat malnutrition is very diverse and complex. At the national level four major ministries are engaged in designing, implementing and monitoring the activities of these programmes. There is a great deal of institutional diversity at the sub-national level, particularly at the state level, and it varies to a great extent among the various states in India. In general, the agricultural production and supply management is carried out by the Ministry of Agriculture and Farmers' Welfare, the ICDS programme is managed by the Ministry of Women and Child Development, the Mid-Day Meal Scheme is implemented by the Ministry of Education, health programmes – including preventive health measures such as vaccination – are implemented by the Ministry

of Health and Family Welfare. In addition to these, the Ministry of Consumer Affairs, Food and Public Distribution, ensures supply of sufficient food materials for the programmes run by all the ministries. All the actions of these ministries have to be coordinated, and handled at various levels (district, block, taluk and village level) for the intervention to reach the target population. This institutional infrastructure is diverse, complex, and of varying strength, especially in the integration among its constituent actors.

### NEED FOR ENHANCED CONVERGENCE

There needs to be a great deal of convergence among these institutions in order to effectively implement nutrition improvement programmes for better results. It is also critical for facilitating demand side interventions, which is currently absent in many of these programmes. Hence convergence between these ministries, which are public institutions, can enhance the impact of the ongoing programmes and is effective in improving the efficiency of actions along various pathways for better nutritional outcomes. A representative convergence strategy for better nutritional outcomes is given in Figure 1. In addition to convergence among various arms of public institutions, there should be effective convergence with various institutions in the private sphere as well as civil society. Such a convergence will have a multiplier effect on ongoing programmes and activities and contribute significantly to improvement in the nutritional status of the population.

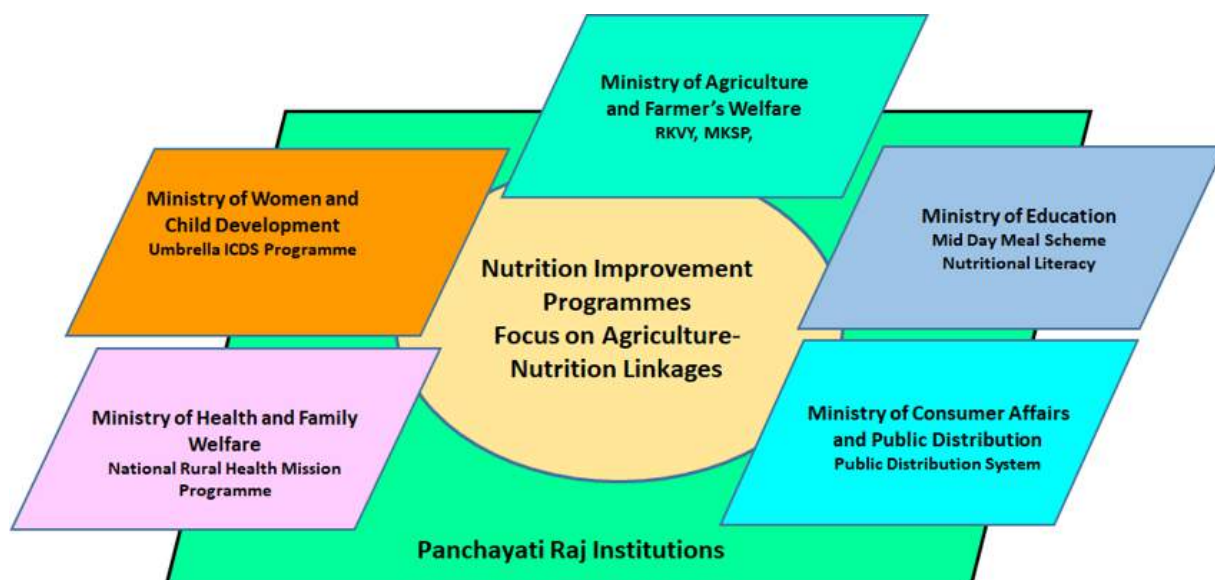


Figure 1: Panchayati Raj Institutions as platform for convergence

## Box 1: Diverse Challenges on the Nutritional Landscape

Globally 88 per cent of countries face a serious burden of either two or three forms of malnutrition. The Global Nutrition Report 2020 estimates that '1 in 9 people – 820 million worldwide – are hungry or undernourished and raises concerns about global nutrition equity.' We also have become concerned about the growing levels and nature of various forms of inequalities, socio-economic discriminations, and have realised the fallacy of associating economic growth with better nutritional status. Over the last two decades, fighting malnutrition has been at the centre stage and in the forefront of the developmental agenda laid out by MDGs during the 2000s to be achieved by 2015, carried forward by international agencies such as WHO Commitments on malnutrition to be achieved by 2025, leading up to the Sustainable Development Goal target of Zero Hunger by 2030. Countries across the globe have taken steps to develop policies, strategies and programmes to achieve the targets laid out by international alliances to fight malnutrition. However, despite the best of efforts by nations, malnutrition continues to be a critical challenge that defines our development outcomes. Assessments and experiences shows that there is huge diversity in the levels, patterns, determinants of various indicators of nutritional status of population across the world and therefore the policies, strategies and interventions should be specific and sensitive to the socio-economic specificities that define the diversity of nutritional landscape. In addition to these diversities, there are two major concerns that transgress the landscape that defines nutritional outcomes across nations in the world. The first one is the realisation and the concern about levels, nature and characteristics of growing inequality and its 'invisible' effects on nutritional outcomes, and the second one is the challenge of public health vulnerabilities to the incidence of pandemics, such as COVID-19 and the consequent impact on nutritional levels of population. These concerns make the pathways that affect nutritional outcomes complex, diverse, demanding sustained efforts to make some progress.

### STRATEGIES FOR BETTER CONVERGENCE: STATES SHOW THE WAY

In a country like India with wide-ranging geographies, varied agro-ecologies and diverse cultures, achieving convergence is a mammoth task. However, certain initiatives are happening in this direction in different states. To cite a few of them, there are initiatives in the states of Chhattisgarh, Telangana, Odisha and Kerala, that has made some progress in bringing convergence among various institutions and actors engaged in addressing the nutritional challenges of the country.

Chhattisgarh State presents an interesting case where convergence between the MGNREGA, Department of Horticulture, and Department of Women and Child Development has created a model which supplies nutritious food to members of the ICDS programme in Dhamtari district. The Agriculture Department has organised vegetable cultivation in its farm –

engaging MGNREGA workers – and supplying the production to ICDS centres in the block. This has ensured a diversified and balanced diet to the children and pregnant women in the block. The engagement of MGNREGA workers have ensured the creation of purchasing power among the vulnerable population in the area. Similarly, in Sukma district under the initiative of the district functionaries of the Women and Child Development Department, select anganwadi centres have set up small vegetable gardens which grow locally available vegetable seedlings, and its yield is included in the food served to women and children. This is a commendable example of convergence among public institutions that has worked well towards creating better nutritional outcomes.

In the state of Odisha, women SHGs were mobilised under the umbrella of Odisha Livelihood Mission activities to set up entrepreneurial ventures that produce food for supplementary nutrition initiatives. These

1. The Global Nutrition Report 2020 analysing the trend in progress of the WHO 2025 target states that 'The trend is clear: progress is too slow to meet the global targets. Not one country is on course to meet all ten of the 2025 global nutrition targets and just 8 of 194 countries are on track to meet four targets'.

2. For example, malnutrition and dietary risks are the two most important risk factors that drive death and disability in India. Malnutrition was the predominant risk factor for death in children younger than five years of age in every state of India in 2017, accounting for 68.2 per cent of the total under-5 deaths, and the leading risk factor for health loss for all ages, responsible for 17.3 per cent of the total disability-adjusted life years (DALYs).

SHGs were given training under the banner of Mission Shakti programme to produce the Take Home Ration supplied through ICDS centres to pregnant women and children. Women empowerment through various ways is embedded as an integral component at different levels of the implementation mechanism in the nutrition programmes of Odisha. This is an example of convergence between ongoing nutritional improvement programmes and institutions formed to improve livelihoods and empowerment of rural women. It also ensures facilitation of demand side interventions by providing entrepreneurial opportunities which also complement the interventions under nutritional improvement programmes.

In Telangana State, in addition to the standard ongoing programmes for nutritional improvement, the government has roped in private sector players to complement these efforts. The resources from private firms have been mobilised by voluntary agencies to provide support to the Mid-Day Meal Schemes in different schools in selected locations. An interesting feature of this initiative is the way in which individual and organisational philanthropy efforts has been streamlined to support nutrition improvement programmes, and contribute to their implementation through proper monitoring mechanisms. This programme also plans to engage with the agricultural production system to meet

the demands for vegetables and other food materials for the programme. Once established this will facilitate promotion of effective agriculture-nutrition linkages for better nutritional outcomes.

Kerala State presents a unique case with promising and emerging institutional convergence where Panchayati Raj Institutions (PRIs) are trying to create a platform for integration and collective action of various departments together with people's action for creating sustainable livelihoods. Here PRIs, which are the grassroots level institutions, coordinate the functions and activities of the four major departments responsible for programmes aimed at improving nutritional status of the population. This ensures that PRI functionaries who represent people's collective efforts and voices play a major role in implementing the programmes. It also promotes integration and convergence between actions of the key departments contributing to efficiency in implementation and better impact. In addition to that, a comprehensive oversight of the programmes by people's representatives ensures transparency, better monitoring, and creates ownership among the beneficiaries. The most notable feature is that apart from functioning as a social audit mechanism, people's voices at the grassroots level get heard, and play a major role in defining the nature and pace of interventions.



ICDS Centres at Andhra Pradesh, Chhattisgarh, Odisha, and Meghalaya.

The four cases mentioned above – the cases of Chhattisgarh, Odisha, Telangana and Kerala states – present distinct examples of promising initiatives of convergence among institutions of various forms and nature engaged in improving nutritional outcomes. These initiatives demonstrate the potential of convergences among various arms of public institutions, between public and private institutions, among public, private and institutions of decentralised governance leveraging the strength of people's action in implementing, monitoring, and improving the effectiveness of programmes that focus on rallying nutritional status of the population.

Furthermore, there is a greater realisation of malnutrition as a major developmental challenge, but the pathways that define nutritional outcomes are complex and involve multiple sectors and stakeholders that call for convergence and sustained long term efforts. Historically interventions have largely focused on supply side issues, but demand side interventions need to be given more attention. In a country like India with diversity and complexity in all aspects, specific interventions are required for impact that is sustainable and inclusive.

## CONCLUSION

There are three critical components that need urgent attention and intervention. They are given below:

- There is an urgent need for convergence across policies, programmes, activities and institutions at all levels among the various stakeholders and this is critical for improving nutritional outcomes.
- Women empowerment and leadership for women in all spheres of intervention, particularly in creating sustainable livelihoods, promoting entrepreneurship, decision making and monitoring of nutrition programmes is critical.
- Creation of convergence platforms at the grass root level through decentralisation of governance mechanisms – by strengthening of PRIs and empowering them to design, implement and monitor interventions – is essential for improving nutritional status of the population.

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# 55

## Food-Based Strategies For Nutritional Empowerment

As India celebrates Rashtriya Poshan Maah (National Nutrition Month) in September, **Salome Yesudas** highlights the importance of promoting food-based strategies for addressing the rising malnutrition levels in the country.

Malnutrition – whether undernutrition, micronutrient deficiencies or overweight and obesity – is caused by a complex interplay of economic, social, environmental, and behavioural factors that prevent people from consuming and fully benefiting from healthy diets. The most immediate causes of undernutrition and micronutrient deficiencies are inadequate dietary intake and infectious disease. Inadequate dietary intake weakens the immune system and increases susceptibility to disease; infectious disease, in turn, increases the need for more nutrients and further weakens the immune system.

There are three underlying causes of this vicious cycle:

- lack of availability or access to food (food insecurity);
- poor health triggered by poor water and sanitation and inadequate health services; and
- in the case of children, poor maternal and child-care practices, including inadequate breastfeeding and nutritious complementary feeding; and, for adults, poor food choices.

Of course, covert forces of social and economic underdevelopment and inequality often underpin these problems. A food-based dietary diversity strategy has social, cultural, economic, and environmental benefits. Agricultural diversity not only improves production but also enhances income generation and improves accessibility. Biodiverse crops will ensure sustainable diets that are environment healthy, strengthen local food systems by producing traditional/indigenous crops, and provide fodder for livestock. Home gardening, livestock production, aquaculture, and nutrition education will empower women to improve diet quality and nutritional status of the family. All these call for strengthening nutrition-sensitive extension and some ideas in this regard are discussed here.



**Tasting kichadi during recipe demonstration at Dumbriguda, Andhra Pradesh**

## **PROMOTING DIETARY IMPROVEMENT THROUGH FOOD PRODUCTION AND CONSUMPTION**

A balanced diet must contain sufficient fat, protein, energy and other key nutrients if dietary vitamin A is to be properly utilized by the body. A good daily dietary mix can be made up of a staple + pulse + an animal food + green leafy vegetables or an orange-coloured vegetable or fruit. Families should be encouraged to use all these foods to make a meal. Some examples are: staple + pulse + green leafy vegetables or an orange vegetable or fruit at one meal; staple + animal food + green leafy vegetable or an orange vegetable or fruit at another meal; addition of a small amount of fat or oil can provide extra energy if none of the other foods in the meal is energy-rich.

Inclusion of greens leaves, rajmah, finger millet, jamun, add five colours to the meal without much effort. Mono coloured diets of white rice and dal make up a huge proportion of our meal; but without spending too much we can easily change the variety in our plates if only we look for local foods.

Incorporating chicken or fish, liver or small dried fish into plant-based diets can result in marked increases in Fe and Zn absorption. Food preparation methods such as steaming

and stir frying are desirable practices for increasing micronutrient bioavailability, and should be promoted accordingly. The addition of appropriate quantities of fat or oil should also be encouraged when preparing foods containing provitamin A-rich sources, in order to facilitate their absorption. The levels and bioavailability of carotenoids in green leafy vegetables, sweet potatoes, papaya, carrot and other vegetables vary greatly, and it is therefore advisable to promote the consumption of those varieties that contain higher levels.

Foods prepared with appropriate combinations of such vegetables, along with staple grains and/or pre-formed vitamin A sources such as liver or fish, enhance the vitamin A quality of the meals. Malting, fermenting, soaking and germinating of grains and legumes, all fairly typical household practices, have been shown to remove anti-nutrients such as saponins and polyphenols, thus enhancing nutrient bioavailability (Nkhata 2018).

However, lack of awareness about these different food groups, their nutrient status and how different types of processing and cooking enable or disable availability of different nutrients is a major challenge in India, and much more effort is needed, both in rural and urban areas, so as to promote nutritional understanding among the masses.

## **PROMOTING TRADITIONAL FOODS**

The traditional food systems in India have not been researched to its full potential even though methodology for documenting traditional food systems of indigenous populations has been set out by international agencies and civil society organisations. Several indigenous populations have also been studied on their food systems. One can also refer to the AESA Blog 135 (September 2020) 'Local Food Systems for Food and Nutrition Security: Implications for Extension and Advisory Services' for more details on the topic.

Some of the studies can be accessed from the evidence which indicates that dietary diversity is strongly and positively associated with child nutritional status and growth, even after socio-economic factors have been controlled (see the references given for further reading).

In my own research studies in different states of India I have found many varieties of foods indicating a rich diversity which is available around the year if you look at them with interest.



**Forest fruits display at raw food exhibition  
Muniguda, Odisha**

To promote traditional foods, one should organise several activities. These include:

- Recipe demonstrations;
- Cooking competitions;
- Traditional recipe books in local languages;
- Sample menu sheets based on local foods;
- Raw food displays with nutritional profiles;
- Display materials on the functions of nutrients in our body;
- Field visits to local forest/agriculture fields to identify edible plants, herbs, fruit trees, mushrooms with local elderly resource persons;
- Wall paintings of local fruits/greens/tubers;
- Wall paintings of local fish, snail, prawns, crab, etc.;
- Local radio talk shows/TV shows/newspaper articles;
- Helping to create Food Diversity Registers at panchayat level for land- and water-based edible foods (forest, streams, tanks, rivers, agriculture fields, etc.);
- Drawing food sources maps of every village



**Dialogue on local greens at Jawadu Hills, Tamil Nadu**

## **KEY ROLE OF EXTENSION IN PROMOTING NUTRITION**

If the knowledge is to be translated into practice, Extension and Advisory Services (EAS) must play a very big role, and for that we need to strengthen and fine-tune their knowledge of nutrition as well as enhance

their communication skills. Apart from the field staff engaged in EAS delivery in the agriculture sector, we should also enhance the knowledge on agricultural interventions that can address nutrition among the field staff of other sectors too, such as Health (ASHA workers) and Mother and Child Welfare (Anganwadi workers), and State Rural Livelihood Missions (SRLM). But

to do this we need to have a flexible adaptive curricula and learning modules to support the training of these staff together with a mechanism to develop Training of Trainers (ToT) in these areas in these agencies.

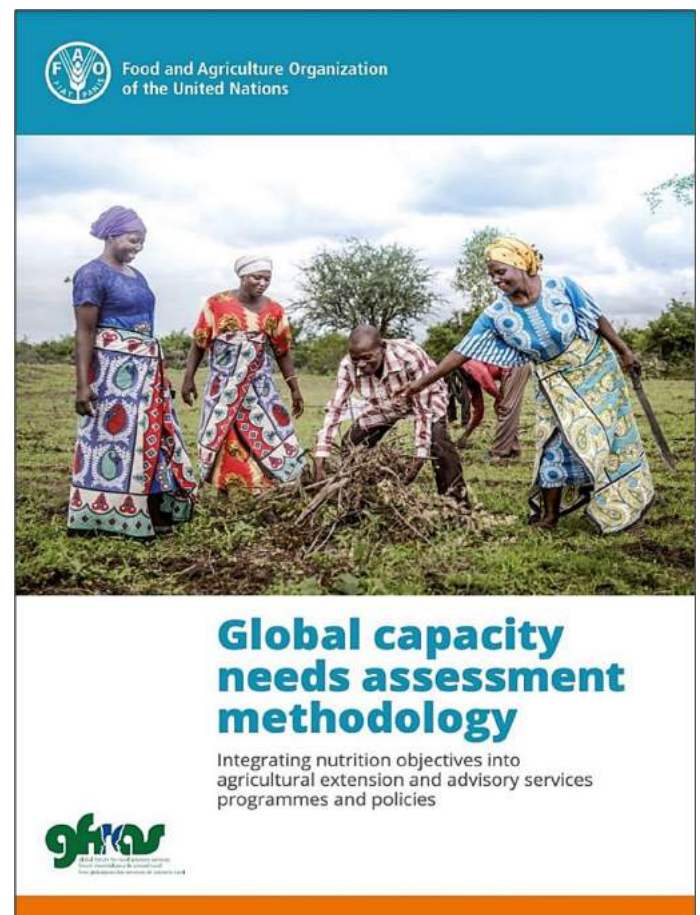
The real challenge is to train EAS, ICDS staff (anganwadi worker & cook), Health workers (Auxiliary Nurse-Midwife and ASHA workers), and Village Extension Workers (including para extension workers associated with the Department of Agriculture and Rural Development/SRLM) on basics of food and nutrition, emphasising local foods and their merits. In addition, sensitizing has to be also carried out at a higher level so as to stimulate cooperation from concerned authorities of these 3-4 departments. In addition, Agriculture, Horticulture, Animal Husbandry, Fisheries and other line departments also need to be sensitized to promote nutrition rich local foods and traditional varieties. Quite often each department works for meeting its own targets, thereby sometimes adversely affecting nutrition outcomes.

Organising short duration training programmes for in-service personnel and including the topic of nutrition-sensitive agriculture as a compulsory subject in induction trainings is a must. Outcomes of all development schemes, programmes or projects should be analysed through a nutrition lens to see how far their interventions enhance the community's food and nutrition security or not. Often times policy makers and project designers think it will happen automatically which is not the case in most projects. Nutritional outcomes are also important as financial outcomes. Grama sabhas (meetings organised by local governments + line departments at the village level) must include food and nutrition security as part of the agenda for discussion regularly.

We talk so much about convergence, networking and cooperation among departments, schemes and programmes. Despite all that anaemia and malnourishment are still haunting us after all these years and programmes. A lot needs to be done in strengthening convergence so as to achieve better nutrition.

It's time to think of locally available food-based menus to improve overall nutrition in a sustainable manner by educating mothers and adolescent girls (future mothers). Supporting small farmers and women's groups in setting up kitchen gardens and nutrition gardens is also important. The Agricultural Technology Management Agency (ATMA) and Krishi Vigyan Kendra's (KVKs) should play a major role in promoting these initiatives. Providing sample menus, organising demonstrations on kitchen/nutrition gardens, and customising plans according to the resources available at the farm/community level should be a priority for ATMAs and KVKs.

Strengthening Antenatal Care (ANC), immunization, parasitic control, hygiene and related activities and services for the most disadvantaged communities in rural and hilly areas is another area that deserves special attention. Regular dialogue with vulnerable groups (reproductive age women, mothers, and pregnant women) is critical so that they can understand the nutritional needs of the family and enable them to make wise food choices for the good of their children and themselves.



**FAO** Food and Agriculture Organization of the United Nations

**Global capacity needs assessment methodology**

Integrating nutrition objectives into agricultural extension and advisory services programmes and policies

**gftv**



**Sharing experiences on “Working with women in agri-food systems” at the IRRRI-CRISP Training on Designing and Delivering Gender Responsive Extension and Advisory Services (EAS), Bhubaneswar, Odisha**

## CONCLUSION

To achieve sustainable food and nutritional security, governments must look at several options beyond bio-fortification and industrial fortification. There are several food-based strategies for promoting dietary improvements which could come from different sources, namely, fields, farms, forests, neighbourhoods and water bodies present locally, and these can make the communities independent and responsible for maintaining the natural resources that can support year-round availability of nutritious food. Promoting a local food diversity-based strategy is the best option that we should prioritise for becoming a healthy nation.

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# 56

## IS INDIA'S PROGRESS TOWARDS NUTRITIONAL TARGETS BACKSLIDING?

Yet another POSHAN Maah has come and the government has launched POSHAN 2.0 as an extension of POSHAN Abhiyaan. In this blog **Ditty Maria Dominic** and **HR Meena** look into the country's progress towards nutritional targets and the importance of strengthening agri-nutri linkages through nutrition-sensitive extension.

Eradicating malnutrition is one of the most important global challenges and it is also a key to achieving the sustainable development goals (SDGs). Success in nutrition paves a strong foundation for success in all SDGs. For instance, improved nutrition helps in achieving gender equality, reducing poverty, and improving opportunities. Since independence India has been formulating and implementing many nutritional schemes such as Integrated Child Development Scheme (ICDS), National Nutrition Mission, etc. Nevertheless India continues to be among the countries having more than one-third of its population malnourished (Box 1). With each passing year, the targets of nutritional schemes are growing but with little progress in achieving them. Hence if India is aiming at sustainable development, nutritional issues faced by the country needs to be worked on consistently and more efficiently.

### Box 1: Malnutrition in India

The hunger and malnutrition tale has been continuing persistently in India for decades now. Despite being the world's largest food producer and fastest-growing food exporter, India ranks 71st out of 113 nations in the Global Food Security Index, 2021, and 101st out of 116 countries in the Global Hunger Index, 2021. According to the 2020 Global Nutrition Report, India is among the top three countries that are severely hit by malnutrition and the report concludes that India loses 4% of its GDP annually due to malnutrition.

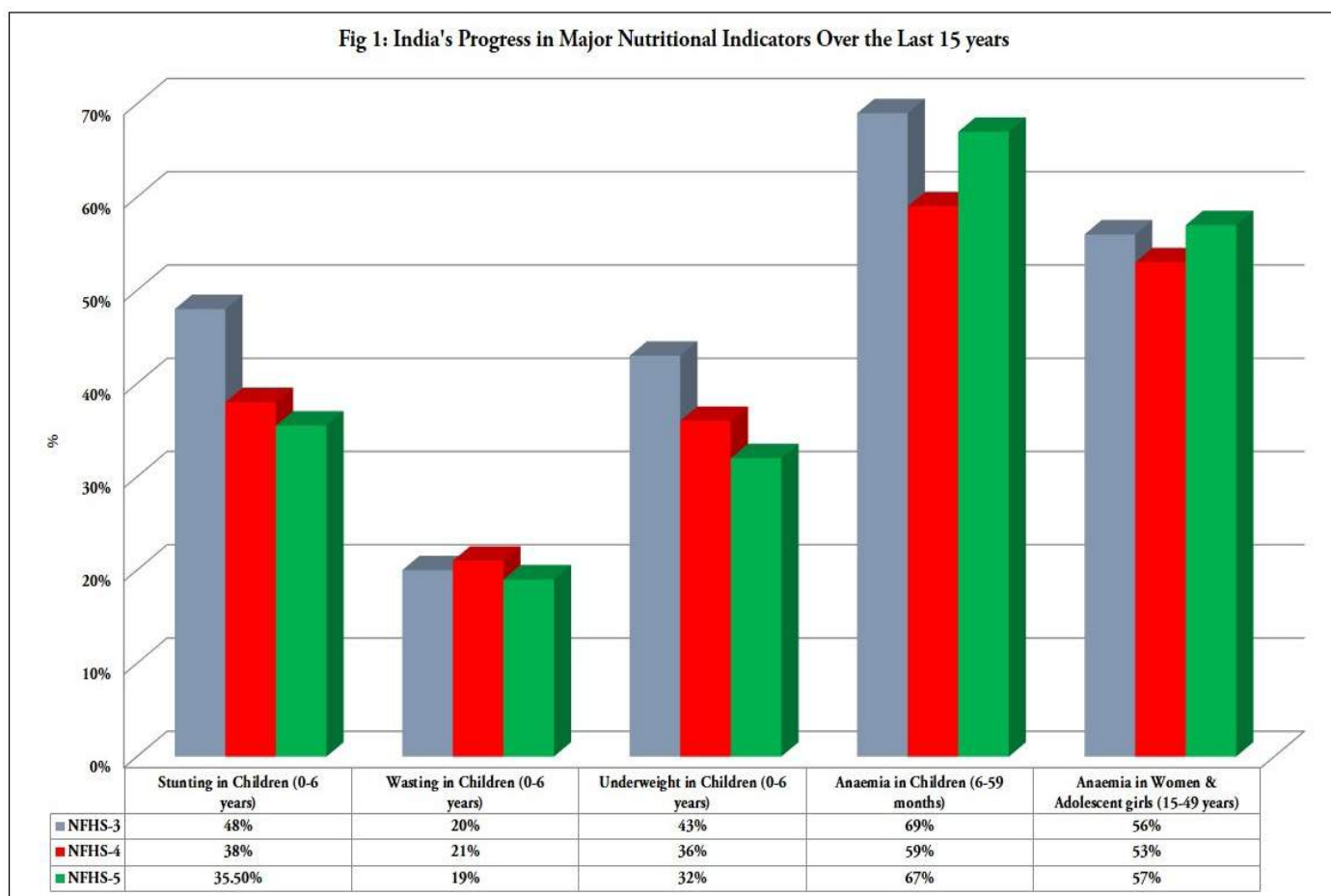
### WHAT THE DATA INDICATE?

The Prime Minister's Overarching Scheme for Holistic Nourishment also known as POSHAN Abhiyaan was ambitiously launched by the government to reduce malnutrition rates in the country with specific targets (as given in Table 1) to be achieved by 2022. But the recent National Family Health Survey (NFHS-5) (2019-21) data show that India still lags behind in achieving the set targets. If we look into the consecutive

fourth (2015-16) and fifth (2019-21) national family health survey, there has been no impressive decrease in any type of malnutrition throughout the course of the five years between 2016 and 2021.

Only three out of the five major indicators aimed at by POSHAN Abhiyaan, – stunting, wasting and underweight in children of age up to 6 years – have reduced, but in very small percentage points, in the last five years (see Fig. 1). The cases of anaemia have increased both in women and children, which is a serious issue as prevalence of anaemia is the proxy

indicator for micronutrient deficiencies and anaemia in children. This cannot be corrected easily in adulthood, potentially leading to cognitive and other impairments. By comparing NFHS-4 and NFHS-5 data it is clearly evident that stunting, wasting and underweight in children have decreased only by 3.5 %, 3% and 4%, respectively, which is much lower than the targets of the POSHAN Abhiyaan. The annual targets set has hardly been achieved in the past three years. Even if it can't be claimed that things have entirely gone wrong , nationwide, they have not gotten better. The improvements are still well short of what was aimed for.



**Table 1: Nutritional Targets**

POSHAN Abhiyaan (by 2022)	Sustainable Development Goal 2 (by 2030)
<ul style="list-style-type: none"> <li>Prevent and reduce stunting in children (0-6 years) by 6% (2% p.a.)</li> <li>Prevent and reduce under-nutrition (underweight prevalence) in children (0-6 years) by 6% (2% p.a.)</li> <li>Reduce the prevalence of anaemia among young Children (6-59 months) by 9% (3% p.a.)</li> <li>Reduce the prevalence of anaemia among Women and Adolescent Girls in the age group of 15-49 years by 9% (3% p.a.)</li> <li>Reduce Low Birth Weight (LBW) by 6% (2% p.a.)</li> </ul>	<p>India has been targeting the Sustainable Development Goal 2, through its various nutritional interventions, including POSHAN Abhiyaan. It aims at ending hunger, achieving food security and improved nutrition along with promotion of sustainable agriculture. Ending all forms of malnutrition by 2030 is one of the eight targets of SDG2. The targets referenced in the SDGs refer to WHO's 2012 resolution to reduce the number of stunted children by 40 per cent by 2025. Achieving this goal would bring the total number of stunted children down from 171 million in 2010 to 100 million in 2025.</p>

## MISSING THE TARGETS - IS COVID-19 THE REASON?

COVID-19 has pushed almost 150-199 million additional people in India into poverty (Ram and Yadav 2021). The pandemic caused food and health system disruptions making the people in developing countries more vulnerable to food and nutritional insecurity. The State of Food Security and Nutrition Report (2021) noted that, throughout 2020 the experience of food insecurity and hunger has exacerbated in Asian and African countries due to the pandemic (FAO, IFAD, UNICEF, WFP and WHO 2021). In India too, the pandemic has caused disturbances in the multiple sectors that are linked to agriculture such as food, health, social and economic sectors. Food supply chains were disrupted, income sources were lost and health sector was saturated making the country more vulnerable to nutritional problems (Gopalan and Mishra 2020; Harris et al. 2020; Kumar et al. 2020).

The closure of schools in India, which are a major source that ensures meal accessibility and immunization services for children, also threatened the nutritional security of children during COVID-19. The government made appreciable efforts to support people in coping with various national and state level programmes – food grain supply through Garib Kalyan Yojana, food kit distribution, direct transfer of Mid-Day Meal cost to primary and upper primary school students, etc. But even before the COVID-19 pandemic hit, the world was already off track with regard to achieving Sustainable Development Goal 2 to eliminate hunger and all forms of malnutrition by 2030. So, the pandemic alone cannot be seen as the cause of India lagging behind in achieving these nutritional targets, rather the pandemic revealed how little progress has been made in nutritional indicators by our country.

## IS POSHAN 2.0 THE ANSWER?

Given the under-performance of POSHAN Abhiyaan, implementing another scheme on the same lines is meaningless. Usually the problem of inadequate funding is the issue faced by most of the government programmes, but on the contrary POSHAN Abhiyaan failed to utilize the available funding of 9046 crore

(NITI Aayog, 2021). It allocated only around 7411 crore from 2017-18 to 2020. The policy formulation and planning of POSHAN Abhiyaan was well-praised and it was hinged on key pillars of supporting development of services for the vulnerable populations with the help of Technology, Convergence Action Planning, Behavioural Change Communication and Capacity building (PIB, 2018). Experts are of the opinion that inefficiency in the implementation of the scheme led to the under-achievement of set targets.

Though POSHAN has been reinvented as POSHAN 2.0, (Box 2) in order to revisit and pick up the activities for greater progress, experts are both hailing as well as sceptical about POSHAN 2.0.

### Box 2: POSHAN 2.0

Mission POSHAN 2.0 was launched by Finance Minister Nirmala Sitharaman in February 2021 to prevent any further backsliding of nutrition indicators. The announcement was made as the government decided to devote attention and resources towards integrating numerous nutrition schemes in the country. Mission POSHAN 2.0 brings together the ICDS – Anganwadi Services, Supplementary Nutrition Programme, POSHAN Abhiyaan, Scheme for Adolescent Girls and National Crèche Scheme. The objective is to implement a comprehensive, unified strategy to strengthen nutritional content, delivery, outreach and outcome, with renewed focus on developing practices that nurture health, wellness and immunity to disease and malnutrition in the country. The goal is to have a collaborative effort in executing these programmes so as to counteract regression in the health and nutrition index.

Experts are already doubtful of the higher capacity of POSHAN 2.0. Purnima Menon, Research Fellow, (IFPRI) says, "The programmatic aspects of the Mission POSHAN 2.0 can be analysed for its efficacy only when it comes in the public domain. What appears from the budget is that it is just bundling various schemes. The merger of the supplementary nutrition programme with the POSHAN Abhiyaan is business as usual. There is no increase in the allocations." Though there are new components, such as the Poshan Tracker app, making AYUSH a major part, and a slightly higher budget than before, experts are critical about this being an 'old wine in a new bottle'



approach. Also, simply bundling up the schemes alone cannot improve POSHAN Abhiyaan and this can prove to be successful only if there is clarity in roles, objectives and targets, for all the stakeholders involved.

## SCOPE OF THE AGRICULTURE-NUTRITION LINKAGE AND NUTRITION-SENSITIVE EXTENSION

Agriculture and nutrition linkages have been recognised and acknowledged globally as a major tool in eradicating malnutrition. . Studies show that agriculture plays a crucial role in achieving adequate nutrition (Pinstrup-Anderson 2006) through various pathways such as enhancing food production, raising income and women empowerment (Kadiyala et al. 2014). ). International research organizations – Consortium of International Agricultural Research Centers (CGIAR)– have been pointing out the importance of agriculture nutrition linkages through their work on Agriculture for Nutrition and Health (AG4NH). The potential of using agriculture as a tool for better nutrition and health underpins strengthening of nutrition-sensitive extension and integration of nutrition into agricultural policy.

Any intervention or activity that aims at addressing the underlying causes of malnutrition needs to be nutrition sensitive. Nutrition-sensitive agriculture is an approach to agricultural development that puts healthy foods, dietary diversity and food fortification at the forefront of reducing malnutrition and micronutrient deficiencies (FAO). Promotion of home gardens/ nutri-gardens, integration of bio-fortified crops in the food system, behavioural change communication to develop a positive attitude, and higher intention for nutrition-related behaviors are some of the ideas nutrition-extensionists can work on.

The key recommendations of the finalization workshop on ‘Global Capacity Need Assessment (GCNA) for Nutrition Sensitive Agriculture’ organised by the FAO and GFRAS, are notable and these include:

- setting up nutrition as an institutional mandate in EAS organizations,
- mapping and working with nutrition stakeholders beyond the traditional EAS in the agricultural and allied sectors,
- integration of nutrition into academic training in agriculture,
- and capacity building at all levels (FAO and GFRAS 2020).



Experts such as Dr Hema Divakar (Technical Advisor, Ministry of Maternal Health & Family Welfare), also insist on this by stating that “ASHA workers’ role is very crucial as they are the first and direct connect. We have to work on building the capacity of ASHA workers, we have to increase their task force, and we all have to think in that direction” (IBEF, 2021). Thus,

strengthening the capacity of ASHA workers, by integrating agriculture in their training curricula, is also important. The Agricultural Extension in South Asia Network has published several blogs on the topic of nutrition-sensitive extension (Box 3) and it would be useful to read these while we celebrate POSHAN month now.

### Box 3: Previous AESA Blogs and Good Practices on Nutrition-Sensitive Extension

#### BLOGS

- Surabhi M. 2019. Leveraging Extension Services for Achieving Gender and Nutrition Sensitive Agriculture, AESA Blog 98.
- Salome Y. 2020. Local Food Systems for Food and Nutrition Security: Implications for Extension and Advisory Services, AESA Blog 135.
- Tejaswini K. 2020. Will the Integration of Nutrition into Agriculture Extension Services Help India Fight its Battle Against Malnutrition? ,AESA Blog 136.
- Surjit V. 2020. Convergence Strategies to Strengthen Agriculture-Nutrition Linkages, AESA Blog 137.
- Salome Y. 2021. Food-Based Strategies for Nutritional Empowerment, AESA Blog 159.

#### GOOD PRACTICES

- Debasis Mohapatra. 2019. Public Private Partnerships to reduce Malnutrition among Women and Children, Good Practices 28.
- Er. A. Poshadri, Dr. Y. Praveen Kumar, Dr. G. Shivacharan, Dr. M. Raghuvver, Dr. M. Sunil Kumar, Dr. A. Ramadevi, 2020. Promoting Women Empowerment and Nutritional Diversity in Tribal Hamlets of Adilabad, Good Practices 33.

Although POSHAN Abhiyaan tried to tap into the potential of nutrition-agriculture linkages by including POSHAN Vatikas/nutri-gardens as a feature, its field level implementation and effectiveness is still in doubt. Mostly nutrition-sensitive extension activities see women as the primary target, which is duly supported by the fact that women play a greater role in household's nutrition and health. But due attention needs to be paid to men and their role in nutrition too (Otieno, Farnworth and Banda 2016). Men's privilege and power dynamics can influence ability of the women in their households to act on the nutritional knowledge they have been provided.

Enhancing the engagement of men in POSHAN Abhiyaan has been a mandate of POSHAN Pakhwada, but to what extent targeted activities were carried out still remains unclear. The disparities in nutrition within the household can be solved if men are also given right behavioural change communication. Nutrition-sensitive extension can be the 'Brahmastra' (or an unailing weapon) for ending nutritional problems of the country if the right effort is put in.

#### ENDNOTE

Malnutrition is a pressing issue. Investing in nutrition is one of the most cost-effective steps that can be taken for development and prosperity. Every \$1 invested in nutrition can generate \$16 in returns according to the Global Nutrition Report, 2015. Studies also show that, if developing countries could make progress

on nutritional targets, it can escalate the overall economic productivity of the country by 11 per cent. The gaps in India's nutrition policy and methods for addressing nutrition concerns are highlighted by the Global Nutrition Report 2020. It is pertinent to not overlook the existing gaps in our journey towards attaining the holistic sustainable development goals (SDGs). India cannot afford to backslide on the momentum gained in tackling malnutrition.

The country must invest in nutrition if we are to profit from our demographic dividend. But the existing paradox of underutilisation of the allocated funding throws light on the issues in implementation of the country's flagship nutritional programme, POSHAN Abhiyaan. There is still much work to be done at the field level. Instead of implementing another nutrition strategy that just bundles up the existing schemes, it is urgent to implement one that represents a radical change in both priorities and attitudes. No policy can succeed without adequate execution strategies.

Better targeting and monitoring should be given central focus. Integration of agriculture into nutritional policy and vice versa should be emphasized (FAO and GFRAS 2022). Nutrition, being influenced by multidimensional factors, key entry points should be identified for implementing nutrition-sensitive interventions. Unless thorough deliberation on the multiple entry points to tackle malnutrition cycle and nutrition-sensitive interventions are given priority, the SDG nutrition targets 2030, will recede even farther.

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# Natural Resource Management

09

# 57

## MANAGING NATURAL RESOURCES AND SAFEGUARDING HUMAN HEALTH: IS EXTENSION DOING JUSTICE TO THIS CHALLENGE?

In this blog, **SVN Rao** argues for having an extension strategy for Natural Resource Management so as to address the deteriorating natural resources critical for sustainable agricultural development.

Natural resources such as soil, water and air are crucial for agriculture. These three key resources are interconnected to each other in one way or another. Meddling with one will always have an adverse effect on the other two. Human actions play a pivotal role in conserving these resources for sustainable agriculture. But, in the race to develop agriculture (to improve the country's economy) through the introduction of modern technologies, are we forgoing to manage the quality of these resources? There is evidence on the deterioration of natural resources and risks to human health due to some of the modern agricultural developments. Given that extension professionals at the grassroots level transfer technologies from lab to land, are they really weighing the consequences of their actions on natural resources? In this blog we look into certain critical issues that affect Natural Resource Management (NRM). For example, what are the government initiatives that really touch conservation practices and what are the competent strategies that extension professionals/policy makers can bring to the table while promoting NRM?

### AGRICULTURAL DEVELOPMENT AND DETERIORATING NATURAL RESOURCES

In the case of India, agriculture and allied sectors have contributed a fair share to the progress of its economy. Research and extension interventions in this area have helped the country to become self-sufficient in food production. But, how have these efforts impacted the quality of natural resources and the environment? If we consider just one example, that of promoting input intensive agriculture, this has led to higher use of chemicals on soil and environment resulting in reduced soil fertility, soil nutrient imbalance, over exploitation of groundwater, deforestation, crop burning and others. These actions led to depletion of the groundwater table, water logging, air pollution etc. In addition, some actions,

such as crop burning, water pollution, were also found to have severe effects on human health (Chakrabarti et al. 2019; Kumar et al. 2019; GoI 2018; Suresh et al. 2018; Dar et al. 2017; Dhawan 2017; Singh et al. 2017; FAO 2015).

The consequences of chemical usage in agriculture/nature was highlighted in Rachel Carson's 1962 classic *Silent spring*, where she mentions, "In nature, nothing exists alone. If you harm environment, you will be harmed". This applies even today. Human attitude and acts towards nature is also critically valid. There is a need for transformation in agricultural practices regarding management and conservation of natural resources, where extension functionaries have a key role to play. Contemporary extension services are actively focussed on transfer of input intensive technologies among farmers. But, are there any efforts which help farmers to understand the implications of these technologies on the environment? So there is a need to understand such aspects.

### **Pollution of Natural Resources (Land, Air, Water) and Policy**

Agricultural and industrial practices can lead to natural resource pollution. Industrialization, mining activities, urbanization, and deforestation are some of the important causes for natural resource pollution. Soil degradation in India was estimated to be occurring on 147 million hectares (Mha) of land, including 94 Mha from water erosion, 16 Mha from acidification, 14 Mha from flooding, nine Mha from wind erosion, six Mha from salinity, and seven Mha from a combination of factors.

Inappropriate agricultural practices such as excessive tillage and use of heavy machinery, excessive and unbalanced use of inorganic fertilizers, poor irrigation and water management techniques, pesticide overuse, inadequate crop residue and/or organic carbon inputs, and poor crop cycle planning are leading causes of soil deterioration. Additionally, social causes like land shortage, decline in per capita land availability, economic pressure on land, land tenancy, poverty, and population upsurge are also contributing to soil degradation (Bhattacharyya et al. 2015). There is need to manage and conserve the health of soil, which is

a vital living ecosystem for sustenance of plants, animals and humans (NRCS-USDA 2021).

The UN Food and Agriculture Organisation (FAO) declared 2015 as the International Year of Soils (Box 1). In 2002, recognising the need to raise awareness on soil conservation and soil health ecosystem, the International Union of Soil Sciences with the support of FAO recommended that World Soil Day be celebrated annually. Last year we celebrated World Soil Day (2020) with the theme Keep soil alive, protect soil biodiversity, emphasising the effects of increasing population on soil, and urging all to consider the contributions of soil organisms to soil processes without which life on earth would be impossible.

#### **Box 1: International Year of Soils**

FAO declared 2015 as the International Year of Soils with a slogan 'Healthy soils are the basis for healthy food production'. It is estimated that 95% of the food is produced directly or indirectly on soils. Healthy soils are the foundation of the entire food system. Soil is the basis for agriculture and the medium in which nearly all food-producing plants grow. Healthy soils produce healthy crops that in turn nourish people and animals. Soil quality is directly linked to the quantity and quality of food produced. Soils supply all essential nutrients, water, oxygen and root support that our food-producing plants need to grow and flourish. They also serve as a buffer to protect delicate plant roots from drastic fluctuations in temperature.

(<http://www.fao.org/soils-2015/news/news-detail/en/c/277682/>)

Initiatives from the Government of India – Paramparagat Krishi Vikas Yojana (PKVY) under National mission on sustainable agriculture towards soil health management, Soil Health Cards (SHC) schemes – have been in place from 2015 to conserve soil health (GOI 2017). Awareness about these programmes are created through broadcast news, campaigns at field level by extension professionals, and trainings provided for farmers so as to recognise the importance of conserving soil health. Farmers are facilitated with soil testing and residue analysis facilities at minimal price from state/nationally established laboratories. But some of the capacity gaps within the extension system led to faulty implementation of this scheme in several places.

For instance, ineffective sample collection from farmers' fields, farmers' inability to understand the results of SHC reports/technical trainings given to them, and poor availability of timely input/lab facilities were found to be major gaps in implementing this scheme (Reddy 2017; Kishore et al. 2021).

Air quality deterioration is another major concern resulting from the actions of humans mainly in industrial and agricultural sectors. The resulting air pollution from agriculture in the form of ammonia and other forms of toxic emissions, combines with pollutants from combustion — mainly nitrogen oxides and sulphates from vehicles, power plants and industrial processes — to create tiny solid particles, or aerosols, no more than 2.5 mm across and about 1/30th the width of a human hair. These aerosols have a severe effect on human health causing heart or pulmonary disease and in extreme cases leading to death (Journal of Nature, 2015, Geophysical Research Letters).



The crop-waste burning in north western India is one of the classic examples of air pollution from agriculture. It has adverse effects on the environment, mainly with regard to emission of greenhouse gases, increase in particulate matters and smog, deterioration of soil fertility. The emission of particulate matters from crop residues are found to be 17 times more than that from other sources (vehicle emission, garbage burning and industrial discharge) in Delhi (Jitendra et al. 2017). This pollution not only contributes to global warming, loss of fertility of agricultural biodiversity, but also has hazardous effects on the health of millions living in the North, mainly Delhiites and their neighbours. The practice is commonly observed during November and December months in

north western India (Thakur 2017; Jitendra et al. 2017; NPMCR 2014; Punera et al. 2018) (Box 2).

### Box 2: Crop Residue Burning in Northwestern India

Northwestern India is known as the 'breadbasket' of the country producing two-thirds of food grains, with wheat and rice as the principal crops grown under the crop rotation system. Agricultural data from India indicates a 25% increase in the post-monsoon rice crop production in Punjab during 2002–2016. NASA's A-train satellite sensors detect a consistent increase in the vegetation index (net 21%) and post-harvest agricultural fire activity (net 60%) leading to nearly 43% increase in aerosol loading over the populous Indo-Gangetic Plain (IGP) in northern India. The ground-level particulate matter (PM 2.5) downwind over New Delhi shows a concurrent uptrend of net 60%. The effectiveness of a robust satellite-based relationship between vegetation index — a proxy for crop amounts, and post-harvest fires — a precursor of extreme air pollution events, has been further demonstrated in predicting the seasonal agricultural burning. An efficient crop residue management system is critically needed for eliminating open field burning to mitigate episodic hazardous air quality over northern India (Jethva et al. 2019).

There are several policy initiatives under Government of India with regard to pollution control and crop waste management, namely, The Air (Prevention and Control of Pollution) Act, 1981; The Environment Protection Act, 1986; The National Tribunal Act, 1995; The National Environment Appellate Authority Act, 1997; National Policy for Management of Crop Residue (NPMCR), 2014; and Section 144 of the Civil Procedure Code (CPC) to ban burning of paddy. The National Green Tribunal has imposed strict measures in the states of Rajasthan, Uttar Pradesh, Punjab and Haryana to limit crop residue burning and the act of crop residue burning is a punishable offence. Despite all these initiatives and measures, the problem demands more emphasis on sustainable crop management practices, such as live composting, biochar production, in situ management with mechanical intensification (Bhuvaneshwari et al. 2019).

Studies point to the fact that farmers mainly burn crops due to narrow turnaround time between summer and winter crops, labour-



cost concerns, as well as limited incentives and cost-effective equipment that can mechanically cut down the stubble. In addition, unspecific follow-up of these initiatives, limited awareness among farmers, poor monitoring and evaluation measures all hold back the problem for long (Bhuvaneshwari et al. 2019; Lohan et al. 2018; Jitendra et al. 2017). These gaps indicate the need to strengthen the research-extension system technically in order to address the issue.



In the case of Punjab-Haryana, the management of rice residue left after mechanized harvesting in the rice-wheat cropping system is challenging due to heavy straw load, short time window between harvesting of rice and wheat, which together are considered to be the major reason for farmers resorting to straw burning. One promising solution is the 'happy seeder', which combines straw incorporation and sowing of wheat seeds with minimal soil disturbance. Scientific trials and demonstrations have recorded the positive benefits of the happy seeder both in terms of reduced straw burning and increased yield. Increasing the availability of happy seeders and extension efforts to out scale the technology can go a long way towards minimising air pollution due to straw burning (Kumar et al. 2019; Sidhu et al. 2015). Similarly zero till method, which involves minimum soil disturbance and direct sowing of wheat seeds into the rice stubbles is a proven climate smart technology in these regions of northern India (Khan et al. 2016). Such technological promotions have wider scope in resource conservation – and this is where extension can play a key role.

Recently, the Indian Agricultural Research Institute (IARI), New Delhi, developed a

technology in solution form called 'PUSA Bio-Decomposer', which has potential to prevent stubble burning. Upon application, the solution decomposes the crop residue into manures in 15-20 days and avoids stubble burning. This helps the farmers to take up the next crop easily. This was tested successfully through on farm trials in farmers' fields. The Delhi government has taken active steps to multiply and distribute it among the farming community in respective regions, and the extension institutes/professionals have vast scope to reach such initiatives effectively to farmers (The Hindu 2020).

Groundwater is another important natural resource under discussion where over exploitation of groundwater in states like Punjab, Haryana, and others (GOI 2018; Dhawan 2017) and excessive pumping of untreated urban and industrial wastes directly into rivers and water bodies, and over use of chemicals, pesticides, fertilizers, etc., result in the depletion and pollution of groundwater. The excessive use of inorganic fertilizers and manures in agriculture have increased the nitrate levels in water resources, which results in adverse health outcomes in humans (besides methemoglobinemia), for example colorectal cancer, thyroid disease, and neural tube defects, when consumed (Ward et al. 2018). Excessive irrigation with polluted water leads to salination which in turn results in lower crop yields and renders fresh water undrinkable (Raychaudhuri et al. 2014). Further, the runoff from agricultural lands overstimulates the growth of algae which gets decomposed, robbing water of vital oxygen and harming aquatic life.

Large scale fish farming in areas like Kolleru (Andhra Pradesh) is contributing to environmental degradation. Aquaculture which uses lots of chemicals and pesticides discharge waste and chemicals into the environment thus posing serious threats to ecological balance. Over the years due to vast expansion of aquaculture farms in this region, once the largest fresh water lake in India is no longer a lake and the area was reduced to about 35% of its original size and this area is also in a degraded state (Box 3).

### Box 3: Assessment of impact of aquaculture on Kolleru Lake (India) using remote sensing and Geographical Information System

It was estimated from the topographic maps of 1967 that the total lake boundary area was 180.38 km<sup>2</sup>, in which 70.70 km<sup>2</sup> had water throughout the year and 100.97 km<sup>2</sup> had water during the rainy season. The digital image processing of the 2004 satellite data revealed that Kolleru was no longer a lake and the lake area of 62.65 km<sup>2</sup> (34.73%) only remained in a degraded state, extensively colonized by macrophytes. The total loss of lake area was 109.02 km<sup>2</sup> between 1967 and 2004, in which aquaculture was developed in 99.74 km<sup>2</sup>, which represented 55.3% of the 1967 lake area. The maximum conversion to aquaculture occurred in the lake liable to be inundated during the 1967 rainy season. The area under agriculture was 16.62 km<sup>2</sup> in 2004, the increase in lake area for agriculture between 1967 and 2004 being 8.22 km<sup>2</sup> (4.55% of lake). If human induced degradation is allowed to continue, the lake will very soon disappear. Now, the Government of Andhra Pradesh, India, has initiated schemes and laws to restore the lake to its pre-development state. Lessons learnt from the Kolleru Lake cautioned that there is need for regular monitoring of important water resources throughout the world to sustain the natural resources for future (Jayanthi et al. 2006).

The link between drinking polluted water and using polluted water in agriculture can result in health hazards which was observed in the case of Eluru city of Andhra Pradesh, India. People suddenly fell unconscious after suffering from fits and nausea. The medical diagnosis reported that the presence of lead and nickel content in drinking water and milk was the root cause of this disease (News 18, Dec 08, 2020). The rivers are polluted by industrial and urban wastes. When the improperly treated industrial/ sewage water is used in urban and peri urban areas for cultivation of green fodder and vegetables, it leads to serious health hazards for humans due to indirect consumption of heavy metals through milk and food. Similarly, indiscriminate use of pesticides and fertilizers, especially in Malwa region of Punjab, led to increase in cancer cases. Due to increase in cases and more movement of cancer patients from Malwa, Punjab to Bikaner, Rajasthan, to avail subsidized treatment for cancer, the connecting train (Bhatinda-Bikaner) is popularly known as 'cancer train'. These cases highlight the magnitude of health risks associated with indiscriminate use of agro-chemicals.

For better governance of water, and to reduce pollution and depletion the Government of India has promulgated several policy initiatives, such as National Water Policy (1987, 2002, 2012), National Water Mission (2009) under National Action Plan on Climate Change (NAPCC) with focus on natural resource conservation. These have espoused strategies like recharging of aquifers, conjunctive use of surface and groundwater, controlled extractions, improved agronomic practices and others that

have the potential to conserve the natural resources at farm level through improved soil treatment, increased water use efficiency, judicious use of chemicals, labour and energy, and increased soil carbon storage, etc. (GOI 2012; GOI 2010).

Similarly the government has taken up initiatives to promote Zero Budget Natural Farming which was highlighted in the 2019 Union Budget, to conserve natural resources and the environment from pollution and also to promote sustainable agriculture. This programme focusses mainly on chemical-free agriculture, which mainly relies on agro-ecological approaches. It is primarily dependent on organic inputs and claims that there is no application of external inputs for cultivation. So, when there is no external application of fertilizers/pesticides, the soil quality will be conserved and in turn the water and air quality is also maintained. The environment will not have any pollution from the chemicals used in agricultural practices. However, the upscaling of these initiatives requires proper incentive structures, aligning them with farmers' values and extension efforts. There are many examples from the natural resource conservation field, which looks good on paper, performs well in scientific trials, but raise no interest in farmers.

The study conducted by Reddy et al. (2004) based on secondary data to assess the impact of incentives on the adoption and maintenance of Soil and Water Conservation (SWC) practices/assets in India concluded that though the government is tackling land degradation in an integrated manner investing huge money on

ameliorative measures, the farmers' response to the state initiatives has been a mixed one. Farmers adopt and sustain only those SWC measures, which ensure adequate internal economic incentives, involve less cost and call for low collective action. Though most of the SWC practices are worthwhile from an evaluation point, it is essential to focus on adequate internal incentives and multiple objectives of farmers in matters of conservation for long-term sustenance of SWC. They recommended that a combination of subsidy and credit be explored for certain types of SWC that can enhance incentive regimes. Special emphasis need to be placed on the livestock component in SWC for fodder development and grazing facilities, which not only fetch higher returns to farmers but also prevent soil erosion due to the soil-binding property of grasses and plants. Extension agents need to play an important role in devising strategies to promote adoption of the complementary technologies, which not only benefit farmers but also conserve the environment.

## GAPS IN NRM EXTENSION

Historically, extension at the grassroot level placed higher emphasis on production-centric technologies, in line with national priorities. However, with India becoming self-sufficient in food production and a net exporter, we need to focus on conservation of natural resources. The government has also started many initiatives to promote sustainable agriculture, which balances the environment and economy trade off. The extension system needs to evolve and focus on incorporating technologies which promote resource conservation. However, it is easier said than done. Generally, the benefits of natural resource conservation are realised in the long term, the immediate impact may not be observable. The consequences of resource depletion is also gradual, so making farmers understand the need, importance and benefits of resource conservation can be challenging.

For example, Kishore et al. (2021) argues that the Soil Health Card scheme and the subsequent fertiliser dose recommendation had negligible effect on both farmers' understanding as well as their actual fertiliser use. The authors opine that educating farmers, simplifying the interpretation, personal visits

or tele advice, and repeated engagement with farmers is needed to make farmers understand the importance of soil tests and adjust fertiliser use accordingly. Similar observations are also made by other researchers like Reddy 2017; Singh and Ganguly 2018; Kumar et al. 2020)

There might be several such cases where the need for extension action was undermined by the policy which did not allocate enough budget for capacity building of extension professionals and in developing several teaching aids to educate farmers on various aspects related to NRM. We need to learn from other countries that are successfully helping their farmers in employing appropriate strategies designed to manage natural resources. Some of these strategies are mentioned below.

## Soil health strategies promoted in USA

Many organizations/universities in the USA have come out with several educational tools to help farmers on different aspects of soil health. These tools include manuals, videos and webinars, blogs, slides, etc. Further, the universities also have specialized programmes to train manpower in the area of resource extension. For instance, there are NRM programmes under Cooperative Extension at Cornell University, which offers a certificate programme on pesticide management, and safety education.

The University of Maine, USA, developed strategies for farmers to maintain soil health; and their primary strategies to improve and maintain soil health include reducing soil disturbance, keeping the soil covered as much as possible, growing a variety of plant types, and adding organic materials, such as crop residues, manures, and compost.

One example of the way the cover cropping strategy is being adopted by the farmers is given in Box 4. To quantify the benefits of cover crop in monetary terms, the farmers are advised to use resources such as the Cover Crop Economics Calculator by the USDA – Natural Resources Conservation Service. This helps farmers to realise the economic benefits of adoption. Likewise, the University is assisting the farmers in using other strategies.

## Box 4: Promoting cover crops

Cover cropping is an increasingly popular and important practice for improving economic and environmental sustainability on many Maine farms. Cover crops are plants used to improve soil health and fertility, provide beneficial insect habitats, reduce weed pressure, and/or provide other agronomic or environmental benefits. Cover crops are generally not harvested for profit, but used to improve water quality, reduce fertilizer needs, decrease insect, pest and weed pressure, protect against soil erosion, and increase cash crop yields. For example, the specific considerations for cover cropping are:

1. Setting goals – improve soil organic matter, increase soil microbial activity, improve soil structure, decrease erosion, decrease weed populations;
2. Timing – determine what time of year you can plant the cover crop and how long you can leave it in the field;
3. Planting cover crops – fertility, soil preparation and weed management;
4. Seeding rates;
5. Planting equipment;
6. Termination and incorporation.

<https://extension.umaine.edu/agriculture/soil-health/>

The above examples indicate the importance given to natural resources and how academicians and extension professionals are educating farmers through the development and use of several extension teaching tools that enable farmers to understand and use appropriate strategies for sustainable crop and livestock production.

### WHAT COULD BE DONE TO STRENGTHEN NRM EXTENSION

To contribute effectively to NRM, extension services should have sufficient support and strategies for behavioural change communication where extension activities must motivate farmers to participate, learn, trial, and adopt resource conservation and management practices (Mendham et al. 2007). There might be several resource conservation interventions but the basic principles will be essentially the same (Pannell et al. 2006). It is also necessary to involve the private sector in promoting the adoption of soil and water conservation technologies as suggested by Alwin and others (2019) based on a study conducted on zero tillage wheat adoption in Bihar.

It also depends on the extension professionals as to how well he/she can make the farmers understand the importance of the health of natural resources, and how to manage them for optimal and sustainable crop and livestock production.

For example, extension professionals must adopt strategies such as:

- Playing games to conserve water (Meinzen-Dick et al. 2018); How collective action can be promoted in conservation of a common property resource;
- Agro-climatic zone-based crop plans need to be promoted which balances environment and economy;
- Promoting farmers' community actions and community monitoring of resources (watershed projects; organic farmers associations);
- Short courses, seminars, study tours on NRM for extension professionals, students and farmers;
- Transfer updated information to farmers. This includes updating the content of package of practices, and recommending suitable eco-friendly practices which help farmers to manage and conserve resources;
- Designing and developing appropriate updated knowledge resources like context specific manuals, books, handouts, leaflets, etc.;
- Capacity building of extension professionals and also the concerned technical staff;
- Mandatorily conduct soil and water testing by the farmers in approved STLabs;
- Provide information to farmers on pollution control Acts and Laws and also keep them informed about the fines and other punishments for contaminating/polluting natural resources;
- Repeated advocacy and authentic education provided to farmers, specifically on effects and future consequences of natural resource pollution through use of pesticides/chemicals; crop burning actions.

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## ZERO BUDGET NATURAL FARMING - IS IT SCIENTIFIC AND SUSTAINABLE?

In this blog, **Nanditha KM and KM Sreekumar** discuss the pitfalls of embracing Zero Budget Natural Farming (ZBNF), as a key strategy for agricultural development and argues for a much-informed debate on it based on scientific principles and evidence.

Zero Budget Natural Farming (ZBNF) was included in 2020's Union Budget of India as a way of increasing farmers' income. The state governments of Andhra Pradesh and Karnataka have spent a huge sum in encouraging this technology. In Andhra Pradesh, 5.23 lakh farmers have converted 13% of agricultural land into ZBNF. The Government of Andhra Pradesh claimed that this type of farming is more climate resilient and named it as Climate Resilient ZBNF and has implemented it since 2015-16 through a not-for-profit-company Rythu Sadhikar Sanstha (RySS – a farmers' empowerment organization).<sup>1</sup> In Karnataka one lakh farm families are involved in it (NAAS 2019). Other Indian states are also encouraged to adopt this technology on a wider scale. ZBNF claims to encourage farmers to use low-cost locally-sourced inputs, eliminating the use of chemical fertilizers, pesticides, and without availing credit from financial institutions or local moneylenders. So it is imperative to discuss the scientific rationale of this technology in detail.

### WHAT IS ZERO BUDGET NATURAL FARMING?

Padmasree Subhash Palekar is the proponent of Zero Budget Farming. After pursuing graduation in agriculture from Nagpur Agricultural College, he started working with his father on the farm with modern agricultural technology. According to Palekar, 'when the production in his farm decreased he became demystified with modern farming and looked for alternatives. He observed that the trees in the forest yielded profusely every year without fertilizer application, whereas in the farmland addition of manures and fertilizers are essential to maintain production.'<sup>2</sup> This made him think and he concluded that all soils contain all the necessary nutrients in the correct quantity and proportion required for plant growth but was not made available due to decreased microbial

activity. So, to increase the microbial activity he proposed application of desi cow dung solution – jeevamrita – along with mulching.

The conceptual base of ZBNF contains a careful combination of Masanobu Fukuoka’s natural farming where use of paddy straw as soil mulch is practiced, and Rudolf Steiner’s biodynamic farming where spraying of diluted organic preparations over the field is followed. But Palekar denies both organic farming as well as scientific farming.<sup>3</sup>

### Box 1: Four Pillars of ZBNF

Beejamrutham is a fermented liquid consisting of cow dung, cow urine, lime, cereal powder and some soil from the field, which is used for seed treatment.

Jeevamrutha is a fermented microbial culture containing desi cow dung, cow urine, jaggery, pulse flour and a handful of soil from the farm which acts as a catalyst that promotes the activity of microorganisms in the soil. He recommends the application of jeevamrutha to the crops twice a month – either in the irrigation water or as 10% foliar spray.

Mulching with fallen leaves or dried straw conserves the soil moisture and maintains the root temperature at 25-32°C. It enhances the microbial activity. He emphasised three types of mulching viz., soil mulch, straw mulch, and lime mulch. Waphasa is soil moisture in vapour form which he believes plants are able to absorb.

Source: <https://www.insightsonindia.com/2019/07/12/insights-into-editorial-zero-budget-natural-farming-in-india/>

Now let us analyse the scientific basis of ZBNF’s claims and arguments.

### ZBNF CLAIMS

There is no need to apply chemical fertilizers, manures, and soil ameliorants in crop fields. Apply only diluted desi cow dung as microbial mixture and mulch the fields.

#### Soil Fertility

Agricultural Science developed in the last 170 years. Now we know, in detail, the roles of different nutrients in plant health. Primary (Nitrogen, Phosphorus, Potassium), Secondary (Calcium, Magnesium, Sulphur), and micro nutrients (Boron, Zinc, Manganese,

Molybdenum, Iron, Nickel, Copper) are essential for the growth of plants. If plants are not provided with these nutrients in accurate amounts and in correct proportions at the correct time it may lead to nutrient deficiency and low yield. The proportion of nutrients required for different crops varies. Starch-producing crops such as cereals and tubers require a high amount of potassium whereas leafy vegetables require a high amount of nitrogen.

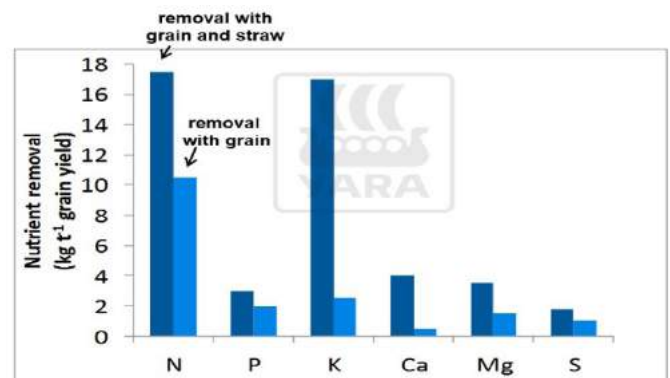


Figure 1: Average nutrient removal per 1t grain yield (macro nutrients)

Source: Dobermann & Fairhurst, 2000

Similarly, different soil types have different ratios of nutrients in it and have its own limitations in providing all plant nutrients. For e.g., lateritic soil has a high amount of iron (Fe) and aluminum (Al) and less calcium, potassium, magnesium and boron and is highly acidic in nature. Unless the soil acidity is corrected to neutrality, all the nutrients will not be made available to the plants and Fe and Al may reach phytotoxic levels. The soils of Gujarat are alkaline and addition of gypsum is essential to bring it to neutrality, and addition of Fe will improve plant health. Contrary to Palekar’s arguments, microbes alone cannot provide all the nutrients to the soil. A few species of microorganisms can fix atmospheric nitrogen but no microorganism can produce or convert an element into another that is not available/deficient in the soil.

In this context, it will be worthwhile to examine these two questions.

#### Should we manure our plants?

If plants in forest can grow without the application of manure, then why should we apply it for crops? The answer is very simple. In forests, the nutrient recycling is complete.



Plants immediately absorb the nutrients from dead and decomposed plant parts. Nutrient loss from the soil is minimum. But in a paddy-wheat system with a productivity of 10 t/ha, nutrient removal by way of harvest will be N:225 kg, P<sub>2</sub>O<sub>5</sub>:100 kg, K<sub>2</sub>O:315 kg, Ca:62 kg, Mg:38 kg, S:40 kg, Fe:4 kg, Mn:44 kg, Zn:400 g, B:300 g, Cu:300 g (Tandon 2004).<sup>4</sup> ZBNF claims that dung and urine from one desi cow can support 12 ha of land. It may be noted that one cow will give around 5 t of dung in a year which will supply 12kg N whereas the removal of N due to harvesting will be 2700 kg. Plants will show deficiency symptoms and susceptibility to pests and diseases, if the field is not replenished with nutrients, thus adversely affecting the yield. Soil testing, leaf colour chart in paddy and wheat, and index leaf analysis in other crops help in detecting these deficiencies at an early stage and its correction ensure high yield. In tree crops, the nutrient recycling is better as the roots can reach far and deep and absorb nutrients. It is a proven fact that plants absorb nutrients in inorganic form only – even if we apply organic manures. The claim that by mulching crop residues and spraying thin solution of cow dung (10 kg in 100 L water) will provide sufficient nutrients is without any evidence.

### **Will chemical fertilizers kill the soil?**

The widespread belief, which Palekar and a few others also share, is that application of chemical fertilizers will destroy the soil properties. But, ICAR-AICRP through Long Term Fertilizer Experiments (LTFE), going on for the last 50 years in different agro-eco regions and cropping systems, have proven beyond doubt the significance of balanced fertilization (Singh and Wanjari 2017). Cui et al. (2018) reported that long-term balanced fertilizer application using manure and chemical fertilizers not only increased organic material pools and nutrient availability, but also enhanced the biodiversity of the rhizospheric bacterial community and the abundance of Actinobacteria, which contribute to the sustainable development of agro-ecosystems.

### **Pest Management**

For pest management, Palekar developed three decoctions, namely agniastra, neemastra, and brahmastra, basically containing buttermilk, cow

milk, pepper powder, neem seed, garlic and green chilli (Palekar 2016). But is this sufficient to manage all the pests? Plants may be inflicted with different diseases or pests such as fungi, phytoplasma, viruses, bacteria, nematodes, mites and insects. The above mentioned astras (see Four Pillars of ZBNF) cannot cure all types of ailments because the causative organisms are diverse. Explicit acaricides can kill phytophagous mites without damaging the plant. In the same way, antibiotics, fungicides, and pesticides can manage the pests precisely, with minimum and temporary impact on the environment. World over, this is how pests and diseases are managed currently under modern farming.

### **Mulching and Waphasa**

ZBNF emphasises three types of mulching viz., soil mulch, straw mulch and lime mulch. Mulching has been practiced by farmers for several centuries and is also recommended by agricultural scientists sufficiently early. So there is no point in presenting mulching as a new technique. ZBNF recommended waphasa. Waphasa is the soil moisture in vapour form which Palekar believes plants are able to absorb. But science shows that the concept of waphasa is inappropriate. Plant roots cannot absorb water vapour. Studies have shown that only epiphytes can absorb water vapour through their roots.<sup>5</sup>

### **Is ZBNF more climate resilient than conventional farming?**

According to Palekar, ZBNF is a low-input, climate-resilient type of farming. ZBNF crops have shown greater resilience to climate shocks than non-ZBNF crops. The article 'Concept note on ZBNF' states that during 2018, Andhra Pradesh had suffered from two cyclones namely Pethai and Titli. Despite heavy winds and devastation in many parts of the state, ZBNF crops were able to withstand the cyclone due to better health of the plant root system.<sup>6</sup>

But the statement is not supported by experimental evidence. Just showing the photographs of the healthy and damaged banana fields is insufficient to support such a claim. The article, 'ZBNF as a nature based solution for climate actions', states that ZBNF is reducing carbon emission and increasing carbon sequestration in the soil<sup>7</sup>. But no

experimental data is provided on the building up of carbon in ZBNF plots over the years. Saurabh et al. (2018) made tall claims that by doing ZBNF, 17 of the Sustainable Development Goals can be achieved. But detailed reading of the document shows that all these claims are just guesswork without any experimental data or hard statistics. The design of cherry picking some case studies and making far-fetched conclusions is clearly evident.

How can agriculture be climate resilient? The Intergovernmental Panel on Climate Change (IPCC) predicts that there will be more climate-extreme events, like serious droughts or floods in the coming years resulting in severe crop loss, more outbreaks of pests and diseases, and then pests or diseases may become primary. The status of primary pests or diseases may get lowered, but nutrient deficiency syndromes may become more rampant. Untimely rains may have adverse impact on the physiology of crops. In such a situation mitigation of these impacts is important at the national level.

Development of varieties which are short duration may help in escaping from drought spells. Development of varieties by pyramiding resistant genes is a sure way of reducing pests and diseases and abiotic stress impact. Development of acidity, alkalinity and salt tolerant varieties are possible through biotechnology, without compromising on yield potential. Reducing soil acidity or alkalinity by proper amelioration and providing nutrients in an integrated manner based on soil testing will make the plant healthier with deeper root system, thus allowing them to tolerate climate change events. Deeper knowledge of plant physiology may bring solutions such as hormone application, foliar nutrition, application of chemicals like salicylic acid, etc., to overcome drought, flood, non-flowering, flower and fruit dropping, and so on. Newer irrigation methods, such as drip irrigation, have greatly increased water use efficiency. Slow release nitrogen fertilizers, such as neem coated urea, have increased fertilizer use efficiency. This shows that proper use of agricultural technologies can mitigate climate change in agriculture to a great extent – and not ZBNF. ZBNF has not been scientifically proven to be climate resilient.

## Destruction of Local Culture and Human Health

Farming practices, other than ZBNF, result in destruction of local culture/human health is another perception that needs to be addressed. The arguments about destruction of local culture or human health are baseless. In the past one century period, the longevity of people in India have increased from 25 years to 70 years because of all-round development in the areas of health, agriculture, etc. (Bhagavati and Choudhary 2015). Globally high yielding varieties and hybrids form the basis for food and nutritional security. Even though Palekar rejects hybrids and HYVs, the role played by such in increasing the production of cereals, fruits and vegetables, milk, poultry and eggs cannot be denied.

Category	Unit	2000	2019	Growth Rate from 2000 to 2019
Population	bn people	1.06	1.37	29%
Food grains	mn MT	197	297	51%
Vegetables	mn MT	94	192	104%
Fish	mn MT	6	13	117%
Fruits	mn MT	43	99	130%
Milk	mn MT	81	188	132%
Eggs	bn No's	37	103	178%
Poultry	mn MT	0.4	4	900%

Source: 1. World Bank 2. IndiaStat 3. Basic Animal/Husbandry Statistics - 2019 (Accessed on 17<sup>th</sup> October 2021)

**Figure 2: India - Population growth vs Agri. Production growth**

## PROCEDURAL FORMALITIES IN THE DEVELOPMENT AND PROMOTION OF AGRICULTURAL TECHNOLOGIES

Package of practices (POP) for crops developed by the State Agricultural Universities is considered the most appropriate guide for promoting modern farming. It is the guiding document on promotion of scientific farming by the Department of Agriculture of every state in India. A technology finds a place in POP only after testing its performance through multi-locational trials and then presenting its results in the respective Zonal Research Extension Advisory Council and at the POP Workshop at state level. During the process of technology development many experiments will be conducted, data generated, analyzed and conclusions drawn. That means, technologies will be accepted based on rigorous experimentation and scientific evidence. But when it comes to ZBNF, no such exercise was

done in Andhra Pradesh or Karnataka before it was officially endorsed by the Government of India. Finally, when doubts were expressed, the responsibility of testing was not entrusted to ICAR or SAUs by the AP Government but with CIRAD (Agricultural Research Centre for International Development) which is a French research centre working with developing countries and University of Reading, England.<sup>8</sup>

It may be noted that India has changed from a country lagging at the back of the classroom to the second best in the world in terms of value of agriculture produce because of the tireless efforts of the Indian Council of Agricultural Research (ICAR) and State Agriculture Universities. But later Niti Aayog ruled that ICAR will make an evaluation of the ZBNF system before its nationwide rollout (Economic Times, 13 July, 2020).

## STUDIES ON ZBNF

The Indian Institute of Farming Systems Research (ICAR - IIFSR) at Modipuram conducted a multi-locational comparative study. In wheat-rice cropping system 59% reduction in wheat yield and 32% reduction in rice yield under ZBNF as compared to conventional farming was reported. Wheat and rice are the backbone of our food security, so, such a reduction is to be viewed very seriously (NAAS 2020).

A 3-year study by the University of Agricultural Sciences (UAS), Dharwad has shown a decrease of 30% in yield in soybean-wheat, groundnut-sorghum, and maize-chickpea cropping system, and 17% in cotton-groundnut intercropping system under ZBNF (NAAS 2020).

A study by University of Aberdeen shows that contrary to the fears of many scientists the ZBNF system could support improved food production for low input farmers. In addition, because inputs of crop residues are high, soils are unlikely to degrade. However, the maximum potential nitrogen supply is only likely to be 52 to 80% of the average fertilizer application rate. This means that yield penalties are likely in higher input system, so widespread conversion of farms from all sectors to ZBNF is not recommended (Smith 2020).

Barucha et al. (2020) made a detailed analysis of the ZBNF movement in Andhra Pradesh and compared the yield and income of farmers under ZBNF and conventional farming. ZBNF yields were higher than non-ZBNF yields across all districts, except one. All crops, except irrigated maize and irrigated cotton, consistently show higher yields under ZBNF relative to a non-ZBNF control. Costs of cultivation under ZBNF conditions were lower, and net incomes higher than non-ZBNF for all crops. Irrigated crops achieved slightly larger reductions in costs of cultivation relative to rainfed crops. This is incredible in the first year of conversion. The data they have taken for analysis was generated by RySS but it is not foolproof experimental data – thus making it undependable for drawing objective conclusions. Third party verification of the facts and figures is a part of the methodology of science which was not followed here.

Another study (Khadse et al. 2017) glorifies ZBNF as a departure from green revolution technology but remains silent about negating the methodology of science by Palekar and testing the veracity of the tall claims of ZBNF. Munster (2018) pointed out instances of rejecting and selectively embracing science and technology by Palekar. He also noted that the main reason for the spread of ZBNF among farmers of Wayanad in Kerala is mistrust of mainstream agricultural extension usually backed by strong anecdotal evidence about clueless officials, easily noticeable evidence of the ecological costs of agrochemicals, and close experiences with the financial risks of growing cash crops. Another observation by Munster (2018) is that Palekar frames his critique of the State-Capital-Science nexus in obscurantist idioms of conspiracy theories, cultural nationalism, and Hindu chauvinism. Saldanha (2018) observed that ZBNF is promoted as a miracle solution to the numerous problems of Indian agriculture but it is riddled with inconsistencies. Moreover, the term 'Zero Budget' implies the low cost of investment required for the farming technology but the thousands of crores of rupees that are being raised for its implementation deserve some justification as well as transparent and accountable utilization.

## END NOTE

Our agricultural sector is facing lots of issues in this era of climatic extremes. We have to enhance agricultural productivity by adopting sustainable farming practices. For that, precise use of agricultural science and technology is essential. Negation of it and glorification of the old will make the farming issues more complex. ZBNF technology should be adopted only after thorough scientific examination. Promoting unproven technologies in the name of

agroecology, climate resilience and biodiversity conservation is an unfair act towards the farming community. A preliminary examination of ZBNF shows that its tall claims are untenable and it is akin to the practices followed in India prior to the 1950s when the country faced severe food shortages. It is high time that the agricultural science community comes forward with courage and conviction to publicly express its concerns on promoting ZBNF. Lack of such an effort will push the country backwards by several decades.

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## ENDNOTES

<sup>1</sup><http://apzbnf.in/>

<sup>2</sup><https://www.thestatesman.com/opinion/natural-wisdom-can-save-agriculture-1502680003.html>

<sup>3</sup><https://www.insightsonindia.com/2019/07/12/insights-into-editorial-zero-budget-natural-farming-in-india/>

<sup>4</sup>N-Nitrogen, P-Phosphorous, K-Potassium, Ca-Calcium, Mg-Magnesium, S-Sulphur, Fe-Iron, Mn-Manganese, Zn-Zinc, B-Boron, C-Copper.

<sup>5</sup><https://www.britannica.com/plant/epiphyte>

<sup>6</sup>Concept note on ZBNF <https://drive.google.com/file/d/1qQkvjZ5XkeH1LkeFsqwQr7LdRnLuQN7d/view?usp=sharing>

<sup>7</sup><https://wedocs.unep.org/bitstream/handle/20.500.11822/28895/Zerobudget.pdf>

<sup>8</sup><https://drive.google.com/file/d/1qQkvjZ5XkeH1LkeFsqwQr7LdRnLuQN7d/view>

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# 59

## SUSTAINABLE LAND-USE MANAGEMENT: A PATH TO GREEN RECOVERY AND WELL-BEING

Restoration and enhancement of natural ecosystems is critical for developing the resilience of forest and farming systems. Based on their work in this sector, **Chhaya Bhanti and Saurinder Goswami** highlight the importance of enhancing awareness, financing, capacity development, and monitoring towards natural resource management as a key priority for India.

This year, the International Day of Forests holds special significance. We're a year into a once-in-many-generations pandemic caused by a virus that crossed over to human populations through a combination of factors linked to forest and habitat loss. Warnings about the dire consequences of habitat loss — species loss, man-animal conflicts, increase in zoonotic diseases et al. — have been issued by ecologists for decades. Last year, scientists<sup>1</sup> urgently appealed for a halt to deforestation and wildlife trade, to ensure that wild animals that host pathogens dangerous to humans if crossed over, are not forced out of their natural habitats.

### RECOVERING FROM COVID-19 IMPACT

The crippling economic fallout of COVID-19, has shown the vulnerability of a business-as-usual economic approach. Employment linked to central production systems has been severely challenged, and degraded natural ecosystems in rural areas have proven inadequate to sustain the increased pressure from reverse migration. Business-as-usual does not put a price on environmental or social externalities. Quantifying how much of the pandemic's economic casualty is ultimately connected to the loss of habitat and ecosystems is still being studied. However, one thing is clear, healthy ecosystems are the only buffer we have to tackle the increased risks to humans and biodiversity, and the only insurance available to us for increasing resilience in the face of extreme events such as pandemics, which the climate data tells us, are projected to only increase.

<sup>1</sup> <https://pubmed.ncbi.nlm.nih.gov/32703868/>

No discussion about recovery and well-being is complete without a massive focus on the restoration and enhancement of natural ecosystems. In India more than a quarter of the population is sustained by forest ecosystems, while almost half of the population needs agriculture for sustenance. The provisioning and regulating services from natural ecosystems are essential to the economic, social and environmental prosperity of India's rural and urban populations.

## CONSERVING ECOSYSTEMS & PROTECTING BIODIVERSITY

### Box 1: IORA and Vertiver

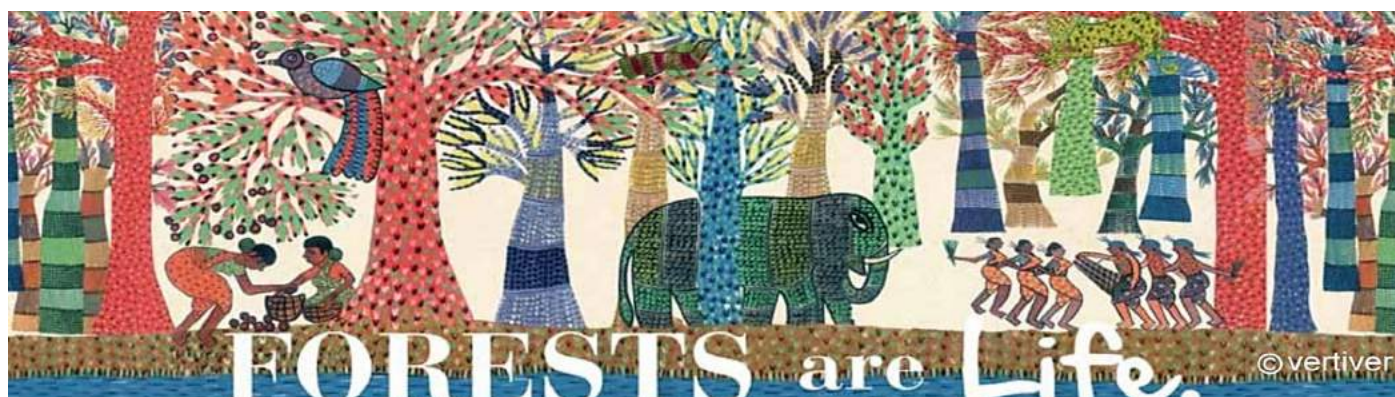
IORA Ecological Solutions is an environmental advisory group that specializes in policy, finance and technology-based approaches for climate action and biodiversity conservation through nature-based solutions. (<http://ioraecological.com/>)

Vertiver is a sustainability consultancy that works at the overlap of behaviour change, communications and knowledge dissemination to enable cross-sectoral implementation of nature-based solutions. (<https://vertiver.com/>)

Through our work at IORA and Vertiver (Box 1) we've had the chance to work on multi-disciplinary projects on natural resource management, land restoration, forest conservation, sustainable agriculture along with climate change mitigation and adaptation across India through policy, technology, finance, behaviour change and communications approaches. Having spatially mapped over 10 million hectares of forests over 27 states of India since 2010 to study land use-land cover change, we see a pattern of degradation of forest stock, proliferation of invasive species, loss of water bodies, and forest fires across the country. We have applied these data

insights to the design and implementation of many on-ground nature-based solutions that conserve ecosystems and protect biodiversity. These, simultaneously lead to many economic and social benefits and co-benefits such as livelihoods, improved health, increased resilience and climate change adaptation, among many others.

In Sikkim, we have worked on Jurisdictional REDD+ as part of the USAID-MoEFCC Forest-PLUS programme to enable resources and capacity for improved forest management. We have also worked on creating a state-level GHG emissions reporting system in Sikkim. In Mizoram, we have worked on reducing forest vulnerability from Jhum Cultivation, and identified approaches that blend traditional knowledge on resource use and management with development of suitable farming machinery for upland systems. In Assam, we have proposed innovative technological and community-led approaches to manage forest land, and developed a framework for carbon neutral development. In Madhya Pradesh and Karnataka, we have worked with communities to reduce pressure on forests by implementing fuelwood reduction and value addition technologies and creation of FPOs to help communities derive more value from the sustainable harvesting of and sale of Non-Timber Forest Products (NTFPs). In Maharashtra, we have supported DFID on the development of decision support tools for selection of appropriate species for varying landscapes. In Kerala, we have proposed landscape management approaches to address both forestry and agriculture ecosystem management, and in Gujarat we have worked on climate change adaptation and mitigation with farmers through sustainable agriculture practices.



## LESSONS FROM IMPLEMENTATION

These, and other projects, point to the need for enhancing awareness, financing, capacity building and monitoring towards natural resource management as a key priority for India.

### **Strategic Communication**

Awareness requires strategic and well-planned communications that focus not on the problem but on the type of solutions that are required. One of the key issues in conservation work is that although practitioners share data that emphasizes the problem, solutions are not well-communicated, confusing policy makers and citizens alike. We have seen that multi-lingual, context-specific communications that balance technical data with engaging interactive content and dissemination (across digital or folk performances) require visual thinkers and domain experts working together to create a common roadmap that rallies communities, policy makers, and funders. Awareness is also connected to the knowledge and dissemination of new tools that enable Artificial Intelligence-(AI) led advisory for agriculture, remote Decision Support Systems for improved forest management, SMS and other low-tech interactive response tools for farmers, Apps and Digital Forums for peer-to-peer learning, and citizen science approaches to increase stakeholder participation in management processes.

### **Financing**

Financing that supports natural ecosystem management mostly include government funding and foundation grants, but as the private sector begins work to mitigate risk to their supply chains from loss of ecosystems, private sector partnerships are also seen as vital to meeting the funding gap that exists. Funding from MGNREGA, which already allocates a small portion for employment through improvement in green cover, can be enhanced to reduce the gap between need and availability of resources for such work. Some approaches, such as green bonds, REDD+, Voluntary Carbon Markets and Green Tree Credits, are fast emerging to supplement public funding. Emerging blockchain encrypted technologies which can tokenize trees and their benefits are avenues that our organizations are now starting to

explore. Our work on biodiversity financing a few years ago, showed that companies have been able to assess the vulnerability of their supply chains to loss of ecosystems and biodiversity, and as a result they are pledging to improve biodiversity through direct and indirect investments. Examples include, ITC's investment of over USD 42 million in forestry and biodiversity conservation in 2018-19.

### **Capacity Development**

Capacity development is a massive need across all aspects of the natural resource conservation value chain in India. From a forest ranger who needs training on new tools to manage forest fires, to a farmer who needs new knowledge on transitioning to low-carbon agricultural practices, to a woman farmer whose knowledge on nutrition-centric crops and value addition needs enhancing, to officials who need to gain new skills for managing data, to communities who must be taught improved management of seed banks and harnessing other indigenous knowledge, to FPOs that can gain certification for sustainable produce, to knowledge management systems that provide on-demand resources, to mapping of overlaps between different departments, data and relevant linkages for improved decision making — there are countless needs for building the capacity of all sectors to enable an integrated approach to natural ecosystem management which can lead to improvement in soil and water quality and enhancement of ecosystem services. We are currently working with GIZ to build the capacity of groundnut farmers and extension workers in Gujarat, to help them build resilience under various climate scenarios.

### **Monitoring**

Finally, all investments in improving our natural ecosystems can only yield positive results if robust monitoring systems are in place to assess their ongoing impact. These include enabling communities to monitor their own ecosystems with simple technologies such as geo-tagging and picture uploads to more sophisticated spatial monitoring of land use change as an outcome of interventions. In addition, primary monitoring of related farm-based incomes, biodiversity, soil and water quality and market linkages is also required to create reinforcing cycles of information linked



to iteration, and improvement of interventions if required. The monitoring must continue until the intended objective has been achieved. We are currently carrying out a monitoring of all state-level investments in major schemes such as CAMPA (Compensatory Afforestation Fund Management and Planning Authority) in Telangana and IGC (Increasing Green Cover) in Odisha.

## SUPPORTING MITIGATION

As part of its work on climate change mitigation and adaptation, India under its Nationally Determined Contributions (NDC) Goal 5, aims to capture an additional 2.5 to 3 billion tonnes of carbon stock in its forests for climate change mitigation and adaptation. Our work with the Ministry of Environment, Forest and Climate

Change (MoEFCC) on creating a roadmap for NDC Goal 5 revealed several challenges including inadequate nursery capacity. To support India's ambitious goals for increasing green cover including through Trees Outside Forests (ToF) technology can play a catalytic role by connecting nursery capacity with landscape-aligned species plantation as well as by connecting financing with verified plantation, and ongoing monitoring of such investments. We are also currently serving as partners to the International Union for Conservation of Nature (IUCN) and MoEFCC, on India's first Forest Landscape Restoration (FLR) assessment project across five Indian states to enhance natural ecosystems. FLR ensures that conversations on forestry, biodiversity and agriculture are happening under the same lens to address land degradation in a holistic approach.



**Ground Truthing at Sikkim**

**Field Assessment at Manipur**

## END NOTE

Loss of biodiversity, including agro-biodiversity, is a critical issue that needs addressing for improving ecosystems. Some years ago, we supported an IUCN/ITC study on Sustainable Agriscapes in Bihar, which highlighted the importance of pollination, pest control, nutrient cycling and water services from forests to enable sustainable agriculture. This was a great example of a business taking a prescient approach and correlating agri-yields with forest ecosystems. Many such studies are needed to map the importance of vital agro-forestry ecosystems to improve the health of natural ecosystems.

Forest and agro biodiversity have direct links to developing resilience of forest and farming systems and communities. Agricultural communities with local seed banks are also

important custodians for maintaining this biodiversity. Building their capacity, to make crop decisions that help them adapt to climate change, will be key to reducing climate vulnerability and creating sustainable food systems. Due to population pressures, yield per unit area of land will need to increase through crop intensification. Encroachment into forest lands that typically results from increasing agricultural production can also be addressed through this approach. Work on water use efficiency and crop management under the Transforming India's Green Revolution by Research and Empowerment for Sustainable food Supplies (TIGR2ESS) project on sustainable agriculture, in which we serve as partners, show that diversified cropping patterns, climate resilient crops, and restoration of local water bodies are important tools for building resilience. (<https://tigr2ess.globalfood.cam.ac.uk/>).

Forests and farms play a pivotal role in climate change mitigation and adaptation. The almost 22% of forest area in India accounts for 7.1 Billion tonnes of carbon stock and agriculture is responsible for 22% of GHG emissions. Agriculture in India is also responsible for almost 89% of all groundwater use because of the high resource use practices and demand patterns. In addition the deep root systems in forests help in soil formation and protection which can solve the declining fertility of adjoining agricultural lands. Forest and tree systems can also substantially avoid soil runoff into rivers – thereby addressing the twin problems of erosion and floods. Forests serve

as water catchments and well-maintained watersheds can provide enough water supply for agriculture in the vicinity. They are also the most effective and efficient carbon sequestration technology available. Putting nature-based solutions at the heart of economic recovery is vital to shifting away from the business-as-usual approaches that exacerbate climate risks. As we continue work on protecting biodiversity and habitats, and linking ecosystem conservation with climate change mitigation and adaptation in India, we invite collaborations that help mainstream the restoration and enhancement of our vital natural ecosystems.

# 60

## EXTENSION AND ADVISORY SERVICES FOR SUSTAINABLE WATER USE: LEARNING FROM THE EXPERIENCES OF CWRDM

As the world prepares to celebrate this year's World Water Week during 23-27 August, through this blog **U Surendran and Manoj P Samuel** discuss the role of Extension and Advisory Services in promoting sustainable water use.

Water is truly at the core of sustainable development. Water is significantly linked to climate change, agriculture, food security, health, equality, gender and education, and there is already international agreement that water and sanitation are essential to the achievement of many of the UN's sustainable development goals. More than any other natural resource, water is considered to be the elixir of life. So, the conservation of water resources is very important, especially for our collective future. The utilization of water and water resources will become more crucial in the coming years. Sustainable water management is designed and practiced for the conservation and utilization of water and water resources. This concept intends to minimise water consumption, maximise the use of sustainable water resources, make water systems sustainable and reduce water pollution.

Currently, agriculture accounts (on average) for 70 percent of all freshwater withdrawals globally (and an even higher share of 'consumptive water use' due to the evapotranspiration of crops). Water plays an important role in food security by being a critical input for agricultural production. Irrigated agriculture represents 20 percent of the total cultivated land and contributes 40 percent of the total food produced worldwide. Due to population growth, urbanization, industrialisation and climate change, competition for water resources is expected to increase, with particular impact on agriculture. Promoting sustainable water use therefore should be a priority for both research as well as Extension and Advisory Services (EAS) in the agricultural sector.

*"When the well's dry, we know the worth of water."*

**– Benjamin Franklin**

# World Water Week 2021

## 23-27 August • Online

World Water Week 2021 will be held under the theme *Building Resilience Faster*, with a focus on finding concrete solutions to the world's greatest water-related challenges, starting with the climate crisis and including water scarcity, food security, health, biodiversity, and impacts of the Covid-19 pandemic.

### EXTENSION AND ADVISORY SERVICES FOR SUSTAINABLE WATER USE

Extension and Advisory Services (EAS) is often presented as one of the most important influences on the adoption of any innovations, especially from the point of view of the technology supply push theory. This is because extension can help users/stakeholders overcome barriers or constraints in achieving their goals. In the case of Agricultural Extension Services, it has been shown that when the extension services are more accountable, and work in tandem with farmers' needs, and provide the required technical knowledge and information, then it is more successful. EAS for sustainable water use should support application of scientific research, knowledge,

and technologies to improve water use efficiency in agriculture through farmer education.

### Centre for Water Resources Development and Management (CWRDM)

Recognising the need for catering to the R&D needs in the field of water management, the Government of Kerala established a premier R&D institution named 'Centre for Water Resources Development and Management' (CWRDM) at Kozhikode, Kerala (<http://www.cwrmd.org/>). The mission of CWRDM is to enhance the quality of life by ensuring water security for all by providing necessary Research and Development inputs, with special emphasis on the humid tropics. Training and extension services are also an important mandate of CWRDM.



## Box 1: CWRDM

CWRDM has been playing the role of Water and Land Management Institute (WALMI) for Kerala since the late 1980s, and it has been training officials from all stakeholder departments/agencies on all water-related topics. Approximately 50 training programmes on capacity building on water resources are conducted every year. National level courses on selected topics sponsored by different agencies, and tailor-made training programmes based on specific requests, are also organized. Many workshops, seminars, conferences on various scientific themes in the water sector are being organized by CWRDM. CWRDM has established a Water Heritage Museum, which remains open to the public. The museum portrays the history of development and management of water resources in Kerala and helps to create awareness on conservation and management of water.

CWRDM has implemented a large number of rainwater harvesting structures under different projects and evaluated its impact. It has implemented several programmes on the following techniques viz., Drip Irrigation & Fertigation; Wick Irrigation Techniques; Renovation of Condemned Public Wells; Spring Based Rural Water Supply Schemes; Artificial Wetlands & Urban Drainage; Water Resources Development; Polyhouse Farming- High-tech Farming, and all these activities have resulted in significant improvement in water use efficiency and saving of water.

Understanding the importance of participatory approaches, CWRDM used to have this as an important component of institutional frameworks for the governance of water resources and services. It has made it possible to engage new actors in water monitoring, with a shift from reliance on technical experts to the inclusion of non-experts, including local communities. The feedback received from local communities helps researchers/policy makers to develop technologies in a way that takes site- and culture-specific circumstances into consideration, making their implementation easier. For instance, some of the successful projects are implemented in community based participatory approach viz., DST-funded project on drip fertigation technology, which was done in a farmer participatory mode, community drinking water schemes, community-based water and sanitation programmes, etc.

Based on our experiences in this sector we proposed the following broad categories where EAS should focus on promoting sustainable water use. The agencies involved should have a thorough understanding on all these aspects. The topics discussed are exclusively made in the context of Kerala, but it will hold good for any other region.



**Figure 1: Broad categories for EAS in sustainable water use**

### 1. Supply Augmentation

The prime objectives under the supply augmentation sector are classified into three sections (A to C) as discussed below:

#### **A. Suitable and equitable water allocation for all water use sectors and fulfilment of basic water requirements**

##### **Strategies**

- Prioritization of water use for various sectors, i.e., domestic, agriculture, industry, conservation of ecosystem, etc., and setting up of water-use criteria/allocation to various sectors from Grama/Block Panchayat to District level.
- Promotion of conjunctive use of surface water and groundwater.

##### **Action Plan**

- Updating and building up of information on water requirements for various sectors under changing climatic scenarios;
- Development of water resource potential and management plan for Block Panchayats and setting up guidelines for sector wise water allocation;

- Allocation of water for the various sectors under the framework of river basin management plan, including ecosystem services;
- Augmentation through groundwater-based irrigation in surface water irrigated areas during the lean season.
- Rejuvenation and development of springs.
- Implementation of micro irrigation schemes such as drip, sprinkler and wick irrigation.

### C. Creation of new water conservation/ storage structures

### B. Improving the water use/management efficiency

#### Strategies

- Renovation of existing water resource infrastructure;
- Protection of natural resources, especially the water recharging ecosystems;
- Replication of successful models of supply/ water management in other feasible areas.

#### Action Plan

- Rehabilitation of water sources and waterways, including their development and conservation plans.
- Repair and improvement of distribution systems and control structures in order to reduce water losses and ensure improved water delivery.
- Periodic de-silting of reservoirs for increasing water storage capacity.
- Renovation of the dilapidated irrigation ponds/tanks (Thalakkulams) at the head portion of
- Padasekharams.
- Renovation of VCBs, barrages, check dams, and other water storage/diversion/ distribution structures.
- Empowering community organizations for taking care (planning, implementation and monitoring) of the common property resources.
- Prevention of encroachments and protection of river banks by eco-friendly measures.
- Protection of water recharging ecosystems such as forests, wetlands, paddy fields, sacred groves, and so on.
- Prevention of uncontrolled mining of sand, granite, clay, soil, etc.
- Replication of successful models in the district to gear up the water conservation programmes.
- Repair and renovation of unused/defunct tanks/ponds for domestic/public use.

#### Strategies

- Promotion of water conservation measures;
- Creation of new structures on a priority basis.

#### Action Plan

- Construction of rainwater harvesting and recharge pits and percolation tanks in suitable areas on a watershed basis.
- Implementation of mechanisms for open well recharge from roof top rainwater harvesting in all households.
- Adoption of suitable erosion control measures such as contour bunds, terracing, etc., for better soil and water conservation.
- Promotion of rooftop rainwater harvesting at household and institutional levels.
- Construction of check dams, barrages, dykes, VCBs, etc., on rivers/streams, wherever it is feasible.
- Construction of ponds/tanks etc., at ideal locations.
- Development of abandoned quarries as water harvesting and storage structures.

#### Box 2: Demonstration of Wick Irrigation

CWRDM has successfully developed two types of wick irrigation systems for potted/grow bag raised plants and field grown plants. The first system consists of a grow bag filled with potting mixture, one used water bottle, wick made of glass wool and two bricks. In the second system, instead of water bottle, PVC pipes were used along with the water source. Wick irrigation works on the principle of capillary action. Plants use capillary action to bring water up the roots and stems from the soil to the rest of the plant. Wick irrigation provides the water needed for the growth of the plant and hence water use efficiency is high. Our experiment and demonstration showed a saving of water to the tune of 35 to 40% and yield improvement ranged from 28 to 64% as against the conventional flood irrigation method. The demonstrations and awareness programme helped to popularize this technology and many farmers are adopting this technology now.



## 2. Demand Management

**Demand management sector is grouped into five user categories:** Domestic (including drinking water), Irrigation, Industry, Hydropower, and Ecosystem services including wildlife needs. However, by considering relevance to this blog, here only irrigation is discussed.

**Irrigation:** Improving the irrigated area and crop water productivity

### Strategies

- Preparation of block level and panchayat level irrigation plan by considering all the existing schemes and feasible new schemes at AEU level;
- Improvement of the water use efficiency for maximizing water productivity which is the limiting resource (i.e., More crop per drop of water used);
- Better stakeholder participation in irrigation management through decentralization.

### Action Plan

- Preparation of framework for strategies to be adopted for increasing the irrigated area at district level, block level and

panchayat level on AEU basis.

- Completion of all ongoing medium/minor irrigation structures on a war footing.
- Promoting more minor irrigation projects/schemes, where feasible.
- Creation of new storage and diversion structures, such as ponds, VCBs, barrages, check dams, percolation tanks, etc., in all feasible areas. Highland areas and current overexploited, critical and semi-critical areas of groundwater usage (Chittoor block, Malampuzha block, Pattambi block and Thrithala block), etc., to be given top priority.
- Development of springs in highland and midland areas.
- Provide more lift irrigation schemes in lowland areas, wherever feasible.
- Irrigation of high value horticultural crops such as pepper, cardamom, vegetables, banana, etc., to attain maximum productivity.
- Increased involvement of Water User Associations (WUAs) through Participatory Irrigation Management (PIM) for enhancing physical access of each individual plot to water, and thereby more cultivable area may be brought under assured irrigation.
- Promotion of extension activities relating to water harvesting, water management

- and crop alignment for farmers and grassroots level field functionaries.
- Increase of irrigation water availability through watershed management programmes – soil and water conservation, groundwater recharge, minimizing runoff losses, providing livelihood options and other natural resource management activities.
- Enhancement of water utilization capacity of irrigation projects (including MI schemes) by timely/annual repair and maintenance of structures as well as entire canal network, introducing piped water

supply up to the field on a pilot basis in selected projects in critically water scarce areas. Improving the adoption of advanced micro irrigation and water saving technologies, precision farming, polyhouse farming, and hydroponics to achieve more crop per drop of water including in the command areas.

- Reduction of irrigation water demand by proper planning viz., proper irrigation scheduling, early sowing of variety, uniform way of planting in group approach, laser land levelling, mulching, etc., on a watershed basis.

### Box 3: Case studies on demonstrations of drip fertigation under Farmer Participatory Action Research Programme

'Farmer Participatory Demonstration and Evaluation of Drip Fertigation Technique in Kerala' was implemented by CWRDM in collaboration with the State Agriculture Department. The project involved laying out of 21 demonstration plots of drip fertigation in farmers' fields for various crops in Thiruvananthapuram, Alappuzha, Idukki, Ernakulam, Thrissur, Palakkad, Malappuram, Kozhikode, Wayanad, and Kasaragod districts of Kerala. About 850 farmers of these districts were given awareness on drip fertigation through seminars /workshop and field visits arranged in the demonstration plots. Majority of them held a favourable opinion on drip fertigation after observing the demonstrations. Data collected from the plots has shown that there is an improvement in crop yield through drip fertigation. The Benefit-Cost Ratio of drip fertigation worked out under the project ranges from 2.05 to 3.50 for selected crops. The positive outcome of the demonstrations was also evident through the adoption of drip irrigation and drip fertigation by some farmers who attended the seminars/workshop and field visits. The collaboration of the Department of Agriculture, Govt. of Kerala, has helped CWRDM very much in the implementation of the project, including identification of suitable farmers' plots in various districts, arranging seminars/workshop and field visits for farmers, and conducting questionnaire survey among drip irrigation adopters.



Drip fertigation plot- Cow pea

This system addresses the water woes of tail end farmers – to some extent – by scheduling and regularizing water supply and associated irrigation. It considers both the temporal and spatial distribution of water ensuring canal water availability at the right time and the right place, mainly through farmer cooperatives societies, which work in association with the concerned irrigation department. This system is still under practice in some of the command areas.

#### Strategies

- Defining the rights and responsibilities for various water users;
- Involvement of stakeholders at different levels of governance

#### Action Plan

- Implementation of decentralized water governance spelling out rights and responsibilities of various stakeholders.

### 3. Water Governance

The prime objective here is to frame/modify the statutory mechanisms for effective management of water resources in the district that is in transition to polycentric water governance. 'Participatory irrigation management' is a concept that allows farmers to become decision makers while ensuring equity in water supply.



- Framing/modification of rules/acts based on emerging situations, especially with regard to punitive/penalty measures for water/environment pollution, water misuse, etc.
- Creation of awareness about emerging scenarios/trends in water crisis/management in institutions/agencies, executives, elected representatives and judiciary.

#### 4. Capacity Building

The prime objective is to empower human resources in the water management sector and Extension Advisory Services (EAS) so that they can take a lead role in this.

##### Strategies

- Human resources development for scientific water management;
- Reorganization and strengthening of institutional mechanisms, wherever necessary;
- Establishment of river basin authorities for the major river basins in the district;
- Strengthening of Research and

- Development activities in the water sector;
- Awareness and skill development.

##### Action Plan

- Development of human resources and thereby local organizations and stakeholders for scientific water management through capacity building programmes.
- Involvement of students in awareness campaign and community action for water conservation.
- Organization of public campaigns and community forums at the district and local levels for a clear understanding of potential and problems with regard to water resources.
- Inducing participation of public and private organizations in the water resources management process.
- Development of Water Resource Information System (WRIS) for the district similar to the one developed for the country by ISRO.

#### Box 4: A unique case from Kerala

A unique type of participatory irrigation management system has been prevailing for years at Yethadka village of Kasaragod District of Kerala. The farmer groups construct check dams across the Yethadka river every year, mostly towards the end of the predominant south-west monsoon season and store water. They construct three to four dams every year and its carrying capacity varies from 20 to 120 million litres of water. The expenses towards the construction are divided among the participating farmers based on the extent of farm land they irrigate with the stored water. This type of participatory water harvesting, sharing and irrigation has been in practice for almost three decades

#### Box 5: Demonstrations on use of domestic waste water for vegetable production

CWRDM implemented demonstrations on the use of domestic waste water for vegetable production. The treatment system includes: primary, secondary and tertiary system, and treated water was used for irrigation using drip/wick irrigation. Results showed that vegetable production increased, apart from increasing water productivity and protecting the environment.



## IMPLICATIONS FOR EAS

### Capacity Development on Sustainable Water Use

There is a need for continuous training of EAS staff and others on different aspects of Sustainable Water Use. Since the 1990s, CWRDM has been organising extensive trainings on integrated watershed management for elected representatives of local self-

government departments (LSGDs) and NGOs under the People's Planning Programme. Currently the Water Resources Management Training Programme (WRMTP) at CWRDM is providing training on various aspects of water and land management for different stakeholders, including farmers, officers of line departments, elected representatives of local self-government, and NGOs (Box 6).

#### Box 6: Trainings at CWRDM

CWRDM organises induction training programmes for newly recruited engineers of the State Department of Irrigation and Kerala Water Authority, especially on the hydrological and irrigation management aspects. Officers of State Agriculture, Soil Conservation and Soil Survey departments are also being trained on various land, water and irrigation management technologies. Apart from these, training programmes on watershed management and livelihood improvement have been organised in coordination with various watershed development projects of State Planning Board and Central and State departments of Rural Development and Agriculture & Farmer's Welfare. The sociological aspects of water management are specifically taken care of in all the training programmes. Many national level training programmes on irrigation management, drip and sprinkler irrigation, watershed development, participatory irrigation management, and wetland management are conducted at CWRDM. The Centre also provides training and research opportunities for students and research scholars from universities and other academic institutions.

In addition to CWRDM, many other Training Institutions under the Ministry of Agriculture & Farmer's Welfare, such as State Agricultural Management and Extension Training Institute (SAMETI), Agricultural Technology Management Agency (ATMA), Extension Training Centre (ETC), Soil Conservation Training Centre, etc., and Irrigation Design and Research Board (IDRB) under Ministry of Water Resources, Government of Kerala, are also offering training programmes on water and land management. Krishi Vigyan Kendras (KVKs) of ICAR and Kerala Agricultural University (KAU) and NGOs in all districts are also giving training on natural resources management to extension workers. These training institutions need to be interlinked and partnerships have to be established to make their training programmes successful.

The major constraints of the above-mentioned training institutions are as follows:

- i) Lack of funds;
- ii) Lack of expert trainers/subject matter specialists;
- iii) Difficulty in conducting hands-on training due to pandemic restrictions;
- iv) Lack of infrastructure and instruments;
- v) Lack of training needs assessment and feedback studies; and

- vi) Training activities and capacity building programmes not figuring in the priority list of concerned departments/agencies.

Many KVKs lack experts or subject matter specialists in the domain of water resources management. Hence scientific and technical experts have to be appointed in KVKs located in those districts that are facing issues with water stress, floods, decline of groundwater table, and other natural resources management problems. However, a few KVKs have successfully taken up activities on sustainable use of water resources and effectively demonstrated them at community and field levels, by ensuring farmer participation.

Hence these concerns need to be addressed in order to make the training programmes more meaningful and to achieve the desired impacts on sustainable water use.

#### Strengthening inter-departmental coordination

Major irrigation projects that are dealing with dams and command area are managed by the Department of Irrigation and Water Resources. However, the micro-irrigation projects are managed at different levels by both – the Departments of Agriculture and

Irrigation. Most often their interventions are limited only to the command area and hence the catchment area interventions including drainage line treatments, source protection and groundwater recharge activities, are ignored. Departments working in water conservation and management activities therefore need to be linked with those managing irrigation projects and there is a need for better coordination in this area. For instance, water conservation and use efficiency improvement is being dealt with by many departments including Irrigation and Water Resources, Agriculture, Soil Survey and Soil Conservation, Ground Water, Rural Development, Local Self Government Departments (LSGDs), etc., under programmes such as Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA), Jal Jeevan, etc.

In Kerala, as the three-tier decentralization of powers is working well, the efficiency of projects implemented is relatively better than in other states of India. However, still there is scope for improvement for better coordination and partnership activities between the line departments and it is suggested that these activities can be coordinated by an agency like CWRDM /KAU/similar research and development organizations.

### Strengthening Evaluation

Since the Government of India is nowadays placing more emphasis on water conservation programmes through different missions brought under the umbrella of *Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)* programme, in which financial assistance to State Governments are being provided. Line departments at the state level, in collaboration with research organizations such as CWRDM, and KAU should have programmes for evaluation of these techniques after implementation; and also carryout relevant extension programmes such as CWRDM, and KAU should have programmes for evaluation of these techniques after implementation; and also carryout relevant extension programmes such as large-scale demonstrations and associated seminars over a longer period of time, till the desired impact is achieved.

### Curricula Reforms

The management of natural resources (NR) is generally viewed as a topic related to ecology and environment and not to agriculture. Natural resource management, especially water resources management, has to be included as an important component of the BSc Agriculture curricula. EAS providers should have an in-depth understanding of the water-energy-greenhouse gas emission- agriculture-climate change nexus. The curricula have to be reoriented and aligned with SDG-6: Water and sanitation for all by 2030, mainly to mobilize EAS actions which help to transform how we manage and use water sustainably and efficiently.



**Experiments for developing appropriate water management options**

### END NOTE

EAS for sustainable water use should be supported by an adequate knowledge-exchange system and the success of EAS would depend on how greater institutional responsibility is shared among all the stakeholders in water-related policies and development of strategies. This, in turn, would create an enabling environment and provide an incentive for all relevant stakeholders to share greater responsibility for sustainable water management across the entire gamut of water resources. The capacity of EAS on the topic of sustainable water use needs to be considerably enhanced. Promotion of more water-efficient practices have wider environmental benefits and is critical for ensuring economic profitability and prosperity to posterity.

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## TAKING SOILS FOR GRANTED: HOW OVER-EXPLOITATION OF THIS NON-RENEWABLE RESOURCE POSES A GRAVE THREAT TO OUR FUTURE

This blog, in the backdrop of World Soil Day, 2021, is a gentle reminder of the importance of practicing sustainable land management. Well-framed policies and extension functionaries capable of educating farmers on sustainable soil management are absolutely necessary to protect soils, opines **Trisha Roy, Gopal Kumar and M Madhu.**

Soil is at the core of various ecosystem services provided by our planet Earth; and 95 percent of the food consumed by the global population comes from soils. Thus, taking care of this non-renewable natural resource is one of the most important duties of every citizen. However, we have neglected our soils for too long and we are paying the price now. Land degradation – in the form of erosion, chemical degradation, physical degradation and desertification – is looming large across all continents and we are losing this priceless resource inch by inch. The celebration of World Soil Day is a part of the global campaign to save our soil resources, which was initiated in 2014, and since then, every year on 5 December we celebrate 'World Soil Day', to raise awareness on how important this resource is for the survival of all living organisms.

### LAND DEGRADATION DURING THE COVID-19 PERIOD

We are at the crossroads where the strain on our natural resources is very high due to increasing population pressure, and simultaneously the quality of our natural resources are deteriorating due to over-exploitation. Land degradation is one of the foremost challenges which impact all live forms on this planet. The alarming rate of land degradation has spread across one-third of the earth's land resources and it is expected that 90 percent of the land will be in peril by 2050 if an action-oriented approach to protect land resources is not adopted globally (Brown 2020 <https://www.triplepundit.com/story/2020/world-soil-day/708946>). Over the past 50 years, industrial development, progress in the technological field, and altered consumption patterns have dramatically impacted all ecosystems, putting over one million species at risk. Our soils are lost at a rate of 10 to 40 times higher than its formation rate, indicating how rapidly we are progressing towards a point of no return.

# World Soil Day

**Halt soil salinization,  
boost soil productivity**



All these issues have become more pronounced with the arrival of the COVID-19 pandemic. This has put immense stress on the already vulnerable systems worldwide and poses a real challenge to the achievement of Land Degradation Neutrality (LDN) by 2030. This pandemic is expected to increase the number of starving people from 135 million to more than 250 million around the globe (<https://www.wfp.org/>). Also, it has hit the agricultural labour force very hard forcing them to reverse migrate from urban to rural areas. These can have a far flung influence and is likely to affect our already impoverished land resources negatively. The land is at the receiving end of this vicious cycle, thus getting poorer by the day.

The emergence of diseases, like COVID-19, has also highlighted the importance of sustainable land management. Anthropogenic infringement into the natural ecosystem and disrupting the balance has been stated as one of the root causes of increased novel infectious diseases occurring in humans and livestock that are transferred from wildlife (UNCCD 2020). Land use changes often drive wild animals from their habitat, leading to increased human-wildlife conflicts. This heightens the risk of disease transmission and microbial alterations from wildlife to domestic animals and human systems, which is referred to as zoonosis. Land use changes have been identified as the primary transmission pathway for various emerging infectious diseases in humans, 60 percent of which is zoonotic in nature. The main aim of delving into diseases – taking a side track from sustainable land management

and land degradation – is only to highlight how important it is to act and protect these natural resources, which if left unattended would soon bring doomsday upon us.

## **SOIL EROSION: A MAJOR CAUSE OF LAND DEGRADATION**

Of the various forms of land degradation affecting the soil, water erosion is one of the main forms that move healthy, fertile soil from one place to another transforming productive landscapes into barren lands. India has been reeling under the problems of water erosion which happens to impact about 83 m ha area of the country (Mandal and Sharda 2011). Though soil erosion is as ancient as the advent of human civilization or may be even older, it is the accelerated rate of soil loss which poses a serious threat to the ecosystem today. Erosion reduces the productive capacity of land resources, diminishes the soil of its various essential functions, deteriorates soil properties and also aggravates the phenomenon of climate change. The deposition of translocated soil to oceans, water bodies, etc., reduces the storage capacity of reservoirs, increases natural disasters such as flooding. Furthermore, erosion results in the loss of huge amounts of biodiversity, which often goes unaccounted.

In India, the impact of water erosion in terms of production losses is estimated to be 13.4 million tonnes with a monetary valuation of \$ 2.51 billion (Sharda et al. 2010). If soil loss is quantified in terms of nutrient and C losses, erosion of 1mm top soil from 1 ha land results

in loss of 150-225 kg C, 12.97-28.26 kg N, 1.14-6.79 kg P, 13.03-25.5 kg K and 3.74-4.85 kg S (Mandal 2014). In terms of energy, to compensate the nutrient loss of N, P, K and S through inorganic fertilizers, 1592 MJ of energy expenditure per ha is required. Thus, compensation of erosion losses is a costly affair, and what's more, it has a detrimental impact on the overall ecosystem with intangible losses in terms of ecosystem services, soil health and food security.



**Landslides in the unstable slopes on North Western Himalayas**

## TACKLING SOIL EROSION: PAST, PRESENT AND FUTURE

Technologies and management options to avert and arrest soil erosion has been in place for a very long time. However, their real time application on a priority basis is often lacking. Time-tested soil conservation measures such as land levelling, contour bunding, field bunding, terracing, strip cropping, reduced and minimum tillage, cover crops, mulching, inter-cropping, residue retention, conservation agriculture, trenching, etc., have been age-old methods for soil and water conservation. All these conservation measures – in combination or alone – are applicable in different agro-ecological regions of the country. All these conservation measures have the capacity to combat soil erosion and improve water conservation. However, if we see the execution pattern of these technologies at the farm scale, the right approach is missing. Though the farmers have know-how of various techniques they are often reluctant to execute because of the cost or inconvenience of adopting the conservation measures. Integrated Watershed Management Programs (IWMP), which was once a flagship programme of the Government of India, had much success in terms of soil

and water conservation. The IWMPs were executed in the backdrop of sustainable land management or rather sustainable natural resource management with due emphasis on livelihood security and economic enhancement of the people living in the watershed. With time the IWMP has gone out of focus, and presently the IWMP has been merged with various other schemes under the *Pradhan Mantri Krishi Sinchayi Yojna*.

The success story of watershed development at ICAR-IISWC (Indian Institute of Soil and Water Conservation) was etched with the Sukhomajri Project in the Panchkula district of Haryana, which was a model watershed in the country. Following suit various other watershed projects were taken up by ICAR-IISWC, Dehradun, and its regional Centres such as the Fakot, Langha, Rabari, Jigna, Salaiyur, Raghupur, Mandhala, etc. (Bagdi et al. 2015). However, as the focus has shifted away from watershed management programmes it is time to initiate newer strategies to tackle the problems of soil erosion at the farm level.

The approach of Sustainable Land Management (SLM) involves 'the use of land resources including soil, water, animal and plants, for production of goods to meet changing human needs while ensuring long term productive potential of these resources and the maintenance of their environmental functions'. SLM will help in selecting the most appropriate land use for a given bio-physical and socio-economic condition so as to avoid further land degradation, rehabilitate degraded land, and ensure maximizing the resilience of land resources. SLM is based on five principles:



Achieving SLM and reducing soil erosion is a major task which needs a big shift in the way agriculture and allied sectors are functioning in the country. The implementation of SLM would involve more data intensive and technologically advanced practices such as precision agriculture, use of sensors, drones, precision water management systems, which will not only optimize the use of various agriculture inputs but also enhance system productivity by minimizing losses. This would also help to build a stable ecosystem and lower the C output. The most crucial part of SLM is the selection of appropriate land use which is acceptable across the social strata while fulfilling all the other four criteria of SLM. For example, in the north-west Himalayan region, farmers practice the maize-wheat cropping system intensively. Loss of 1 ton soil in the Lower Himalayan Region results in loss of maize yield to the tune of 15 kg/ha grain (Mandal et al. 2015), with a cumulative energy loss of 655.5 MJ (Sharda et al. 2019). In order to make this land use system sustainable any conservation measure such as mulching, intercropping, crop residue retention, improving soil aggregation using microbes, etc., which prevents soil loss is necessary.

Simple practices – integrated nutrient management, use of well-decomposed manure, soil testing to identify deficiencies, choosing proper crop rotation and cropping cycle, green manuring practices, inclusion of bio-fertilizers in the fertilizer schedule, micro-irrigation techniques, on-farm water harvesting, timely forecasting of weather as well as pest and diseases control – can together help in achieving sustainability at the farm level. Well-framed policies and technologically-equipped field functionaries are necessary to disseminate these improved practices and validate the

already existing ones at the lowest level of farmers/stakeholders.



**Spurs for controlling flow of torrents**

## END NOTE

This article in the background of World Soil Day, 2021, is a gentle reminder on how important this natural resource is for the sustenance of life on Earth. Though time and again we are reminded and sensitized to act, somehow there remains a missing link. It's time we rise up to the cause and understand that our future generations are in jeopardy because of our misdeeds today as we tend to ignore the soil every time we step on it. The health of the soil is reflected on how healthy our life is. Sadly we are all turning sick. Until and unless we nurture our soil we will continue remaining sick until we perish in the soil itself. Reese (2014) has rightly highlighted that 'Soil erosion may get us before climate change does' as history has witnessed the downfall of several prosperous civilizations due to mismanagement of its soils (Scholes and Scholes 2013). Let us unite together for this vital cause for sustainable soil management with the pledge to present a better planet to our future generations.

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# 62

## SOIL SALINITY IN PADDY FIELDS OF SRI LANKA AND BEST PRACTICES TO AVOID CROP FAILURES DUE TO SOIL SALINITY

'Halt soil salinization, Boost soil productivity' is the theme of this year's World Soil Day (5 December). Increasing soil salinity is adversely affecting agricultural production in Sri Lanka. In this blog, **DN Sirisena and WADP Wanigsundera** discuss the challenges Sri Lankan farmers face due to increasing soil salinity, and ways of addressing these.

One of the major constraints that limits the expansion of cultivated area and restricts productivity increase in agricultural fields in Sri Lanka is abiotic stress. Many factors contribute to abiotic stress in agricultural fields. Soil salinity or accumulation of soluble salt, iron toxicity, soil acidity, and low fertility are some of these factors. The area affected by coastal salinity is estimated to be around 112,000 ha during the 1970s. In addition, approximately 4000 ha of coastal rice soils in Sri Lanka were flooded with salt water in 2004 due to the tsunami that struck it. The area affected by coastal salinity has not been estimated in recent times. A study conducted by Sirisena and team (2013) in Puttalam district has revealed that 50% of the 24,000 ha of cultivable paddy lands have become non-cultivable due to soil salinity.

### DRIVERS OF SOIL SALINITY

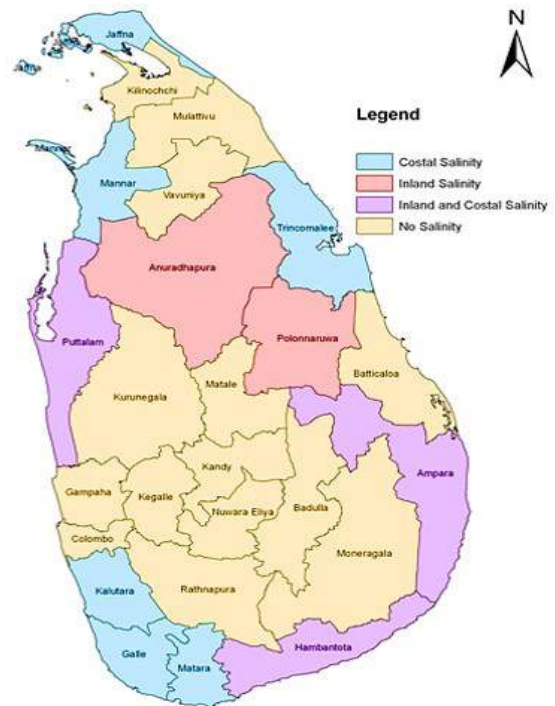
Intrusion of sea water into inland areas causes coastal salinity. Sea water intrudes into inland areas in many ways. Occurrence of tides and dikes is the major reason for intrusion of sea water into inland areas. In the coastal areas, rice farmers experience tidal waves ranging between 45 cm and 60 cm during spring tide and between 10 cm and 25 cm during neap. This brings considerable amount of salts into agricultural fields in the coastal areas. In addition, during dry weather, salt water intrudes into lands up to 50 cm above mean sea level. As a result, rice growing soils in the coastal belt of Sri Lanka are salinized every year making rice growing difficult.



**Paddy land abandoned due to soil salinity**

Sea water intrusion by surface flow or seepage may render soils of the coastal areas saline. Removal of sand from river beds for construction work and reduction of water levels in rivers due to dry weather cause sea water to enter into rivers, and use of this salty water for irrigation purposes also increases the salt content in agricultural lands. Blockage of drainage canals (to increase cultivated area and for unauthorized water use) also adds to the problem by preventing draining of salts, leading to accumulation of salts in even larger quantities.

The degree of salinization in areas depends on climate, tidal regimes, and processes of streams entering the coastal plains. Salt accumulation and severity of salinity increases in the drier climate and decreases greatly in an equatorial climate without the presence of a pronounced dry season (Moorman and Van Breedman 1978).



**Figure 1: District-wise distribution of saline paddy in Sri Lanka**

### Box 1: Deteriorating soil health in Sri Lanka

Soil acidity and iron toxicity are prevailing in the Low Country Wet Zone (LCWZ) areas. LCWZ is comprised of land below 300m amsl receiving a rainfall >2500 mm per annum. Soil acidity in paddy soils widely occurs in Gampaha, Ratnapura, Kegalle, Colombo, Kalutara, Galle and Matara districts. Of the 90,000 hectares of cultivated rice lands in LCWZ, approximately one-third may be considered as potentially high in acidity (Bandara and Gunathilake 1994). Iron concentrations in the acid soils change according to season, year, and location. Normally yala season (March to September) is severely affected and iron toxicity problem is seen more than in the maha season. Salt accumulation in paddy fields can be seen in all three zones (dry, intermediate and wet).

The main reasons for accumulation of salts in paddy fields in dry zone areas are salt containing minerals, irregular irrigation practices, low rainfall, high evaporation, high salt content in groundwater, over extraction of groundwater, and intrusion of sea water into inland areas. As shown in the map (Figure 1), inland salinity areas exist mainly in high potential rice growing districts, such as Anuradhapura, Polonnaruwa, Puttalam, Hambantota and Ampara districts, where intensive rice cultivation is practiced. Coastal salinity prevails in Mannar, Puttalam, Jaffna, Trincomalee, Ampara, Hambantota, Galle, Kalutara and Matara districts. Inland salinity in the dry zone is aggravated due to improper use of irrigation water. According to agronomists in Sri Lanka, irrigation is practiced in the upper parts of the catena causing soil salinity development in the lower parts (Handawela 1982).

Salinity levels in Mahaweli areas (the largest irrigation and settlement scheme) were low or medium at the initial stages but is gradually increasing in Mahaweli H area in the Anuradhapura district. Sikurajapathy et al. (1983) estimated that 4.96% of the paddy fields are affected by salinity in the H area, while 30% of poorly drained soils in the newly developed paddy lands in Kirindi Oya project area are affected. They also indicated that there was a likelihood of more lands becoming salt-affected if improved drainage is not provided in the future.

Surface water sources in the dry zone are not sufficient, especially in the yala season, for cultivation and farmers use the water from agro-wells (shallow dug wells) for irrigation purposes. Researchers estimated that in 2005 there were nearly 50,000 agro-wells in the dry zone (IWMI 2005). As soluble salt infuses agricultural lands while moving through it agro-well water in rain-fed areas contains more soluble salts (as compared to agro-well water in irrigated areas.) It shows that agro-wells in the rainfall areas of the dry zone contain high saline water and it might be because rain water does not wash out excess soluble salts in the soil. Hence, it restricts application of such water for crop irrigation (Kendaragama 1977).



**Accumulation of salts in the soil profile**

### IMPLICATIONS FOR AGRICULTURE

Several research studies provide ample evidence that accumulation of salt in the paddy fields in both inland major irrigation areas as well as coastal areas is taking place currently. Accordingly, most of the paddy fields in the major irrigation scheme in the dry zone of Sri Lanka are vulnerable to salt accumulation. Sirisena and team (2010 and 2008) revealed that  $\text{CO}_3$  and  $\text{HCO}_3$  ions of Ca, Mg and Na are the prominent anions found in inland salinity areas. So more and more agricultural lands will become saline in the time to come due to unwise use of irrigation water in inland paddy fields. In addition, escalating temperature and

higher evaporation could lead to increase in the area under salinity.

Productivity of rice crop decreases significantly due to dehydration, nutrient imbalance, and pollen sterility. Scientists have observed significant crop losses due to soil salinity in paddy fields. As such, unproductiveness of the land due to high level of salinity is one of the significant causes for the reduced production and productivity of paddy lands in Sri Lanka. In many parts of the country farmers continue to cultivate saline affected lands without taking adequate/appropriate measures, and that will cause further financial losses.



**Crop damages due to soil salinity**

## ADDRESSING THE CHALLENGE

**Maintaining soil health:** Farmers should be encouraged to practice good tillage practices, proper land leveling, and application of organic manure to improve land productivity of salt-contaminated paddy fields.

**Introduction of salt-tolerant varieties:** Use of rice varieties which can withstand saline conditions is the most important option to improve rice production in salty paddy fields. Some salt tolerant rice varieties have the ability to accumulate high salt contents in their cells without damaging tissues. It has been observed that Pokkali variety has an ability to accumulate sodium (Na) salts in their vacuole that can reduce salt toxicity. Some rice varieties have the capacity to reduce effects of salt through dilution effect by producing higher biomass, while varieties like Nonabokra have the ability to absorb essential plant nutrients by excluding toxic nutrients. Therefore, introduction of high yielding, salt tolerant rice varieties is the most suitable and effective alternative that can improve rice production in the saline paddy fields of Sri Lanka.

Pokkali and Nonabokra were the two traditional salt tolerant rice varieties available in Sri Lanka since the 1940s. As these two varieties are tall and produce lower grain yield, actions were taken at the Ambalatnota Rice Research Station during the 1980s to produce salt tolerant high yielding dwarf rice varieties (e.g., At 354 and At 401) using the genetic background of Pokkali (see photo below). In 2010 another two salt tolerant dwarf and high yielding rice varieties (Bg 369 and Bg 310) were developed at the Rice Research and Development Institute at Batalagoda using genetic background of Nonabokra and Pokkali. As such, Pokkali, Nonabokra, At 354, At 401, Bg 310 and Bg 369 are salt tolerant rice varieties adapted to Sri Lankan conditions. According to the results reported by Sirisena et al. (2010) the highest yield (7.5 t ha<sup>-1</sup>) under salt affected conditions was recorded from the new rice variety Bg 369, followed by Bg 310 (7.0 t ha<sup>-1</sup>).

**Supply of salt tolerant varieties:** Non-availability of adequate quantities of saline tolerant varieties (e.g., Bg 310, Bg 369, At 354

and At 401) is the problem that farmers face today. Therefore, action should be taken to make available quality seeds of these saline tolerant rice varieties. In addition, there is an urgent need to promote self-seed production of saline tolerant varieties by farmers. Finally, establishment of seed production farms to produce saline tolerant rice varieties in the major districts is urgently needed.



**At 354, a salt tolerant rice variety developed in Sri Lanka**

**Take measures to stop illegal sand mining:** Illegal sand mining across the riverine areas may cause alarming intrusion of sea water into the land during droughts. The existing government laws and policies are not enough to control illegal sand mining. Development of alternative construction technology and manufacture of alternative sources of sands for construction are critically needed to reduce the negative impacts of river sand mining in vulnerable areas. Professional support should be given by government to go for alternative technologies, such as use of quartzite and quarry dust as sand substitutes.

**Construct sea water restraining bunds:** One of the major reasons for salt water intrusion into paddy lands is the damage of saltwater restraining bunds. Such bunds should be prepared wherever possible in the vulnerable areas and have to be constantly repaired in areas where such bunds are damaged.

**Promote scientific water management:** Insufficient irrigation water especially in the yala season leads to high salt contamination. In addition, during the dry season evaporation is high leading to increased salt concentration

on the top layers of the soil profile. Therefore, proper maintenance of water distribution structures and increasing the efficiency of water usage are critical to avert salinity-related problems. Use of other field crops, which have lower water requirement during yala seasons is important so as to reduce soil salinization and improve land productivity.

#### **Regulate groundwater extraction:**

Appropriate groundwater development together with management policies and guidelines to regulate groundwater extraction in order to ensure environmental friendly and sustainable use of groundwater are urgently needed. Regular monitoring of electrical conductivity of well water is necessary before using them for cultivation.

**Use weather advisory, GIS and remote sensing technologies for planning paddy cultivation:** Salt contamination is dependent upon the prevailing weather conditions and paddy lands are extremely sensitive to climate change. Therefore, cultivation seasons should be decided based on the weather conditions in the district. Weather conditions during the last five years can be considered for this decision making. Utilization of new technologies, such as geographic information systems (GIS) and remote sensing systems to identify the salt accumulated in fields, is also necessary to introduce best management practices.

### **IMPLICATIONS FOR EXTENSION AND ADVISORY SERVICES**

Extension and Advisory Services (EAS) can play a very important role in educating farmers on ways of addressing the issue of soil salinity and promoting best practices to address the challenges arising out of increasing soil salinity. It is the general experience of EAS that motivating farmers to adopt technologies that

have long term sustainable impacts is not that easy. Both farmers and EAS are often attracted to those technologies that can demonstrate short-term financial benefits. During the last 15 years, the government implemented programmes that provide a substantial subsidy for fertilizers for paddy cultivation. This has brought significant benefits, but increased the tendency of farmers to place lower emphasis on the essential soil management practices that are critical to maintain agricultural sustainability in the long run.

Even though there are traditional and improved technologies available for the adoption of agro ecological farming that promotes sustainable agricultural practices, the conventional extension approaches adopted by the EAS providers are still based on group and mass extension methods, which are more suitable for the promotion of farming methods having short term benefits at the expense of long term disadvantages. As discussed in this paper, soil salinity is becoming a serious issue critically threatening paddy cultivation in affected areas. Therefore, EAS need to adopt new EAS interventions for such areas. This would involve adopting group methods, such as Farmer Field Schools, and individual methods such as frequent meetings with farmers in the affected region to provide field-based problem solving advisories relevant to each farmer.

The dearth of EAS providers in the food crop sector and the lack of adaptive research to support extension professionals should be addressed without delay. Extension personnel may lack the knack of persuading the farmers to adopt much-needed sustainable farming methods. A proper capacity needs assessment must be done to identify the gaps in their functional capacities. There is also an urgent need to have policies that incentivize farmers to adopt better soil and water management practices.

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# 63

## ADOPTION OF SUSTAINABLE LAND MANAGEMENT (SLM) TO HALT SALINIZATION IN BANGLADESH COASTAL REGION

“Halt soil salinization, boost soil productivity” is the theme of this year’s World Soil Day (5 December). As a country with a large coastline, saltwater intrusion has significant adverse impacts in Bangladesh. To address the land degradation due to salinization, the country should adopt a strategy for sustainable land management, opines **Jalal Uddin Md. Shoaib**.

In Bangladesh, the problem of soil salinity is a persistent threat to ecosystem services in both coastal lands and islands in view of its adverse effects on sustainable use of land and water resources. In the last 35 years, salinity has increased by around 26 percent in this country. Salinity intrusion is spreading continuously into the northern non-coastal areas as well (Mahmuduzzaman et.al. 2014). Large areas of land remain fallow in the dry season (January–May) because of soil salinity, lack of good quality irrigation water and problems with water control, mostly drainage (Haque 2006, Mondal et al. 2006, SRDI 2010).

After the Krug Mission Report in 1957<sup>1</sup>, embankments were constructed to protect farms and farmers from sea water intrusion and tidal water in 1960s and 1970s. Total 139 coastal embankments or polders (Box 1)) have been constructed to protect low-lying lands from tidal inundation and salinity intrusion through large-scale and small-scale Flood Control Drainage (FCD) and Flood Control, Drainage & Irrigation (FCDI) projects. Those interventions protected 1.2 million hectares of land, supporting 8 million inhabitants.

### Box 1: Polders

The polders- a Dutch word, refers to an area enclosed by embankments/dikes made as an independent hydrological unit. These are only connected with surrounding natural water system through manually operated water control structures. The immediate results from the coastal polder were very significant for the socio-economic development of coastal lives and livelihoods. But from early 1980s, poldered area started to get cut-off from the surrounding tidal riverbed due to rapid sedimentation and declined river gradients. Yet, despite past and on-going investments in constructing and maintaining the polder embankments and sluice gates, drainage congestion and risk of flooding increased while agricultural productivity remains low and poverty is rife (CGIAR 2015, Jakia 2017).

By and large salinization process remained unaddressed due to poor or absent embankment maintenance and protection from coastal surges, conflicting interest on water resource usage, non-functional sluice gates, lack of community involvement, leasing internal canals, deforestation of mangroves, etc. SRDI 2010 database reveals progressive increase of saline area from 83.3, 102.0 and 105.6 million hectares in 1973, 2000 and 2009 respectively.

## DRIVERS OF SOIL SALINITY

The major drivers of soil salinity are as follows:

- capillary rise of saline ground water in dry season,
- depth to ground water table,
- irrigation with saline GW,
- sea/river water inundation in both protected and unprotected polders,
- seepage of saline water to adjacent agricultural lands of the polders,
- shrimp farming and poor water governance and polder management,
- conflict among land users (deliberate invasion of sea water for shrimp, salt etc.),
- grabbing canals/creeks in the polders,
- cyclone and storm surge, sea level rise (due to climate change), etc. (Rashid and Islam 2007, Haque et al. 2008, Rasel et al. 2013).

These drivers vary spatially throughout the coastal region and influence the soil salinity status. Nevertheless, the impacts of these drivers are interdependent and indivisible. In addition, there is spectacular mismatch

of effective interaction between community involvement (social capital) and usage of natural resources (all flora and fauna-natural capital) to bail out from the vicious cycle of poverty in the area (Nandy and Islam, 2010). Moreover, the impact of polderization on livelihood vulnerability is not straightforward and is therefore still poorly understood (Nath et.al. 2019). Commonly, soil salinity becomes evident when evapotranspiration becomes much higher than rainfall and surface soils becomes dry (hydrological environment). Peak period of soil salinity is observable during April/May when salt crust is formed on land surface and it decreases with the advent of monsoon.

## ADDRESSING SOIL SALINITY

The coastal region witnesses two spectacularly different scenarios:

- a) soil salinity in dry season and
- b) water logging (as most of the lands are flooded up to 3 feet) in rainy season.

Thus, there is no one solution to halt or reduce land degradation due to salinization. Simple techniques of soil management to wash salinity, changing landforms, applying vermicompost to improve soil health, discontinuing capillary zone, fresh water reserve, aquaculture, dibbling seeds, etc., are adopted in the coastal region. These methods are either practiced in isolation or in combination of two or more approaches.

Coastal regions need a strategy for sustainable land management (Box 2).

### Box 2: Sustainable Land Management (SLM)

The United Nations defines sustainable land management (SLM) as “the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions”.

The productivity and sustainability of a land-use system is determined by the interaction between land resources, climate and human activities. Especially in the face of climate change and variability, using land the right way given a set of biophysical and socio-economic conditions, and implementing SLM, is essential for minimizing land degradation, rehabilitating degraded land, ensuring the sustainable use of land resources (i.e. soils, water and biodiversity) and maximizing resilience.

SLM encompasses established approaches such as soil and water conservation, natural resource management and integrated landscape management (ILM). It involves a holistic approach to achieving productive and healthy ecosystems by integrating social, economic, physical and biological needs and values. It contributes to sustainable and rural development.

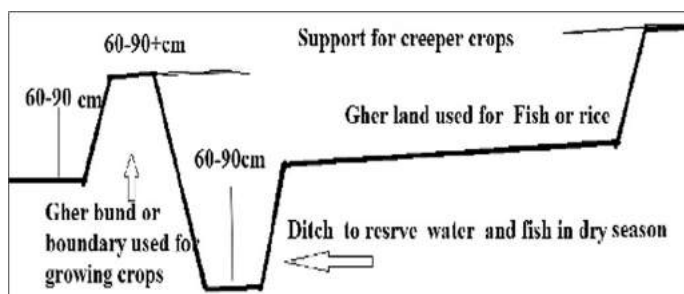
Source: <https://www.fao.org/land-water/land/sustainable-land-management/en/>



Best practices in SLM for coastal region to address salinization were documented by different professionals and institutions using the “World Overview of Conservation Approaches and Technologies- WOCAT tool” (<https://www.wocat.net/en/>). Those SLM could be grouped according to the areas they addressed:

- a) Changing landform to manage soil and water resources,
- b) Adopting salt tolerant crops to circumvent salinity,
- c) Introducing green infrastructure (mangrove and other tree plantation) to protect embankment and tidal surge, and
- d) Increasing fresh water reserve- effective usage of internal creeks.

Widespread adoption of changing landforms is practiced in south-western coastal areas. Figure-1 describes a typical sketch of the process of changing landforms for coastal soil and water resource utilization (Gurung and Azad 2013, Shoaib 2013).



**Figure 1: A typical example of changing landforms in coastal saline areas (Gurung TR and Azad AK (Eds.) 2013)**

Following this approach, farmers of the coastal region in Bangladesh are growing year-round crops (rice, vegetable, fish, etc.) by changing landforms to halt and/or reduce soil salinity by dissolving salt in rainy season, reduce capillary rise of shallow ground water by keeping soil surface covered in dry season and usage of water resources for aquaculture in the same parcel. This type of approach is practically three dimensional to halt or reduce soil salinity:

1. Year-round vegetable on raised desalinated dykes/bunds,
2. Kharif-2 rice on level land and
3. Aquaculture in the ditch (excavated area) either one side of the land or around the land.

The configuration of changing landform depends on a farmer’s choice, fund availability, market, land conditions, expected crops to be grown and the hydrological situation. These practices are spectacular in AEZ-13: The Ganges Tidal Floodplain, and some areas in AEZ-18: Young Meghna Estuarine Floodplain areas. A few pictorial presentations of halting soil salinity in western coastal region (AEZ-13) of Bangladesh follow.



**Bare dykesbunds of shrimp Gher**



**A typical single crop land in coast and converted land in distance**



**Changed landform to grow fruit, vegetables, rich and fish,**



**Cropping on soil heap (Tower gardening) to skip water logging and salinity in homesteads**

**Year-round vegetable raised in saline area**

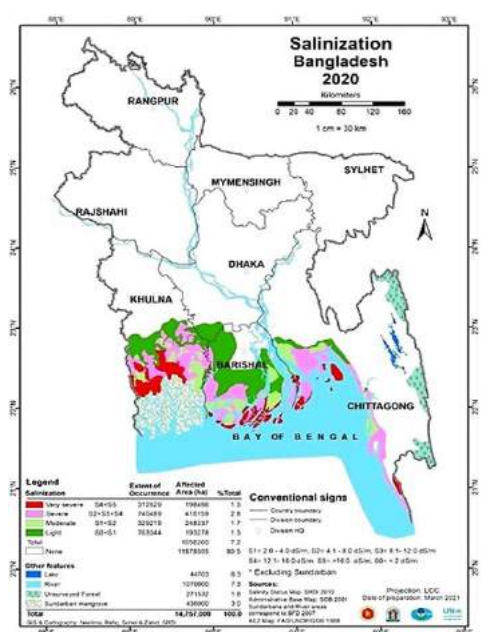
## WAY FORWARD

Managing soil salinity is not very challenging in the coast, but necessitates integrated institutional framework. The central approach to halt salinization in Bangladesh should be focused on efficient polder management with a very strong soil and water governance framework to stop or reduce saline water intrusion from sea/river and limit ground water abstraction for irrigation.

of groundwater (saline) for irrigation and developing supervised green infrastructure (developing mangrove and tree plantation along embankment, etc.)

The strategy may include:

- a. Identify and document SLM best practices, preferably following "WOCAT tool" (<https://www.wocat.net/en/>) and scale-up/scale-out for wider use in the landscape. There are several best practices adopted by farmers that includes indigenous practices and/or promoted by GO/NGO initiatives to manage soils to grow crops in dry season, like watermelon, vegetable, fruit, etc. Department of Agricultural Extension (DAE) could lead a team of local GO/NGO.
- b. Creating strong awareness about polder management.
- c. Research and development of polder management (Like Tidal River Management-TRM, changing landform etc.) and establishing continuous monitoring system. Bangladesh Agricultural Research Council (BARC) may lead the process.
- d. Implementing "Soil Doctor" program to involve the community in promoting sustainable soil management program (FAO 2020).
- e. Establishing green infrastructure in coastal region (along embankments, dykes, gher, etc.) and
- f. Compliance of "World Soil Charter" by all stakeholders (government, private, individual, etc.) to establish an achievable soil management framework.



The process deserves multisectoral (GO/NGO) involvement with rational policy support and investment. Some interventions are (but not limited to) enabling fresh water storage in creeks/khals/river in the polders, establishing effective internal drainage system to beat water logging, restricting deliberate saline water intrusion for shrimp or salt, limiting abstraction

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## ENDNOTE

<sup>1</sup>The Krug Mission Report, 1957 was a product of a study on flood control and water management in East Pakistan after the disastrous floods of 1954, 1955 and 1956 that drew world attention.

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# 64

## DESIGNING AND IMPLEMENTING A CROSS-SECTORAL APPROACH FOR CONSERVATION AND SUSTAINABLE MANAGEMENT OF FOREST ECOSYSTEM SERVICES (FES)

In the backdrop of World Forestry Day (21 March 2022), **Sandip Chowdhury** argues for improved coordination for a cross-sectoral approach in better management of forest ecosystem services, and highlights the importance of strengthening Extension and Advisory Services (EAS) in the forestry sector.

Ecosystem services are the benefits that people derive from natural ecosystems. A forest ecosystem provides multiple ecosystem services (food, water, energy, biodiversity, nutrient-cycling, climate regulation, etc.) that makes life on Earth possible. Forests are not just about trees and animals. These are complex socio-biological systems that cross-cut multiple disciplines. Since land is involved, it is very much a political issue too. This complexity, and the range of ecosystem services that it provides to diverse stakeholders necessitates the adoption of a cross-sectoral approach for its management.



### WHY WE NEED A CROSS SECTORAL APPROACH

The need for a cross-sectoral approach – in both policy and implementation – is not a novel idea. We now know that there is a strong nexus between forests, agriculture, water, energy, livelihoods and climate. Almost every stakeholder consultation on issues around forest conservation points out how different stakeholders need to come out of their silos and interoperate more. However, when it comes to implementation, the movers and shakers of this field fall far short. A glaring example of this divergence between commitment and implementation is the Aichi Biodiversity Targets where we could not fully achieve even one of the 20 targets in 10 years with hardly any progress on ecosystem services (target no. 14 under Benefits).

India already has a robust and scientific management system to govern and manage its forest ecosystem services. Under the aegis of the Ministry of Environment, Forest and Climate Change (MoEFCC), the Indian Forest Department has largely been able to preserve the country's remaining forests from ever increasing anthropogenic pressures. Although deforestation in India is nowhere near the

scales seen in the tropical forests of Amazon, Congo or South-East Asia, biodiversity loss and forest degradation still continue to be the major challenges in our country. The fact that millions of forest dwelling and forest fringe communities in India depend on nearby forests for their livelihood and identity, makes the case for conservation and sustainable management of FES even more compelling.



**Forests help control the water cycle by regulating precipitation, evaporation and flows**

### **Towards polycentric governance**

If conservation and sustainable FES management is to be a success in India, it is imperative that we adopt an informed, equitable and participatory management system. This kind of polycentric governance system allows for a seamless flow of information, collaborative planning and implementation among all societal actors, including those who don't generally cooperate. All stakeholders have individual, complementary and nested roles to play in bringing about cross-sectoral and landscape level FES management with immediate and long term impact. For example, sustaining ecological flows in forest-fed rivers in the context of climate change, mounting demand for water, and increased forest degradation will involve cross-sectoral and sector-specific interventions. Some of the interventions, inter alia, might be restoration of catchment area (Forest Department), more water recharge structures (Department of Water Resources & Mahatma Gandhi National Rural Employment Guarantee

Act [MGNREGA]), increasing water-use efficiency (Department of Agriculture), reducing water pollution (State Pollution Control Board and private sector), greater awareness (NGO), scientific inputs and geospatial monitoring and analysis (academia).

But how do we keep different stakeholders both engaged and motivated for a long time? One of the ways in which such a coalition can be maintained is through a multi-year campaign with each stakeholder's roles and responsibilities institutionalized in their respective work plans. Unless all actors are bound by a common movement with sector-specific responsibilities and accountability, the project will always be at the risk of frittering away its time. One place to look for inspiration is the Let's Millet campaign in Karnataka which aims to mainstream forgotten traditional foods, such as millet, in the state. The campaign involves the state's agriculture department, agro-companies, online retailers, farmers,

media, and the general public, and this has been able to raise the demand for organically grown millets in Karnataka. Sustainable FES management too will require a state-sponsored campaign for the public, involving cross-sectoral

actors who act in mission mode. The table below outlines the implementation roles of such a cross-sectoral task force with regard to FES. The list is only indicative, and many more tasks can be added to make it more comprehensive.

**Table 1: Implementation roles of a cross-sectoral task force for FES**

Stakeholders/Actors	Roles and Responsibilities
<b>Central Government</b>	<ul style="list-style-type: none"> <li>• Ensure requisite budgetary allocation for states</li> <li>• Invoke national and international commitments around FES</li> <li>• Lead inter-state cooperation, policies and legislation around FES</li> </ul>
<b>State Government</b>	<ul style="list-style-type: none"> <li>• Own the FES campaign and channelize required resources</li> <li>• Establish platforms for cross-sectoral coordination</li> <li>• Stop perverse subsidies, and incentivize meaningful solutions</li> </ul>
<b>Forest Department</b>	<ul style="list-style-type: none"> <li>• Lead the project in a time-bound mission mode</li> <li>• Anchor all coalition processes – meetings, follow-ups, monitoring</li> <li>• Execute forestry interventions for FES</li> </ul>
<b>Line Departments (agriculture, horticulture, water resources, rural development, etc.)</b>	<ul style="list-style-type: none"> <li>• Execute non-forestry interventions for FES</li> <li>• Share sectoral expertise and human resources</li> <li>• Work in convergence mode, wherever possible</li> </ul>
<b>Local Communities</b>	<ul style="list-style-type: none"> <li>• Participate in execution of FES interventions</li> <li>• Adopt sustainable practices in agriculture, forestry and allied activities</li> </ul>
<b>Private Sector</b>	<ul style="list-style-type: none"> <li>• Develop innovative deforestation-free markets for FES</li> <li>• Stimulate green entrepreneurships, carbon trade, wherever applicable</li> </ul>
<b>Financial Institutions (especially NABARD)</b>	<ul style="list-style-type: none"> <li>• Promote innovative financing, natural capital accounting</li> <li>• Secure and channelize funds from climate funds and other sources</li> <li>• Stop investing in businesses that threaten FES sustainability</li> </ul>
<b>Scientific and Educational Institutions</b>	<ul style="list-style-type: none"> <li>• Provide the best available Information Technology (IT) and geo-spatial technology for FES monitoring and management</li> <li>• Provide sustainable FES criteria and indicators</li> <li>• Study and develop climate change know-how pertinent to FES</li> </ul>
<b>Transnational Think tanks/ Multilateral agencies</b>	<ul style="list-style-type: none"> <li>• Support the campaign with their international expertise and learnings from other countries on capacity building and technology transfer</li> <li>• Guidance on managing synergies and tradeoffs</li> <li>• Knowledge management</li> </ul>
<b>NGOs/Civil Society</b>	<ul style="list-style-type: none"> <li>• Capacity building, education, training and community mobilization</li> <li>• Influence social norms and behavior and create FES awareness</li> <li>• Showcase best practices and demand accountability</li> </ul>
<b>Media</b>	<ul style="list-style-type: none"> <li>• Stimulate public awareness and political support</li> <li>• Hold governments and businesses accountable, and compare their promises with actions taken on the ground</li> </ul>
<b>Public</b>	<ul style="list-style-type: none"> <li>• Exercise their civic rights to clean environment and promote youth movements</li> <li>• Sustainable consumption and citizen science</li> </ul>

## Coordination

Knowledge-based cooperation and innovation that harnesses such cross-sectoral expertise and ingenuity can generate new possibilities and opportunities for the sustainable management of FES. However, these sector-specific actions need to be coordinated by a leading entity. Since the project is essentially about forest management, a state forest department is best suited to champion this project and anchor all the coalition processes. It also can take the assistance of community-level organizations, such as Joint Forest Management Committees (JFMCs), a corporate arm in the form of Forest Development Corporation, scientific and management advisory bodies such as Forest Research Institute (FRI), Indian

Institute of Forest Management (IIFM), as well as several partnerships with multilateral agencies such as the United Nations (UN), World Bank, The Economics of Ecosystems and Biodiversity (TEEB), among many others. However, the Department of Forests is known for its bureaucracy and it has to be more accommodative in decision making and more responsive to innovations, feedback and change. Cross-sectoral implementation demands clarity of thought, mutual trust, and a sense of fairness among all actors. For such a model to succeed and be up-scaled, it is necessary that the approach and implementation is inclusive, integrated and executable.



**The United Nations General Assembly proclaimed 21 March the International Day of Forests (IDF) in 2012. The Day celebrates and raises awareness of the importance of all types of forests.**

## ROLE OF EXTENSION AND ADVISORY SERVICES

One of the starting points to galvanise this cross-sectoral mission should be the strengthening and expansion of the role of EAS providers vis-à-vis FES. Government institutions, NGOs, and even the private sector can play an important role in identifying current knowledge gaps and training both public and government staff on FES, which is still an emerging subject in India. Unlike the agricultural sector which has a strong presence of extension services, the forest sector lacks such dedicated institutions. The departments which come closest to providing forest extension services are Directorate of Forest Education (DFE), Indian Council of

Forestry Research and Education (ICFRE), and Environmental Information System (ENVIS), which are responsible for generating forestry knowledge and training forest personnel. Their outreach is, however, limited and confined to the forest department.

If a cross-sectoral concept like FES is to take off, these silos need to be broken and departmental exchange needs to be promoted, especially with the departments of agriculture and water. One EAS model worth emulating (albeit with some changes) is from the Tamil Nadu Forest Department which has dedicated forestry extension centres in all of its districts (see Box 1).



## Box 1: Forestry Extension Centres in Tamil Nadu

In Tamil Nadu, Forestry Extension activities are being carried out through Forestry Extension centres established across 32 districts in the state. These Centres are mandated to:

- Transfer the improved technology of tree cultivation to farmlands, motivate the people to take up tree planting and provide a platform for Eco-education;
- Expand forest/tree resources outside natural forests, so as to increase the tree cover to 33% of the total geographical area of Tamil Nadu;
- Increase the tree cover in urban and rural areas by massive tree planting to mitigate pollution;
- Create awareness among the public, especially youth and school children, about the values and importance of trees and forests; and
- Generate employment opportunities among the educated youth, and more particularly in rural people, and thereby enhance their economic status.

The main activities for these centres include: Training on tree growing; Publicity and propaganda; Formation of demonstration plots; Raising and supply of seedlings on subsidy; and Awareness creation among school children and youth about the importance of forests through training and camps.

For more details on Forestry Extension Centres, visit: <https://www.forests.tn.gov.in/pages/view/Extension>

These centres provide technical support for growing trees, and educate people on the importance of tree planting. Such extension centres can be established all across India with a mandate to go beyond the traditional tree plantation activities and include the new paradigm of FES. These forest extension centres can also benefit from the huge wealth of local

forestry knowledge residing in regional Krishi Vigyan Kendras (KVKs),<sup>1 2</sup> thereby leading to cross-fertilization of ideas and better overall conservation and management of FES. The journey towards developing and enhancing forestry extension services has already started, and this is the opportune time to multiply the FES ethos in it.

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## ENDNOTES

<sup>1</sup><https://www.thehindu.com/news/cities/Coimbatore/krishi-vigyan-kendra-inks-deal-with-ifgtb-to-set-up-forest-science-centres/article36558221.ece>

<sup>2</sup><https://timesofindia.indiatimes.com/city/thiruvananthapuram/krishi-vigyan-kendra-icfre-join-hands-for-agro-forestry-in-homesteads/articleshow/28624710.cms>

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## UNDERSTANDING THE CLIMATE WATER NEXUS

Drawing from the experience of collaborative approaches to build resilience and improve water security in Maharashtra and Uttar Pradesh, supported by the 2030 Water Resources Group (2030 WRG), **Meghana Rao Pahlajani, Yogesh Bandhu Arya and Pia Barkataki** provide recommendations for agricultural extension services to improve water security for agriculture in this blog.

*"When the well is dry, we know the worth of water."* This quote by Benjamin Franklin depicts a harsh reality that most communities across the world are starting to recognize. As India celebrates its 75th Independence Day and with World Water Week - 2022 recently concluded, it is important to acknowledge the importance of our rivers, lakes, oceans, and glaciers in building our civilizations, and supporting our agriculture, industries, and communities.

The agriculture sector accounts for almost 90% of the total water consumption in India, with high dependence on groundwater in addition to surface water resources.<sup>1</sup> In 2021, the Global Climate Risk Index ranked India as among the top 10 countries most affected by climate change<sup>2</sup> and projected to face severe water stress by 2050.<sup>3</sup> With 17%<sup>4</sup> of water blocks categorized as 'over-exploited', 70%<sup>5</sup> of India's surface water being contaminated, and high NRW losses (around 40%)<sup>6</sup> in the water system, access to safe and assured sources of water continues to be a challenge. This is owing to a multitude of issues and inefficiencies in governance and management, end use, monitoring and conservation of water resources.



**Dried agricultural lands due to high temperatures across India**

The negative impacts of climate change are intensified by the agriculture sector's extreme vulnerability to it, leading to shifting agro-ecosystem boundaries and invasive crops and pests. Scientists project that a 2.5o to 4.9o C increase in temperatures across India could lead to a decrease of 41% to 52% in wheat yield and 32% to 40% in rice. Crops, such as maize and sugarcane, are equally impacted.<sup>7</sup> With total water demand in India expected to rise by over 70% by 2025<sup>8</sup>, a huge demand-supply gap is expected. This can be managed only with the adoption of climate change adaptation

strategies that build resilience and incorporate water management through collective and multi-stakeholder action.

## BUILDING RESILIENCE AND IMPROVING WATER SECURITY IN AGRICULTURAL ECOSYSTEMS

Two collaborative approaches – supported by 2030 WRG (Box 1) – to build resilience and improve water security in Maharashtra and Uttar Pradesh are discussed below:

### Box 1: 2030 Water Resources Group

The 2030 Water Resources Group (2030 WRG) is an innovative partnership for water security currently hosted by the World Bank Group's Water Global Practice. The multi-donor trust fund catalyzes public-private collaboration to enable transformative impact towards the advancement of water security and climate adaptation. By leveraging its agile network of over 1,000 in-country partners, in particular the private sector, 2030 WRG has demonstrated success in incubating, scaling, and replicating projects across its network, and catalyzing co-financing of initiatives to amplify reach and impact. Working with its partners, 2030 WRG is reshaping business models, implementation approaches, and financing instruments in the water sector. 2030 WRG targets three strategic leadership areas – Transforming value chains, Promoting circular economy solutions, and Building resilience – all structured as core responses to climate change. Through its initiatives, 2030 WRG has secured nearly USD 1 billion in water security co-financing and achieved nearly 1 billion m<sup>3</sup> of water impact through reduced water abstraction and improved water pollution management.<sup>9</sup>

In India, the Multi-Stakeholder Platforms (MSPs) established by 2030 WRG in Uttar Pradesh and Maharashtra drive the agenda of stakeholder-driven collective action to ensure water security, by bringing public, private and civil society partners together. To this end, 2030 WRG is working to design transformative projects around the climate-water nexus by promoting a shift towards climate-smart agriculture.

### Maharashtra

Agriculture and allied sectors contribute to around 12% of Maharashtra's economy and are responsible for around 68%<sup>10</sup> of the State's labour force. Around 80%<sup>11</sup> of agriculture in Maharashtra is rainfed, and farmers depend on seasonal rains for their livelihoods. With two-third of the state's area facing high to moderate levels of vulnerability,<sup>12</sup> the agricultural ecosystem in Maharashtra is affected by climate change-induced droughts, floods, and shifting precipitation patterns. The area under cultivation for food grains reduced from 74% in the 1960s to 52% in 2020.<sup>13</sup> During the same period, the area under cultivation for water-intensive cash crops increased from 24.8% to 46%. This shift has led to the depletion of groundwater resources and imposed health risks owing to the consumption of polluted water from streams and canals.



**Purple pipes facilitating treated water for agriculture**

To address the dual challenges of water access and health risk in water for agriculture, 2030 WRG's Maharashtra Water Multi Stakeholder

Platform (MSP) implemented a pilot project in Zalta, Aurangabad, with the Aurangabad Municipal Corporation (AMC) and Project on Climate Resilient Agriculture (POCRA)<sup>14</sup> for circular solutions to build water security in the region. Through the conveyance infrastructure set up by local farmers, safe treated wastewater from the Zalta Sewage Treatment Plant is reused for agricultural applications in adjacent areas. Apart from organizing farmers in a first-of-its-kind Wastewater User Association and providing them with an assured source of water to increase incomes, this approach enabled AMC to better utilize the treated wastewater as a resource for revenue generation.

Globally, purple pipes signify the flow of treated water. Through this ‘Purple Revolution’ in the use of treated water for agriculture, a prototype for collective action to address water scarcity issues that threaten agriculture in India has been demonstrated. The National Framework for Safe Reuse of Treated Water issued by the Ministry of Jal Shakti, Government of India, lays out the vision, mission and path for implementation of programs and approaches at both state and national level for scaling up such projects.

### Uttar Pradesh



**Villagers with additional harvest using water conserved under Project PRAGATI**

The Bundelkhand region in Uttar Pradesh is characterized by strong underlying risk factors such as persistent water scarcity, poor soil fertility and low productivity that are further intensified by climate- induced vulnerabilities.

2030 WRG’s Uttar Pradesh MSP conceptualized the PRAGATI<sup>15</sup> Project to ensure water, livelihood and agricultural security while

mitigating climate-induced risks. Collective efforts through convergence between the government, private sector and civil society for development of village-level water security plans, water budgets, and rejuvenation of water bodies have led to effective management of water resources. Using a participatory approach, communities have been mobilized to play a central role in managing their water needs. ‘Jal Sahelis’, a cadre of women water warriors have played an instrumental role in coordinating water-related work in villages.

As a part of convergences facilitated, PRAGATI has integrated benefits from relevant departments under the Government of Uttar Pradesh, including Rural Development, Mahatma Gandhi National Rural Employment Guarantee Act, National Bank for Agriculture and Rural Development (NABARD), and Members of Parliament Local Area Development Fund. Private partnerships have also been leveraged for PRAGATI, including those with GIZ, Indian Agriculture Incubation Network (IAIN), Social Alpha, Dalmia Bharat Foundation and other development organizations, such as Parmarth Samaj Sewi Sansthan for implementation support.

Executed on 8000 hectares, it is estimated that PRAGATI has led to 4.8 million liters of water conserved, and 61.82 million liters of freshwater abstraction avoided due to improvements in on-farm water-use efficiency from 2020-21.<sup>16</sup> Considering the project’s ability to drive integrated water resources management, improve water use efficiency, and improve resilience of the local community, such approaches can further help in addressing water-related risks arising from climate change.



**Jal Saheli collective of women water leaders supporting the implementation of PRAGATI in Uttar Pradesh**

## EXTENSION SERVICES IN IMPROVING WATER SECURITY FOR AGRICULTURE

Agricultural Extension Services have played a very critical role in establishing and strengthening the agriculture sector in India. Given the strong correlation between agriculture and water in India, the impact that extension services from Government departments, Water User Associations (WUAs), farmer cooperatives, self-help groups, local universities, ATMAs, KVKs, foundations, not-for-profits and NGOs, have in strengthening water security is tremendous. Examples of how these have supported water security are highlighted below:

- 1) Fostering community-level water stewardship to effectively manage water resources locally. In Zalta, extension services were instrumental in bringing farmers together to develop governance, allocations, testing and water management mechanisms for the use of treated wastewater through creation of a first-of-its kind Wastewater Users Association.
- 2) Driving multi-stakeholder and collaborative approaches with involvement of the private sector, financial institutions, multilateral and bilateral organizations, and convergence with Government programs to mobilize efforts through Jal Sahelis and Pani Panchayats for driving the water security agenda in the region as demonstrated in Bundelkhand.
- 3) Leading awareness creation initiatives and adoption of disruptive technologies and innovative financing as demonstrated in a pilot project by 2030 WRG in Nandurbar, Maharashtra, which focused on harnessing technologies such as drones, analytical tools and platforms for building climate resilience in agro forestry value chains, improving agri-productivity and enhancing farmer prosperity. Local NGOs and farmer groups were critical in mobilizing communities, educating them on benefits of technological

and financial solutions, and facilitating cluster level implementation.

- 4) Enhancing market access opportunities as demonstrated in a program by 2030 WRG and Water Resources Department, Government of Maharashtra. The program focused on integrated development in command areas<sup>17</sup> through off-farm water management, on-farm water use efficiency, and strengthening market linkages. Organizations such as WUAs, Farmer Producer Companies (FPCs), and cooperatives were instrumental in ensuring sustainable and fair access to markets for increased incomes and improved livelihoods.

While extension services have successfully facilitated water security in projects across India, scaling their impact for water efficiency has been challenging. Key recommendations to expand their impact are:

1. Focus on developing and strengthening irrigation extension services by the Water Resources Departments in the State Governments to better utilize irrigation capacity and improve economic gains for farmers through more optimal use of resources.
2. Transition extension services provided for water management from a knowledge to a more user- oriented model that supports and facilitates access to inputs, innovation, and information for farmers at the last mile.
3. Shift from global and regional models of extension service-delivery to hyper-local, digital, on-demand and ready-to-deploy models through digital applications and data-driven products designed to increase agricultural productivity and water use efficiency (for example, Canal Digital Agri-food Ecosystem developed by WIDYA and implemented in Maharashtra).

Strengthening our joint understanding of the climate-water nexus is the need of the hour and the time for concerted leadership and collective action is now!

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## ENDNOTES

<sup>1</sup><https://www.circleofblue.org/2018/world/groundwater-scarcity-pollution-set-india-on-perilous-course/>

<sup>2</sup>[https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021\\_2.pdf](https://www.germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_2.pdf)

<sup>3</sup><https://www.oecd.org/india/India-Improving-Water-Security.pdf>

<sup>4</sup>Water Stressed Districts, Government of India

<sup>5</sup>Composite Water Management Index, Niti Aayog 2019

<sup>6</sup><https://www.irjet.net/archives/V6/i4/IRJET-V6I4739.pdf>

<sup>7</sup><https://www.thethirdpole.net/en/food/climate-change-drives-down-yields-and-nutrition-of-indian-crops/#:~:text=India%2C%20home%20to%201.4%20billion,32%25%2D40%25%20in%20rice.>

<sup>8</sup><https://www.oecd.org/india/India-Improving-Water-Security.pdf>

<sup>9</sup>2030 WRG Annual Report 2021

<sup>10</sup><https://www.adb.org/sites/default/files/project-documents/53264/53264-001-rrp-en.pdf>

<sup>11</sup>Water Conservation and Saving in Agriculture, Water Resources Department, Government of Maharashtra 2019

<sup>12</sup>Socio Economic vulnerability to climate change – index development and mapping for districts in Maharashtra, India, ICAR

<sup>13</sup>Economic Survey of Maharashtra 2021 -2022

<sup>14</sup>Project on Climate Resilient Agriculture

<sup>15</sup>Participatory Rural Agricultural Advancement through increased incomes

<sup>16</sup>These cumulative values are outcomes of efforts made under PRAGATI owing to initiatives undertaken by MGNREGA, a new technology initiative led by ag-tech partner, EF Polymer and local communities.

<sup>17</sup><https://www.fao.org/3/cc0347en/cc0347en.pdf>

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## BEHAVIOUR CHANGE COMMUNICATIONS FOR IMPROVING SOIL HEALTH AND BUILDING CLIMATE RESILIENCE

Millions of farmers have to change their habits in order to improve soil health, which is critical for our food security and farmer livelihoods. As we celebrate World Soil Day 2022, **Chhaya Bhanti** illustrates the potential of behaviour change communication for improving soil health.

This year, as we mark the 20th anniversary of World Soil Day, the issue of soil health in agriculture still remains a critical need—rates of land degradation are still alarmingly high and impacts of climate change on farmers have become painfully clear. We are all aware that tackling India's 'soil emergency', calls for hand-holding of farmers, so that they give up 'harmful' conventional practices in favour of integrated farming practices that put nutrients back into depleted soils. However, we also know that convincing farmers of the merit of such interventions requires a fundamental change in their current behavioural practices, which is a challenge. At Vertiver, our experience in working with communities on behaviour change spans the sectors of forestry, waste, and agriculture in the face of climate change mitigation and adaptation. Over several projects, we've realized that there is a huge gap between the theoretical science of behaviour change and its implementation, especially in the context of massive socio-cultural diversity of rural landscapes in India.

Researchers and development practitioners often rely on Social Cognitive Theory, Theory of Planned Behaviour and Stages of Change Transtheoretical Model to target behaviour change outcomes in program design. Based on multi-disciplinary insights across psychology, sociology, economics and anthropology, these frameworks walk us through various stages and methods that help assess current (baseline) knowledge, attitudes, preferences and practices of an individual or a group. Therefore, researchers have to design relevant incentives and 'nudges', so that barriers to adoption of proposed interventions are overcome a clear path for long-term behaviour change is created.



### Nukkad Natak performance on Soil Health in MP

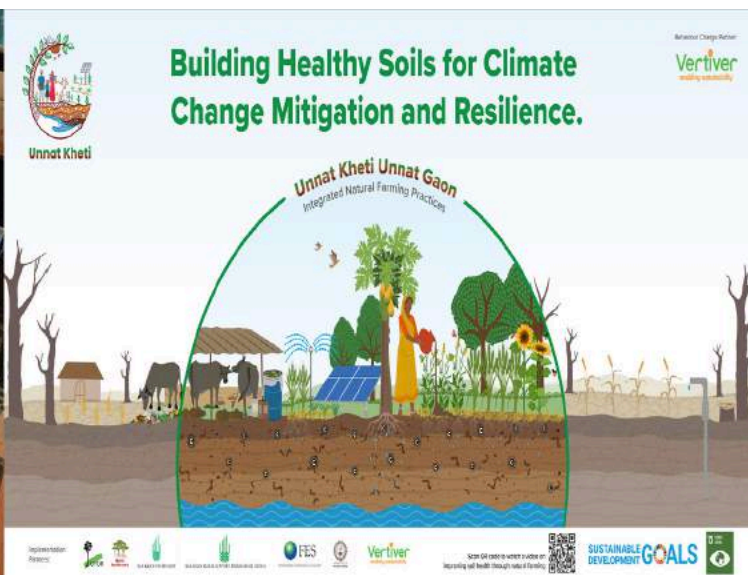
Whether we wish to persuade farmers to reduce or eliminate harmful chemical inputs, practice nutrition-sensitive agriculture, add millets and other traditional crop varieties to the sowing mix, lower the water and energy footprint at the farm through techniques and tools, reduce tillage, not burn crop residue, plant trees, restore common pool water and land resources, improve livestock feed, or create women and farmer collectives, shifting farmers from “conventional” practices that run contrary to these interventions entails a massive overhaul of systems and mindsets. But development programs are typically bound by time and

resource, and rarely can a project afford to tick all the right boxes proposed under a behaviour change theory.

Based on our experience with supporting implementing partners on behaviour change communications, and in implementing projects on our own, we feel behaviour change communications is foundational to achieving program outcomes. Due to the urgency of action that is needed for improving soil health, we now discuss the key steps that can strengthen behaviour change work.



Training field teams under Unnat Kheti project.





## KEY STEPS

### 1. Map Farmer Archetypes in Project Landscapes

- Map Farmer Archetypes across socio-economic classes: Identify a handful of farmers in a landscape whose knowledge, attitude or practice may be contrary or aligned with interventions proposed. Develop a list of corresponding factors (through at least two to three interactions with them and field teams) that would make them adopt or disregard proposed interventions. An example of an SRI (System of Rice Intensification) Farmer 'archetype' could be someone who does not believe it is possible to grow rice without flooding and thinks reducing their water use is unnecessary. Digging deeper into the behavioural profile of this farmer 'archetype' may reveal that they associate flooding as key to their yields; and/or may see SRI as more labour-intensive and input-heavy compared to conventional practices. Creating an 'archetype' map of this farmer will allow the 'personification' of deeply held group beliefs, enabling the generation of ideas from field teams on what behavioural incentives may be needed to convince this 'archetype'. This understanding can then be applied to a larger group that is thought to hold similar beliefs. This rapid 'archotyping' process should be carried out for each intervention, so that program managers can plan stages of behaviour change for such a farmer;
- Map institutional barriers to adoption of potentially proposed interventions;
- Through Focus Group Discussions (FGDs), ensure that one language does not become proxy for the multiple dialects that may exist even within what may seem like a socially homogeneous farmer group so that nuanced insights can be received from large groups;
- Ensure women and men are engaged as separate groups (women's opinions within a mixed gathering can be superficial).

### 2. Build Communication Capacity of Field Teams at the Onset

- Once the needs and willingness of a target community has been mapped for

the proposed intervention, field team members must be trained to communicate key benefits of interventions in short simple sentences, and very importantly, in local dialects, at the very beginning of the program. A good story that paints a clear picture of benefits can go a long way towards getting buy-in of internal team members on program gains, as well as of early adopters – an essential first step towards enabling behaviour change. We have seen that while this may seem very obvious, the technical language often used to communicate such points creates a barrier that withholds clear understanding between field team member and target farmer beneficiary;

- Train community resource people to capture good pictures, and videos of interventions so as to enable farmer-to-farmer learning and sharing. We regularly conduct storytelling workshops that include behaviour change messaging and smart phone-based documentation for rural field teams;
- Train field teams to perform Nukkad Nataks (street plays): We've written intervention-specific Nukkad Natak scripts, and our team of performance artists and soil scientists have trained field teams to 'perform' these plays. Getting professional Nukkad Natak performers to rural areas on a regular basis can be a challenge; so building the capacity of a local team to enact a play, can engage farmer communities through fun and interactivity, which they always value and enjoy.

### 3. Design, Visualize, Socialize and keep repeating

- Invest in 'brand positioning' and 'brand recall' and create a visual and oral identity that is simple and easy for farmers to recall. For example, we developed a logo for the the Unnat Kheti project by CIFF, imbibing various interventions within project branding and developed an introductory visual and song to communicate the importance of integrated natural farming practices;
- Ensure women are represented equally in all communications content, and are prioritized separately in dissemination planning;
- Build visually engaging and culturally

relevant content: We wrote a song on soil health in Hindi, and also produced it as a garba, and to make it more relatable for farmers hired performers to 'enact' the garba in order to help socialize it;

- Create scientifically accurate content geared towards farmers and ensure multi-linguality: This animation we made on soil health in Hindi and Gujarati is being used by MANAGE for wider dissemination;
- Ensure interactive learning: We developed the Kara Bhara Snakes and Ladder game working closely with Unnat Kheti partners, and provided training to help socialize its adoption across landscapes. We have also developed visual illustrations of landscape-specific Bio-input recipes with project partners;
- Co-create process videos with communities

where possible: We made this video with our communities on the Government of India's Su-Dhara project on urban waste management, giving them pride and ownership of the narrative and helping socialize it further;

- Finally, ensure testing of tools prior to launch and collect regular feedback from field teams on all communication tools in use, so that these can be modified, changed and re-introduced based on gaps identified.

Investing in creating distinctive visual communications that is both scientific as well as vernacular, can also be a huge asset when trying to establish policy linkages for the program. We have had success at the highest levels of government with our communications work with this approach.



**Nukkad Natak performance on sustainable harvesting of NTFPs in MP**

### Co-create Champion Farmer Stories

- Field teams should work closely with their communications team to co-create a script and storyboard of a potential champion farmer story to ensure that all field details are communicated very clearly and an agency can plan to film accordingly;
- Ideally, document interventions through at least two crop cycles and ensure that the cost and benefit of the interventions are clearly communicated;
- Collect feedback through observation and

interaction with farmers after screening, and share these with your communications agency so that subsequent champion farmer stories can incorporate these considerations. Disseminating these stories across available digital and in-person venues should be contextually planned through nuanced understanding of media behaviours of a target community. Some champion farmer stories made under the Unnat Kheti project are provided here;

- Another popular and non-digital way to communicate champion farmer stories is through printed calendars that feature

farmers from project landscapes. Offering such 'social rewards' to farmers can motivate them further;

- Long term monitoring is of course vital for ensuring that a farmer does not fall back

into the default 'conventional' behaviour mode, if incentives and 'pressures' embedded within a program are no longer available.



**Vertiver designed snakes and ladder game 'Kara Bhara' under Unnat Kheti project**



**Engaging with farmers on visual tool on System of Rice Intensification (SRI) with Unnat Kheti project field teams in UP**



### Training field teams on storytelling on natural farming

#### END NOTE

Enabling climate resilience of local ecosystems and communities is a top national priority. In our experience, when behaviour change communications are scientifically rigorous and aligned with socio-cultural dimensions of project landscapes, they provide a strong foundation for communicating with key stakeholders and supporting program goals. We have found that this work requires a versatile multi-disciplinary team. It needs scientists to articulate the complex processes behind proposed interventions, and writers, visual artists, designers, filmmakers and performers to work together to convert

scientific and economic arguments into easy to understand messaging and engaging and visually attractive vernacular communication tools that rural stakeholders can relate to.

Though such a diverse skill set is not typically found under one roof, we have built this multi-disciplinarity within the Vertiver team to support natural resource conservation and climate action in India. As behaviour change takes center-stage in development practice, stakeholders in agriculture extension networks can harness the catalysing potential of holistic behaviour change communications towards creating buy-in at landscape and policy level across all stages of a program.

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## PRIORITIZING NATURE-BASED SOLUTIONS FOR RESILIENT COMMUNITIES AND SUSTAINABLE LIVELIHOODS

As we reflect on the International Day of Forests 2023 gone by, **Swapan Mehra** discusses the untapped potential of nature-based solutions in promoting adaptation and building healthy and resilient communities, while simultaneously achieving key climate goals.

We are living in challenging times and no country can escape the impacts of climate change and variability. These challenges have been exacerbated by declining biodiversity, unsustainable land use and inequitable extraction of natural resources. Large parts of India are particularly vulnerable to climate change, with changing rainfall and temperature patterns expected to significantly affect our agricultural output and ecosystems.

The prevailing climate emergency and environmental scenario call for a shift in focus to enhancing the resilience of ecosystems and communities. To accomplish this, our efforts must be focused on working in tandem with the natural system to decarbonize economies while simultaneously addressing social inclusion.

### NATURE-BASED SOLUTIONS

Nature-based Solutions (NbS) is an overarching term that includes several approaches that place nature at the center of solutions for climate resilience and sustainability. They aim to protect, enhance and replenish natural resources that form the basis for achieving food, energy and water security, urban resilience, protecting biodiversity and habitats, restoring land and reducing disaster risk. It is estimated that more than one-third of cost-effective climate mitigation actions required till 2030 can come from NbS (World economic forum, 2021).

Against this backdrop, nature-based solutions are a win-win proposition for people, the economy and the planet and meet the cross-cutting goals of halting biodiversity loss, achieving land degradation neutrality and meeting multiple Sustainable Development Goals (SDGs).

### My Interest in Conservation

Growing up in different parts of India exposed me to the wonders of our diverse landscapes. However, witnessing

the loss of biodiversity and degradation of ecosystems over the years propelled me to work towards developing inclusive solutions to tackle this crisis. The Indian Institute of Forest Management (IIFM), Bhopal, was instrumental in giving direction to my determination, playing a pivotal role in helping me build on this idea and providing me with the skills and tools needed to take it forward. Here I learned the value of

working through both a top-down approach to drive policy action and a bottom-up approach to implement community-driven solutions that integrate scientific tools and traditional knowledge. I also worked for several carbon finance organizations, using carbon credits (Box 1) as a means of providing funding for climate action.

### Box 1: Carbon Credits

Carbon credits are part of a tradeable scheme — one credit gives an organization the right to emit one tonne of carbon dioxide (CO<sub>2</sub>). The credit is a payment made by an emitter of carbon (e.g., oil refinery) to the developer or owner of a carbon sequestration process (farmers practising agroforestry, biogas plant owners, etc.). They are measurable, verifiable emission reduction mechanisms used for offsetting carbon footprint, along with multiple other positive benefits such as empowerment of communities, protection of ecosystems, restoration of forests or reduced reliance on fossil fuels.

Carbon Markets refer to the “market” where credits are obtained and sold from one entity to another within defined processes to avoid or reduce greenhouse gas emissions.

If farmers are able to commit to and demonstrate that they can keep carbon stock in soil through activities such as agroforestry, low-carbon agriculture, or biogas production, they can potentially sell credits under various standards. Verra-Verified Carbon Standard and Gold Standard are the leading international standards in the voluntary carbon market. Carbon projects where credits are generated and sold must adhere to a rigorous set of criteria to pass verification by third-party agencies and a review by a panel of experts at a standard. After an organization or an individual buys a carbon credit, the credit is permanently retired so it can't be reused.

Carbon credits encourage companies to not only reduce their own footprint but also invest in activities outside of their value chain in the transformation to net zero.

However, I realized that funding was not the only challenge to finding effective solutions for building resilience. Climate change disproportionately affects marginalized and vulnerable communities who face multiple challenges because of extreme climate events, associated health effects, food and water insecurity, migration and forced displacement, cultural identity loss, and other related risks. It is important they are at the center of all climate action.

It was this understanding that led me to found Iora Ecological Solutions (Iora), a pioneer in developing and implementing nature-based solutions for climate action. I have been lucky to attract some of the most passionate and committed people, and together we are developing solutions that help mitigate the impacts of climate change and address its social impact by proactively facilitating policy implementation. For more than 10 years,

we have provided end-to-end solutions for ecosystem conservation and climate change mitigation, while bridging the gap between businesses and communities.



**Team Iora out bird watching**

At Iora, we believe NbS have the significant potential to help improve the quality of our soils, enhance water availability, conserve biodiversity, enrich our food systems and secure the livelihoods of our communities. While upholding the values of equitable benefit sharing, we collaborate with decision-makers, NGOs and governments to combat challenges faced by the environment. We strongly believe that a community-driven NbS approach can contribute to reaping the maximum benefits for nature and society. As we progress on building robust strategies and technological interventions to foster NbS application, we invite more partners to replicate this approach across the world.

## FOREST CONSERVATION AND ENRICHMENT AS A SOLUTION TO CLIMATE CHANGE

Conserving and enriching forests is one of the most critical nature-based solution we can implement. Forests play a crucial role as carbon sinks in mitigating climate change and helping economies build pathways for a resilient future while providing income security, safeguarding rights of forest-dependent communities, and improving soil, air and water quality. Approximately 200 million people in India are forest-dependent, which underlines the symbiotic relationship between local communities and forests.

### Policy Action for Decarbonization

India's Nationally Determined Contributions (NDCs) and Long-Term Low Emission Development Strategy (LT-LEDS) both include key roles for the forestry sector. The country's NDC goal – sequestration of an additional 2.5-3 billion tons of CO<sub>2</sub> equivalent by 2030 – is one of the most ambitious in the world. Iora has had the privilege of supporting the Ministry of Environment, Forests and Climate Change (MoEFCC), Government of India, in developing roadmaps for both the goal and the forestry sector related LT-LEDS.

As a part of our general work and process, we engage with several institutions like State Forest Departments, NGOs, forest communities and corporates to design and implement forest conservation and restoration programs and

afforestation programs. As a key-in-country partner for the USAID-MoEFCC Forest PLUS Program, we developed and demonstrated the application of Reducing Emissions from Deforestation and Forest Degradation (REDD+), Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks. This involved developing India's first four Jurisdictional REDD+ pilots, followed by developing and registering, in partnership with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, India, the country's first and only REDD+ methodology approved by an international carbon standard, Verra—the VM00037.

### Technology Use for Sustainability

Under Forest Plus, we also developed 'm-forest application', a digital platform that enables forest inventory data collection, and transparent monitoring and reporting of carbon stock assessment. The application further assists its users – field foresters and community members – in easily monitoring and managing forests. While carrying out analysis on the ground across the four project states via., Karnataka, Madhya Pradesh, Himachal Pradesh and Sikkim, we identified various pressures on forests and potential solutions to addressing them. We identified the need to conserve grasslands in the region, and the potential of improved energy access as a means of reducing pressures on the forest. Working closely with the communities, we realized the need for communication and outreach on the value of ecosystem services offered by the forests and promoting best practices for sustainable use to further reduce pressures.

### Decision Making Tools to Empower Communities

Our USAID-supported flagship Innovations in Ecosystem Management and Conservation (IEMaC) project demonstrated how technology integration can engage and empower communities. We developed iFoReST (India's Forest Resource Decision Support Tool) – an innovative decision support system (DSS) that leverages systems design principles and guides investment decision-making with regard to technological, ecological and policy interventions for sustainable fuelwood management, thereby addressing unsustainable extraction from forests. Our sustained efforts

and interventions in this program led to a 30% increase in the income of forest communities in the project regions of Madhya Pradesh (IoRA, 2015).

### Capacity Strengthening

Strengthening communities and capacity building at the local level is critical to operationalizing climate action. To fill capacity gaps, we need to ensure direct engagement of communities in planning and implementation of environment- related policies. This not only

bestows them with a sense of ownership and empowerment, but also helps to reduce the divide between top-down and community-level policy actions. Our capacity building and training programs have successfully strengthened community-led natural resource management. Supporting the implementation of the Japan International Cooperation Agency-supported forestry projects in Odisha and Tripura, we imparted training on carbon stock analysis and carbon enhancement in forests to several hundred forest staff.



**Working together with a women's group to identify challenges faced due to climate change and land degradation in order to co-develop solutions.**



**Communities sustainably harvest non-timber forest products (NTFP) after outreach and training activities carried out under IEMaC.**



## TREES OUTSIDE FOREST (ToFs) TO SEQUESTER CARBON AND BUILD RESILIENCE

To realise the bold targets of green cover and carbon sequestration, India has to depend on and promote a steady increase in ToFs. At Iora, we view the enhancement of TOFs as a strategy to achieve our climate goals, enhance land quality and reduce pressure on natural forests, through:

- avenue plantations,
- urban plantations, and
- agroforestry.

### Mapping Tree Cover

Working with Michigan State University (MSU) and with support from the National Aeronautics and Space Administration (NASA), we are developing algorithms that can map individual trees on farms or other locations to improve the quality and reduce costs of ToF monitoring.

### Investment Platform to Promote Agroforestry

We have created an investment platform that helps farmers obtain funds from carbon credit buyers who have net zero targets to implement agroforestry and soil enhancement projects on their farms. We are developing a 14,000-hectare (ha) agroforestry project across Odisha and Maharashtra, a 10,000-ha tusser silk host plantation on private wastelands in Jharkhand and West Bengal, and a 2,500-ha fruit tree plantation in Maharashtra. These efforts will result in enhancing the incomes of more than 10,000 farmer families and help build their resilience to climate change. It will also result in sequestration of over 10 million tons of CO<sub>2</sub> and help restore degraded lands.

### Forest Restoration and Management

We recently carried out an assessment of land degradation in five states in India- Madhya Pradesh, Maharashtra, Haryana, Karnataka and

Nagaland, using the International Union for Conservation of Nature (IUCN) Restoration Opportunities Assessment Methodology (ROAM). This helped us identify 12 million ha (mha) of land (of which about 3.7 mha was forest land and 5 mha was agriculture land) that needs to be prioritized for restoration. These regions need to be restored urgently to ensure food security in the country and achieve our climate goals.

We are currently working with State Forest Departments and other line departments to prepare intervention plans centered around nature-based solutions to address these challenges. We are also identifying potential investment and financing sources for these actions.

## LEVERAGING AGRICULTURE EXTENSION TO PROMOTE AGROFORESTRY

Over the past 12 years, having implemented more than 150 projects, we realized that the current agriculture extension system needs to evolve to address the needs of tree plantation on farms by:

- creating the case for improvement in varieties,
- promoting high quality planting material,
- training on monitoring tree carbon and
- disseminating good planting techniques.

Research institutes and government departments, along with community-based organizations, need to collaboratively develop localized business models for agroforestry for it to achieve scale and be truly beneficial to both farmers and the environment. These models must promote the use of native species, ensuring the enhancement of biodiversity, and account for not just the direct benefits of the system, but also the magnitude of indirect benefits and ecosystem services offered.

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# Forestry Extension

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## EXTENDING FORESTRY RESEARCH IN THE TROPICS: THE KFRI EXPERIENCE

In this blog, **TV Sajeev** argues the importance of educating stakeholders on changing their sensibility about forests to accommodate larger concerns such as climate change. To do so, the extension work in the forestry sector should be built on the solid rock of scientific data and empirical projections.

Globally, the perception about forests have considerably evolved over the past few decades. Initially it moved from production forestry to conservation forestry during which the priority shifted from timber production to protection of biodiversity. There was a wild spree of announcing wildlife sanctuaries, national parks, and biosphere reserves across the globe. Soon came concerns on the impact of climate change and the role of forests in maintaining local climate, and these got prioritised. The wide-ranging ecosystem services provided by forests got appreciated. Recent floods across the country have now put one ecosystem service of forests - its water retention and release capability - into the top priority. This blog explains how a research institution dedicated to tropical forestry in the state of Kerala, India, conducted itself in providing extension services through changing times and paradigms in forestry during the past four-and-a-half decades.

The Kerala Forest Research Institute (KFRI) came into existence in 1975 when production forestry was still the main focus of tropical forest research. Protecting commercial tree plantations from pests and diseases, and management of declining soil nutrients and physical texture arising from multiple rotations were the focus themes. Pest management of plantation species like Teak, disease management of Eucalyptus, and the recommendation to abolish Taungya system (the practice of doing agriculture during the initial years of forest plantation establishment) due to worsening soil erosion were indicative of successful extension efforts. It was also a time when the increasing role of conservation forestry was imbibed by KFRI as demonstrated by their floral and faunal surveys and species-specific studies oriented towards conservation of endemic/keystone/umbrella/endangered species. Methods for census of wildlife populations were standardised by KFRI which also imparted training to forest staff and volunteers to conduct the census. Subsequently they did the data analysis that provided the very first estimates of various species of wildlife and their changing numbers in the forthcoming years.

These formative years also laid the foundation for seamless work with the major stakeholder in forestry - the Forest Department. While there were many successes, such as management of diseases in forest nurseries and pests in young plantations, there were failures too: the non-implementation of a biocontrol method developed after nearly two decades of research

for the management of the teak defoliator pest which causes significant economic loss, being the foremost among them. While the extension services for the Forest Department is still going on and has reached a level of real time problem solving, this blog focuses on some of the innovative extension activities.



**Kerala Forest Research Institute**

## **EXTENSION ACTIVITIES OF KFRI**

### **Tree Health Helpline**

It is a single window – created for the general public and various stakeholders in forestry – to directly access information on any aspect of tree health. It opened up the knowledge base created in KFRI over long years to the common man, while for the major stakeholders it offered real time access to information. With the advent of mobile phones, forest staff would call directly from the field, explain the symptoms and get remedial measures which help in fast containment of the problem. An exclusive helpline for medicinal plant farmers was started recently.

### **First Question**

While forestry is basically an area of applied research, it very much depends on advances in fundamental sciences and the scientific temper prevalent in society. While the country found a new awakening of pseudo-science and mythology posing as history, KFRI initiated First Question - a dedicated helpline where children

could call and post any questions. These questions will be scientifically answered and this became an instant hit all across the country. It created a database of very interesting questions which only a child would ask.



### **Democratising Innovations**

KFRI has partnered with Kerala Development and Innovation Strategic Council (K-DISC) under the Young Innovators Programme (YIP). This programme aims at empowering future innovators to invent new products, services wherein its scientists would mentor innovators

so as to realize their ideas. Institutional mechanisms for innovations are thus being opened outside of corporate houses, and KFRI is now in the process of collation and validation of hundreds of innovative ideas in the forestry sector, such as gadgets for firefighting, mapping, accessing tough terrains, mitigating wildlife conflicts, and many others.

### **Advocacy to Protect Forests**

While plantations and expansion of agriculture were the factors that reduced forest area initially, hydroelectric projects became a major factor during the last four decades. The primary data collected by KFRI from the pristine forests, which were set to be drowned, became the knowledge base for widespread protests against sinking forests. Starting from the Silent Valley project, it expanded to other areas like Pooyamkutty and Athirappilly. The struggles which happened in all these places were ideal platforms for forestry extension work wherein the value of forests and their ecosystem services could be communicated to the larger public.

### **Linking Science and Governance**

One of the major breakthroughs in linking Science and Governance in India happened in 2011 when the Western Ghats Ecology Expert Panel commissioned by the Ministry

of Environment and Forests – to look into the conservation of the oldest forest landscape in the country – submitted their report. The report, for the first time divided the entire Western Ghats area into three zones, based on various levels of ecological sensitivity and prescribed do's and don'ts for each zone. The zonation was done based on scientific principles and the implementation process was recommended to be purely on a participatory basis involving the Grama Sabhas. The report immediately drew criticism from the mining community which spread fast to religious organisations and political outfits. While a large amount of false information was spread about the report, KFRI opened a helpline for the general public so as to get their concerns on the report explained and diffused.

The floods of 2018 were an eye opener for Kerala State, which was long considered to be a safe place without natural disasters. The seamless communication network established and maintained since long by way of help lines helped KFRI to open a 24x7 helpline to rescue people from flood-hit areas. Later, the Institute developed restoration protocols for riverine ecosystems impacted by the flood and helped the local self-government institutions to implement it.

### **Box 1: Destruction of Forests: Then and Now**

The contest between forests and non-forests or nature and culture is a fairly long tale. The epics of the land provide details of how the monks who have gone into the forests for meditation complain of fierce animals and how the king conducts rescue trips into the forests, which essentially becomes a poaching spree. A few days of residence in the forests by the king and his paraphernalia is enough to degrade the forests into which agriculture expands. There are also numbing details of burning entire natural forests for which reasons were flimsy, but essentially led to take over of forest lands by agriculture. This history of contests between nature and culture took a critical turn with the advent of colonization by European countries.

Most of the tropical countries had been colonised by temperate countries for a sufficiently long period which facilitated a huge plunder of its resources. Forests were the first resource to be exploited followed by minerals and oil. The removal of natural forests and replacement with monoculture plantations was an immediate offshoot of the realization that trees from natural forests will not be enough. Cultivation of trees and plantation crops like tea, coffee, cardamom and rubber, converted huge landscapes into monocultures. The forest departments of these colonised countries were started by the Imperial Government. Just as in the case of the education system that the colonisers implemented were intended to produce good clerks for their use, the forest officers were trained in the art of cutting, measuring and trading trees. Institutionalization of forestry had deep roots so that hardly anything changed in forest management after Independence in the majority of tropical countries. Natural forests continued to give way to plantations but since the forestry sector contributed well to the state exchequer, no questions were raised.



**The Western Ghats include a diversity of ecosystems ranging from tropical wet evergreen forests to montane grasslands containing numerous medicinal plants**



**Forests help control the water cycle by regulating precipitation, evaporation and flows**

## NEW CHALLENGES

Any good system of research extension needs to be sensitive and adaptive to emerging issues of resource management. Human-Wildlife conflict is one such issue which needs urgent mitigation in the forestry sector. Being a multidimensional problem which involves biology, ecology and population dynamics of the wildlife species in question and land use practices, economy and perception of people on forest fringes makes it the melting pot of forestry knowledge. Issues, like forest fires, are again a socially induced problem; the spreading of alien invasive plants into pristine forest areas and displacing native biota are next in the line.

## END NOTE

To sum up, extension of forestry research happens in a socio-cultural milieu which is influenced by global and local concerns. Unlike many other sectors, extension research in forestry should look at long-term objectives rather than short-term economic gains. In doing this, there should be adequate education of the stakeholders which would change their sensibility so as to accommodate larger concerns like climate change. The extension

work should be built on the solid rock of scientific data and empirical projections.

Looking at success and failure in equal measure, how can this government-run research institution thrive and maintain its scientific critique of government actions while being within the authority of that government? The answer is rather simple: people here do not believe that the government pays them. They know that it is the people who are paying them through the government. This is the crux, trigger and passion of good research extension. The real stakeholder is the larger society and the upcoming generations who need to live in our landscapes.

Otto Rene Castillo, the Guatemalan poet had famously written:

*"One day, the apolitical intellectuals of my country will be interrogated by the simplest of our people. They will be asked what they did when their nation died out slowly, like a sweet fire small and alone."*

If ever that happens, we do believe that this institution will be spared, thanks to its committed extension services which encompass local problems and global concerns.

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## SUPPORTING FOREST DEPENDENT COMMUNITIES TO COPE WITH THE IMPACT OF COVID-19

In acknowledgement of International Day of Forests (March 21), **Aditya Mandloi and Alark Saxena** from Development Innovation Foundation (DIF) share their findings on the impact of the COVID-19 pandemic on forest and forest-dependent communities. This blog highlights their observations from the villages in the Ratapani Wildlife Sanctuary (RWS) in Madhya Pradesh, India.

Globally, the COVID-19 pandemic has challenged food security, public health, working structures and supply chains. There has been a huge disruption in the economic, social and environmental patterns of India. While journalists, scholars and development practitioners have discussed the impact of COVID-19 among urban and rural communities, forest dwellers have generally gone unrecognised. In forest villages – where general accessibility is also low – communities remained unsure of what the pandemic demands. They speculated about the whole situation from what they saw on television, social media, and first-hand narrations from migrants who came back to their respective villages. In this blog, we focus on the findings of the research work done by Development Innovation Foundation (Box 1) in the villages in the Ratapani Wildlife Sanctuary (Box 2) in Madhya Pradesh.

### Box 1: About DIF and our ongoing research

Development Innovation Foundation aims to innovate, implement and promote initiatives towards the sustainability of people and the planet. DIF is invested in finding solutions for effective natural resource management, biodiversity conservation, decentralising renewable energy, and building sustainable cities and communities.

It is currently involved in understanding the challenges of the pandemic on forest and forest-dependent communities during COVID through a research project titled 'Creating evidence for forest based resilience' conducted in Madhya Pradesh, Himachal Pradesh and Assam, funded by the Swedish Research Council. Through a mix of qualitative enquiry, household surveys, and remote sensing analysis, we are assessing the role of forests in household coping strategies during the pandemic, the impacts of changing forest use on forest structure, and identifying policies associated with greater socio-ecological resilience. This research will directly contribute to establishing evidence in terms of the role of forests as a safety net during times of crises, and this blog is based on the findings from this research.



## Box 2: Forest and Wildlife in Ratapani Wildlife Sanctuary (RWS)

RWS spans 824 sq km of area falling under the Central Highlands (Malwa, Bundelkhand and Eastern Satpura). The forests are tropical dry deciduous with hot sub-humid climate. The soil type is black and red soil with a cropping period of 150-180 days. The region is favourable for growing wheat, pulses and mustard. Vegetation in the sanctuary consists of 129 tree species, including *Tectona grandis*, *Bombax* spp., *Acacia* spp., *Butea* spp., *Buchanania* spp. and *Boswellia* spp., as well as 73 herbs and shrubs species. Furthermore, Ratapani is home to 35 mammals, 33 reptiles, 205 birds, 14 fish and 10 species of amphibians (Rathoure 2018). The region also houses a sizable population of 40 tigers (Tomar 2019).

The villages in the RWS have a mix of various kinds of livelihoods that sustain them through the year. These are: agriculture; wage labour (farm and non-farm); migration for wage labour (short term and long term); livestock rearing; collection and sale of Non-Timber Forest Produce (NTFP); shops and services, and pension funds.

The people around RWS practice agriculture as their primary livelihood option. The land holdings are relatively small, and on average, a household holds 1-2 acres of land. Due to the rocky structure of land and soil, that permeates the Vindhya Ranges, the productivity of the land is also low (Soils of Raisen District, ICAR). Most of the households practice subsistence farming only. Agriculture is mostly rainfed here as there is no irrigation facility, so people go for work outside the village as daily wage labourers in the off-season. Landless people are involved in farm and non-farm wage labour.

The livestock in around 50% of households are used for household consumption. Only the Gurjar community in a few villages are involved in the commercial selling of milk and other dairy products. Almost all households use forests for collecting fuelwood, NTFPs, grazing of livestock and leisure purposes. The NTFPs include Mahua, Tendu, Achar, and the occasional extraction of medicinal plants by a few elderly women in the village.

### IMPACT OF COVID-19 LOCKDOWN

Forest dwelling communities strongly depend on forests for their livelihoods. In an attempt to prevent the spread of coronavirus, the government put restrictions on the movement through forests. This affected the supply of essential commodities and stopped the collection of minor forest produce, such as gum, honey, bamboo, beedi leaves, tamarind

and broomstick grass. Moreover, the items they make, like siali leaf plates, rope from siali bark, and an alcoholic juice - salap, harvested from salap trees, are highly perishable (Mohanty and Choubey 2020). These items need a proper weekly market to add value to forest dwellers' lives. The National Tiger Conservation Authority (NTCA) banned all human movement inside all the 50 tiger reserves throughout the country following the news that tigers could be infected by the novel coronavirus (Aditya and Ravikanth 2020). However, there were varying levels of enforcement in terms of forest access in different parts of the country. For instance, some forest areas of Upper Assam were relatively lenient with their restrictions. The forest-dependent communities were collecting what is available in the forest for their subsistence (Aditya and Ravikanth 2020). The weekly local markets (Haats) of rural and forest villages came to a halt during the lockdown (Mohanty and Choubey 2020).

The impacts were as follows:

#### **Agriculture**

In the first lockdown, they faced a lot of difficulties as the markets were closed and they were unable to procure the basic input materials for their farms, such as seeds for sowing, manure, insecticides, and pesticides. All the nearby markets were closed so people started growing vegetables in their homes for consumption. People who sold their produce in Mandis (society), received standard payment while the ones who sold their produce in the open market, suffered some losses.

#### **Livestock**

With regard to the Gujjar community, their main profession is rearing cattle for milk. Gujjars on an average have 5-10 cows per house. Their sales reduced drastically, so they mostly consumed the extra litres of milk. They

also converted it into other dairy by-products like ghee to increase the life and price of the commodity.

### **Labour**

As the market for wage labour in the vicinity of the village went down to zero, households faced difficulty in earning and procuring grains for consumption. This was especially true for landless households that were solely dependent on wage labour. However, the family networks within villages supported each other for the most part. Due to the lockdown, the people were unable to get out of the villages. Gradually, rich and capable farmers bought machines which further reduced requirement of labour. Youth of the village, who were just graduating from 12th class or diploma, also stayed back till the lockdown and other restrictions eased so that they could go to nearby cities such as Obedullaganj, Mandideep, or Bhopal in search of jobs.

### **NTFPs**

The flowering of Mahua is dependent on weather conditions. However, the price for Mahua decreased during the lockdown. In the normal scenario, Mahua would go for around INR 100/kg, while in the lockdown, it went down to about INR 40-50/kg. This really decreased the income that forest dwellers usually generate in the April season.

### **Inflation**

The labour wage remains the same but the prices of commodities such as petrol, cooking

oil, and spices (mainly salt and chilli powder) has been on the rise. The prices almost doubled in a period of six months. For instance, cooking oil increased to INR 170/litre which was INR 70/ litre before the lockdown. Even now the price remains unchanged.

### **Food security**

Some households received extra grains that the government promised under the COVID Relief Package (INR 20.9 trillion), announced by Prime Minister Narendra Modi on 12 May 2020 (Dev 2020). INR 100,000 million was transferred to 200 million women in India holding special Jan Dhan accounts (INR 500/female/month for three months) (Sengupta and and Jha 2020).

However, the ration was only provided to households with ration cards. A vast majority of households that didn't have ration cards didn't receive any extra ration or cooking fuel.

### **Entitlements under Government Schemes**

A very few households received the promised INR 1500 in their account. The money was transferred to women Jan Dhan Accounts.<sup>1</sup> The money was transferred in three months – of INR 500 each – during April to June 2020. The same scheme by the government also promised front-load of INR 2,000 paid to farmers in the first week of April 2020 under the Pradhan Mantri Kisan Yojana. This effort was also only half met on the ground, and just a few people got the money in their accounts.



**Interaction with Women on health, livelihoods and drudgery**

## STRENGTHENING LIVELIHOODS: WHAT COMMUNITIES LOOK FOR

### Integrating MNREGA with NRM

Approximately 90% of the people didn't have job cards in MGNREGA. In some cases, the attendance of the people working under MNREGA wasn't properly marked, and thus they were not paid. Moreover, the communities face grave problems of water for domestic as well as agriculture purposes.

This situation offers potential for two things:

- The integration of MNREGA with NRM-based works, such as deepening of ponds, digging and rejuvenation of wells based on resource mapping, better watershed management and installation of public tube wells. Such an intervention will help in generating employment and creating assets that will be beneficial to these communities in the long run.
- Strengthening of MNREGA as an institution. In such remote parts of the country, the MNREGA scheme is still to penetrate to its full potential. If the National Rural Livelihood Mission (NRLM) departments can team up with local NGOs or community members, they can accelerate the creation of job cards, thus registering more people for MNREGA work. Further on, regular monitoring will also help in checking any malpractices within the system.

### Better healthcare facilities

It was observed that whenever a person, especially the earning member of a family, faces a major medical issue, the financial situation of the family worsens. It requires only one such incident for a family to fall back into the poverty trap.

There is a need to fortify such safety nets in the form of government schemes and better health care facilities, and then work on the extension services. These services would include the means to reach and use services, confidence to communicate with healthcare workers, awareness about the existing healthcare benefits and means to avail them, etc. Enhancing the availability and accessibility of basic healthcare facilities can help in improving or improving livelihoods, and thus, income.

### Strengthening of Village Level Samitis (Committees)

There are various committees in villages such as the Van Samiti (Forest Committee) and Talaab Samiti (Pond Committee) which help in the governance of the commons – community forests, ponds and grasslands. Proper training of these committees will result in better governing of the commons while developing social capital. A community with elevated social capital is bound to take better unanimous decisions and hold the system accountable.

### Food security through self-reliance

Approximately half of the households did not have any livestock or poultry of their own. With the land available for grazing, the community members should at least be able to rear livestock for their subsistence. This will also help in improving the nutrition levels of families, and further help the community achieve food security. There is potential to form Self Help Groups (SHGs) of women, make them creditworthy and provide them loans for a goat shed or chickens in their homes. These activities will help them lead a better life.

### Better market linkages

There is a need for better backward, forward and financial linkages. With financial linkages, such as opening of bank accounts, the community members will be able to access the benefits provided by the government, for example, depositing of INR 2000 during the lockdown. Moreover, it will also help in getting better credit services to farmers for their agricultural and allied needs. There is potential to grow vegetables and fruits in their backyard for their own consumption as well as for sale. This will happen with both backward and forward linkages. Building the capacity of forest dwellers to grow vegetables and a network of vendors that can purchase the produce from the village can add another source of income for them.

## MOVING FORWARD: ROLE OF EXTENSION AND ADVISORY SERVICES (EAS)

Though life is slowly going back to normal, COVID-19 and lockdowns have had an impact on forest-dependent communities, which can have far reaching consequences in the

long run. While a few development actors are supporting farmers with extension and advisory services, more needs to be done to strengthen the livelihoods of these forest-dependent communities in the area of vegetable production, vocational training, and sustainable extraction of wood.

### Vegetable Production

Community members who have started growing

vegetables are continuing the practice. This way they are not only more self-sufficient but are also providing better nutrition to their family. This trend is expected to go on as they have already been immersed in these practices. More members will join in for the commercial production of vegetables given that there are sufficient market linkages and better supply of water.

Actors supporting vegetable production	Current responsibilities	Recommendations for strengthening service provision
<ul style="list-style-type: none"> <li>Department of Horticulture and Food Processing,</li> <li>Food Processing Industries</li> <li>Local Mandi Contractors</li> </ul>	Supply of quality inputs such as fertilizers, pesticides, seeds, agricultural implements, etc.; Ensuring irrigation facility to farmers; Increasing the use of bio fertilizers; Promoting and generating better livelihoods in the villages through horticulture interventions.	Creation of efficient supply chain; Establishment of mini cold storages at Panchayat level; Provision of micro credits at lower interest rates; Work on the ODOP (One District One Product) framework; MoFPI to enhance the demand and supply of local fruits and vegetables.



**Villagers growing vegetables in their backyard**

### Vocational Training

In a few villages, people have set up small general shops upon seeing the opportunity in COVID times. These shops were opened by the entrepreneurial people who saw the gaps in the supply and demand for basic commodities in the village. At present there is an overload of shops, but since factories have reopened, the people from the villages will again be fleeing

to towns in search of better pay and better lives. More and more youth from the villages are turning to cities for livelihoods and are getting basic jobs in the nearby factories. Some factories are even providing pick up and drop facilities for women workers. With the increasing population of youth in the villages, this pattern is sure to exist for a long time.

Actors involved in vocational training	Current Responsibilities	Recommendations for strengthening service provision
<ul style="list-style-type: none"> <li>Department of Technical Education, Skill Development and Employment</li> <li>Rural Youth</li> <li>Corporates</li> </ul>	Vocational training and placement Courses in digital format for Distance Education; Strengthening linkages of technical education institutions with industries for mutual benefits.	Promotion of RNF (Rural Non-Farm) sector which has shown promising growth in the last five years; Strengthening financial education and financial counselling of small shop and business owners; Provision of micro-credit at lower interest rates; Organising gender inclusive vocational training for women workers; Conducting need assessment of skills for industries and prioritizing the related learning outcomes.

### Sustainable Extraction of Wood

Extracting fuelwood by forest-dependent communities for cooking, heating, etc., is a necessity. A few households have started to use LPG for making tea and curries. However, after the first free LPG cylinder empties, people

don't buy a new one when they can extract fuelwood for free. There is a need for innovative and better designed chulhas that consume less fuelwood and produce less smoke inside houses.

Actors Involved	Current Responsibilities	Recommendations for strengthening service provision
<ul style="list-style-type: none"> <li>Forest Department, Government of Madhya Pradesh</li> <li>Local NGOs</li> <li>Local Politicians</li> <li>Ministry of Petroleum and Natural Gas (PM Ujjwala Yojna)</li> <li>Public Health and Family Welfare Department</li> </ul>	Protection and conservation of forests while maintaining the integrity of the existing ecosystems; Ensuring better livelihoods for forest-dependent communities; Ensuring sustainable extraction of forest produce; Providing LPG connections to women from Below Poverty Line (BPL) households.	Bettering accessibility to LPG cylinders; Better awareness and communication to use smokeless chulhas; Designing and providing efficient smokeless chulhas to resonate with the current system;  Generating awareness, especially among women, on respiratory health.

### CONCLUSION

With ongoing research, we are aiming to find concrete evidence for forest cover change, forest use and forest dependence of communities for affirmative action. At DIF, we are striving to find gaps and opportunities for fortifying such communities with sustainable and scalable solutions.

As we see different livelihood trends coming in for forest-dependent communities, they will have to face more such shocks in the future. It is only the communities that are resilient to the shocks, such as climate change, global warming, SARS like diseases, nationwide lockdowns, etc., that will have better chances of surviving and not falling back into the poverty trap. EAS has a critical role to play in supporting these forest dwelling communities.

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# 70

## HORIZONTAL COMMUNICATION: A POTENT TOOL FOR A CULTURALLY APPROPRIATE EXTENSION IN FORESTRY AND ALLIED SECTORS?

Implementing government policies and programmes require effective communication. In this blog **Ajith Chandran** celebrates the International Day of Forests by throwing light on this year's theme 'Forest and Health', and recollecting his experiences with using horizontal communication as an extension tool in community-based forest management.

Every year on March 21, the International Day of Forests is observed to promote awareness on the value of forests and their contribution to the survival of life on Earth. The International Day of Forests in 2023 will have the theme 'Forests and Health', emphasising the vital contribution of forests in promoting human health and well-being. It emphasises the need to protect and manage forests sustainably to ensure their continual contribution to human health and well-being. It also highlights the need for greater awareness of the linkages between forests and health and the need for action to address the challenges confronting forests and their ecosystems.

Forests are a critical resource for human health and well-being, providing numerous ecosystem services such as clean air, water, and soil, as well as habitats for a vast array of plant and animal species. However, the world's forests are facing numerous threats, including deforestation, degradation, fragmentation, and climate change, which are not only threatening the health of the forests themselves but also the health of people who rely on them.

In order to counter these dangers and guarantee the health and sustainability of our forests, effective forestry management and extension services are essential. While extension services are essential in facilitating the transfer of knowledge and technologies from research and development to farmers, forest dwellers, and other stakeholders, forestry management entails the planning, implementation, and monitoring of activities that aim to maintain and improve the health, productivity, and resilience of forest ecosystems.

### FORESTRY MANAGEMENT AND EXTENSION SERVICES

My experience in forestry management and extension services suggests that there are several key areas where these services are making significant contributions to the health of everyone in the world.

These include:

**1. Forest restoration and conservation:**

By restoring and conserving degraded and deforested regions, we may improve the livelihoods and health of populations that depend on forests, improve the well-being of forest ecosystems, and minimise the effects of climate change. Extension services can play a critical role in raising awareness about the importance of forest conservation and restoration by providing technical assistance and support to those engaged in these activities.

**2. Sustainable forest management:**

Sustainable Forest management practices can help maintain the health and productivity of forest ecosystems while providing economic and social benefits to local communities. Extension services can play a critical role in promoting and facilitating the adoption of sustainable forest management practices, such as improved harvesting techniques, forest certification, and agroforestry.

**3. Forest-based livelihoods:** Forests provide a range of products and services that can support sustainable livelihoods for forest-dependent communities, including non-timber forest products, ecotourism, forest-based enterprises,

and increasingly, forest carbon credits.

Extension services can help build the capacity of local communities to develop and manage these forest-based livelihoods, while also promoting sustainable resource use and conservation.

**4. Monitoring forest health and disease control:**

Invasive species, diseases, and pests pose a substantial danger to forest health as well as the health of communities that depend on healthy forests. In addition to offering technical support and aid for the management of disease and pests, extension services can be extremely important in assessing the health of forests.

The connection between forests and the livelihood of communities near forests are well established. While culturally there are strong connections between forest and forest-dependent communities, quite often harvesting produce from the forest forms an important and regular resource for these communities and it is important for both rich and poor (Maiden 2011). Extension works by government and non-government agencies help the communities to improve and sustainably manage these with the help of institutions, funding and linkages, which the communities may have difficulty securing on their own.



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## HORIZONTAL COMMUNICATION – ONE OF THE SUITABLE EXTENSION TOOLS IN JFM

In early 2000, I had an experience with the Gujarat Forest Department where we experimented with horizontal communication (Box 1) as a tool to improve Joint Forest Management (JFM) in conjunction with communities. As a collaborator in the programme, we found that horizontal communication played a crucial role in the success of community-based JFM, especially in the early stages of adoption. Community-based JFM involves the participation of local

communities in the management of forest resources, in collaboration with the Forest Department. Extension and information dissemination customarily happened between the Forest Department and the community. The local non-government organisations (NGOs) also assisted in this critical role. The Joint Forest Management Cell (JFM Cell) which was assisting in the growth of JFM in the state decided to create a novel method of extension. In this model horizontal communication was designed keeping communication between the community members as central, with the Forest Department officials and facilitators only taking a supportive role.

### Box 1. Features of Horizontal Communication

In an organisation, horizontal communication often refers to the sharing of knowledge, concepts, and messages among individuals or groups at the same level of hierarchy. When team members with equal rank or authority inside the organisation interact, it is called horizontal style of communication. Effective collaboration, coordination, and teamwork within an organisation depend on horizontal communication. It enables staff members to impart knowledge, concepts, and skills to their colleagues, thereby improving decision-making, problem-solving, and innovation. Also, it fosters a culture of openness, trust, and transparency within the company, which can increase work satisfaction and employee engagement.

One benefit of horizontal communication is that it can support the dismantling of organisational silos. It can result in better efficiency and effectiveness in attaining organisational goals by encouraging communication and collaboration among various departments or teams. In order to develop more thorough and well-coordinated solutions, horizontal communication can also help discover and address problems or difficulties that may be affecting many teams or departments.

However, horizontal communication can also have some challenges. In some cases, it may lead to information overload or miscommunication if there are too many people involved in the exchange of information. Additionally, without proper communication protocols or guidelines, horizontal communication can lead to misunderstandings, conflicts, or even duplication of efforts.

Overall, horizontal communication is a vital instrument for effective communication and collaboration within an organisation. By promoting open communication, sharing of knowledge and expertise, and breaking down silos, it can lead to improved organisational performance, employee engagement, and job satisfaction.

Typically, communication in community-based JFM takes place between the forest officials, village-level JFM committees, and other community organisations and NGOs involved in forest management. The JFM committees consist of representatives from the local communities, who work closely with the Forest Department officials to manage the forests in their respective areas. The forest officials and JFM committee members communicate regularly to share information, discuss issues, and coordinate activities relevant to forest management.

In the model that was created, horizontal communication took place between communities. The leaders from multiple villages that had already gone through the experience of JFM and having similar cultural attributes are invited to a village that was about to initiate JFM. The two-to-three-day programme had many regular meetings, photo displays, discussions, training, role play, and information gathering sessions. The members invited from existing JFM villages discussed issues pertinent to forest management, shared best practices, and stories from their own experiences

that consisted of both challenges met and opportunities realised. Most of this happened in a semi-formal setting in the local dialects.

Horizontal communication in community-based JFM in Gujarat had several benefits. It enabled the JFM committees to share information, knowledge, and expertise with each other, leading to better decision-making, problem-solving, and innovation. It also facilitated coordination and collaboration among the JFM committees and Forest Department officials, leading to more effective and efficient forest management. Additionally, horizontal communication helped build a culture of transparency, openness, and trust among the JFM committees, Forest Department officials, and local communities, which improved their engagement and participation in forest management activities.

## LESSONS LEARNED

Horizontal communication resembles study tours in reverse in certain aspects. In an extension field trip, members travel to successful areas and study it in a natural setting. However, the knowledge reaches only a few in a village. Through horizontal communication, participants from successful regions visit the host community, where everyone — including women and children — can participate in the activity. This not only builds trust, but as we experienced, it also energises the entire village and the memorable event has the potential to be seen as a turning point for the whole village. When discussions are held in the village, the questions, answers, and information given frequently pertain to identifying solutions that are relevant to the entire village.

Horizontal communication can be employed in any situation that calls for knowledge exchange in a peer-to-peer setting, even though the experience mentioned here was in the Joint Forest Management context. The ideas of horizontal communication can probably be incorporated into any of the programmes under the government's National Action Plan on Climate Change that call for community adoption of new initiatives, technologies, and practices. Overall, it was felt that horizontal communication was a crucial

aspect of community-based JFM in Gujarat, especially in the formative years when a village was looking to adopt JFM. It enabled JFM committees, Forest Department officials, and local communities to work collaboratively, share information, and coordinate activities, leading to better forest management outcomes.

## CHALLENGES IN IMPLEMENTATION

However, there are also some challenges with horizontal communication. In community-based JFM in Gujarat, one of the significant challenges was the lack of adequate resources and infrastructure to support effective communication among the JFM committees and Forest Department officials. A high degree of planning and resources were required for horizontal communication as this was an 'each village at a time' approach. Planning required inviting community members from other successful JFM villages, arranging for their travel and stay, which may be in the village or a nearby guesthouse, arranging food for them and others, coordinating with the local Forest Department, arranging a place for people to gather, displaying items that included photographs of forests and activities from successful villages, having a talented team that can organise short plays and other local attractions with embedded messages, and having personnel skilled in participatory appraisal and discussions. Since these are done in a village setting, they need not be very expensive, and many local resources could be tapped with the help of the village leaders. However, a dedicated team skilled in various activities has to be prepared and put in place beforehand.

Another challenge was the difficulty in coordinating communication among the large number of JFM committees and communities spread across the state. These had to be tackled differently through networks and Working Groups. Networks included National Level JFM Network, networks of villages that formed a federation at the state level. Other activities included creation of Divisional Level Working Groups and State Level Working Groups.



## END NOTE

In conclusion, the theme of 'Forests and Health' for International Day of Forests 2023 underscores the importance of forests in supporting human health and well-being. It is a reminder of the critical role that forests play in sustaining life on Earth and the need for greater awareness and action to protect and manage forests sustainably. International Day of Forests presents a unique opportunity to educate the community, practitioners, students, and policymakers on the critical role of forests in supporting human health and well-being. It can also help advocate for increased resources

and political will to address the challenges facing forests and their ecosystems, such as deforestation, climate change, and biodiversity loss.

It is important that we use effective methods to support the proliferation of forests and its better management by communities and local governments. Methods, such as horizontal communication, have the potential to break barriers and are applicable not only in forestry but also in almost all other allied sectors where peer to peer learning makes it an effective and culturally appropriate tool.

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# **Governance and Policy**

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## RETHINKING POLICY FROM A BEHAVIOURAL ANGLE: A CASE OF NUDGE

Behavioural Economics can be very useful not only in understanding our own behaviour, but also in formulating the right policies and evaluating policy outcomes. In this blog, **Muthuprasad T, S Niranjan and Aditya K S** urge academia to consider inclusion of Behavioural Economics topics in social science curricula.

Behavioral Economics is not a new branch of Economics. Its seeds were sown by Adam Smith in his book "Theory of Moral Sentiments", in which he opined that human decisions are driven by several factors, such as cognitive ability, attention and motivation. However, the seed of Behavioural Economics did not germinate until it was rejuvenated by Daniel Kahneman and Amos Tversky in the 1970s with their paper titled 'Judgment under Uncertainty: Heuristics and Biases'. For his contribution to Behavioral Economics, Daniel Kahneman was awarded the Nobel Prize in 2002. Further developments in the field of Behavioral Economics came up largely due to the seminal works of another Nobel laureate, Richard H Thaler. Publication of the book 'Nudge' by Thaler and Cass R Sunstein (2008) revolutionised economic thinking and drew the attention of both academia and policy makers alike. This book talked of how understanding of different biases and use of simple nudges can induce people to make ideal/optimal choices.

### NUDGE

'Nudge' means a light touch or push. The term 'nudge', in this context, is any aspect of the choice architecture that alters people's behaviour in a predictable way without forbidding any options or significantly changing their economic incentives (Thaler and Sunstein 2008). Let us consider, for example, that the objective of a policy is to reduce the weight of obese people, and you are tasked to design the choice architecture for achieving this. In this case, banning junk foods is not a nudge but keeping fruits and other healthy food in places which has higher probability of catching the attention of people is definitely a nudge. All the same, as mentioned in the definition, a nudge should not prohibit any of the options available.

## Box 1: Are humans rational?

Humans are always rational! It is one of the most common assumptions in most economic theories. Rationality assumes that human beings always aim at maximization of utility, subject to the constraints imposed by their given income. In simple terms, rationality assumption implies that a decision is always directed towards maximizing utility. Probably 'rationality' is the easiest assumption to write in the answer sheet for an economics student, but how far is it true in real life? Are Homo Sapiens always rational? Let's check.

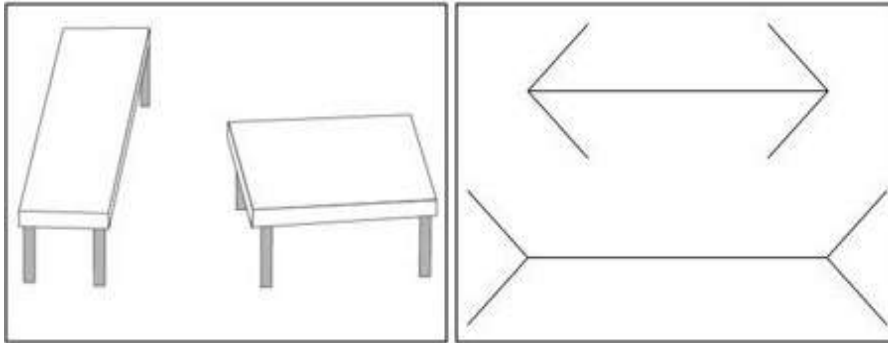


Figure 1: Shepard's Table

Figure 2: Müller-Lyer line

Observe the figures and answer the following:

In Fig. 1, which one would you prefer as a study table, the one on the right or the left? And in Fig. 2, guess which one is longer among the two lines?

Hope you have made your choices. Allow us to surprise you. Both the tables in Fig. 1 have the same dimensions, and both the lines are of the same length in Fig. 2. Well, if you have correctly predicted it, then you have outclassed most Homo Sapiens.

Now, some of you must be rushing up to your writing table to grab a ruler and verify, right? Yes, even we did the same, when we tried these illusions at first.

But don't worry, if you have selected either of the two tables in Fig. 1 and the bottom line in Fig. 2, you are with the majority.

Shepard's table: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3485780/> Müller-Lyer line: <https://www.illusionsindex.org/ir/mueller-lyer>

Now, let's look at these numerical questions and try to solve it.

1. A bat and a ball cost \$1.10 in total. The bat costs \$1.00 more than the ball. How much does the ball cost? \_\_\_\_\_ cents.
2. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? \_\_\_\_\_ days (Source: Richard H Thaler and Cass R Sunstein. 2008. Verbatim.)

Hope you are ready with your answers, if your answers are 10 cents and 24 days then we are sorry again, you are wrong. If the ball costs 10 cents then according to the condition the total cost will be \$1.20 not \$1.10. Similarly, if your answer is 24 days, then according to the conditions given in the problem, the lily pads will cover the whole lake in 25th day itself (if 24th day, lake is 50% full, and it doubles every day). So, the correct answers are 5 cents and 47 days. Ashamed for failing to solve a simple numerical problem? Well, don't be. Most of us fail to give the right answer to these questions and this has nothing to do with a person's intellect.

So, what do these illusions and confusing numericals mean in economic theory? A lot. Allow us to explain. While performing even a simple calculation, we are affected by biases which blur our logical thinking and lead us to wrong answers. The reason is that we don't spend considerable energy in understanding it and also because we are habituated to a particular way of thinking. Human behaviour and the choices we make, to a large extent, are affected by biases and other considerations, and are not only driven by the objective of 'maximising individual welfare' (or utility) as postulated by the 'rationality' assumption. In simple terms, the rationality assumption assumes that all human beings are rational, that they evaluate the choices they have objectively and choose the one which maximises the utility/welfare. If our senses can be fooled by illusions, and if biases and habituated thinking can also lead us to wrong answers for simple numericals, how then can we expect an individual to be always correct in choosing utility maximising choices? That is the reason why a few economists have raised questions regarding the validity of the 'rationality' assumption, on which most conventional economic theory rests. Thinking along this line gave birth to Behavioural Economics.

## Framing

Let us assume that you are consulting a doctor for major heart surgery. You are interested in knowing what the probability is of the being successful, right? Suppose the doctor says, "Of one hundred patients who have undergone this operation, ninety are alive after five years", what will you do? For most of us, the statement will be pretty comforting, and probably provide enough confidence to go ahead with the surgery. What if the doctor frames the statement in a slightly different way and says "Of one hundred patients who have this operation, ten are dead after five years"? This statement sounds alarming and might make the patient seek a second opinion. Here, even though the contents of both the statements were exactly the same, people tend to react differently based on how it is framed. Similarly, framing nudges are used in marketing, advertisements, promotions, and also in government policy making. For instance, consider the following information campaigns: (a) If you use energy conservation methods, you will save Rs. 5000 per year; or (b) If you don't use energy conservation methods, you will lose Rs. 5000 per year. It turns out that information campaign (b) framed in terms of loss, is far more effective than information campaign (a).

One of the recent examples of using framing as a nudge in Indian policy making is the renaming of Swachh Bharat to Sundar Bharat (Economic Survey of India 2019).

## Anchoring Bias

Anchoring bias is a cognitive bias in which an individual choice depends on the initial piece of information offered while making decisions. Allow us to explain with an example. One of my friends was looking to purchase a new laptop. As usual, we searched on two e-commerce websites and narrowed down on a model, which was priced at Rs. 35,000. Since it was electronics, we thought of purchasing from a shop, rather than from an e-commerce site. We reached a nearby shop, and to our happy surprise, the same model was on sale for Rs. 34,000. We immediately purchased the laptop and came out all satisfied. However, later in the day, we discovered that one of our friends had purchased the same model for Rs. 33,500 in a shop which was just 100 feet from where we had purchased. Well, what made us

purchase the laptop in such a hurry, even before enquiring in the neighbouring stores?

The answer lies in anchoring bias. For all our decisions in purchasing the laptop, the initial price (which was the price of laptop on e-commerce site, Rs. 35,000) was the base price. As soon as we discovered that the actual price is one thousand less than the base price, we were convinced that it was a great deal. This concept of anchoring effect is successfully used during many marketing campaigns such as 'Amazon big billion days' and 'Flipkart freedom sales'. Initially, the price is quoted way above the actual price (in our heads that will become the benchmark price) and then offer hefty discounts on the products (like 50% off). When next time you see any advertisement like 60% off on MRP, think twice and don't be a victim of anchoring bias!

## Default settings as Nudge

Default options are pre-set courses of action that take effect if nothing is specified by the decision maker (Thaler and Sunstein 2008). Default settings can be used as nudge if inertia exists. Let us understand it through simple examples.

While booking a flight ticket or any other travel ticket, as default the travel insurance check box will be ticked and many a times, we end up paying the insurance amount, only to realise the mistake later (we don't mean that buying insurance is a mistake, but buying it when you never wanted it is a mistake).

Even in many of the websites, while registering for membership, as a default, the check box for subscribing to their newsletter will be ticked, and often we go ahead without changing it. Only when the newsletter reaches our mail box, do we realise that we have subscribed for it. In this case, setting subscription as default increases the number of subscribers to their newsletters.

## Choose your delivery options

### Delivery Details [\(Learn more\)](#)

#### Choose a delivery option:

- FREE Super Saver Delivery (3 - 5 business days)
- First Class (up to 2 business days)
- Expedited (1 business day(s))

Figure 3: Be aware of defaults



In some of the e-commerce sites, though free delivery is available it will not be set as a default option.

### Decoy effect

The decoy effect is technically known as an 'asymmetrically dominated choice' and occurs when people's preference for one option over another changes as a result of adding a third (similar but less attractive) option (Bateman et al. 2008). We will now explain theoretical bluffs that you didn't understand correctly with simple examples.

In the picture above the \$30 bottle will be seen as expensive, but once the \$50 bottle is introduced into the picture the \$30 one will be seen as relatively cheap. Here the role the \$50 bottle plays is as a decoy to increase the sales

of \$30 bottles. This is the reason why many of the items in several restaurants are highly priced even though nobody buys them. Actually, the role of such items in the menu card is to induce people to buy the other items in the menu. Thus, you will find many decoys in the product lines of many companies.



Figure 4: Decoy effect

### USE OF NUDGE IN AGRICULTURE: LITERATURE REVIEW

We have listed a few applications of nudges in the agricultural policy space in the following table:

SECTOR	PROBLEM	NUDGE	OBSERVATIONS
<b>Pesticide policies - Germany</b>	High use of pesticides	All pesticides will be labelled with a traffic light indicator for toxicity levels.	Total Frequency Index (measure of intensity of chemical crop protection) in the green nudge treatment declines by 4.2%. (Buchholz et al. 2018)
<b>Water protection rules - Germany</b>	Nitrogen runoffs induced due to agricultural fertilizer causing environmental damage to surface waters	Nudge with information and pictures showing environmental and health damages that are presumably caused by breaching the minimum distance-to water rule.	Nudging has a preventive effect and reduces the share of non-compliant participants. (Peth et al. 2018)
<b>Irrigation sector - France</b>	High use of water for irrigation purposes	Targeted farmers receive weekly information on individual and group water consumption over four months.	The nudge was effective at reducing the consumption of those who irrigate the most. (Sylvain et al. 2019)
<b>Agriculture - (Africa)</b>	Due to inertia people postpone many of their time-sensitive and important actions even though they are aware of the consequences of postponing.	To stop farmers' procrastination in buying fertilizer (possibly due to inconvenience in traveling to town) home delivery of fertilizer in appropriate period of the season was made.	Fertilizer use increased by 70%. This effect was on par with the effect of 50% price subsidy. (Duflo et al. 2011)

From the discussion above, it is evident that Behavioral Economics has a lot of scope in agricultural policy making. Throughout the world, many countries have realized the importance of Behavioral Economics and have started to establish their nudge units in order to introduce 'nudge' in the policy space.

In the Indian context, Behavioral Economics is still at a nascent stage. The Government of India, realizing the value Behavioural Economics holds in policy making, has dedicated an entire chapter to it in the Economic Survey of India 2019, which is quite admirable and a welcome step.

Some of the important areas where nudge can be used in the Indian context are –

- In reducing water usage;
- In reducing food wastage;
- In reducing pesticide usage;
- In saving electricity;
- To induce the farmer to adopt new technologies; and
- To induce the farmer to opt for crop insurance etc

## WHY NUDGE IS GOOD FOR EFFECTIVE POLICY MAKING?

- Nudges are cheap (involves minimal cost);
- Nudges are more democratic (not forbidding any choices).

We welcome the step taken by the Government of India regarding Behavioral Economics; at the same time we would like to point out that there is a long way to go. Nudges are good, but more research has to be done in the Indian context, not just to clear all the scepticism around it, but also to identify what nudges work and what do not.

Behavioural Economics can be very useful not only in understanding our own behaviour, but also in formulating the right policies and evaluating policy outcomes. Knowledge of Behavioral Economics can help social scientists in understanding farmers' choices – be it their decision to adopt technologies or their response to policies or choice of source of information. Concepts, such as 'framing effect' can be used in devising extension strategies for upscaling of technologies. Also, nudging farmers to make socially desirable choices is a nascent area, waiting to be explored. Hence, we urge academia to consider inclusion of Behavioral Economics in social science curricula.

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## MANAGING SUSTAINABLE TRANSITIONS: TEN GUIDING THOUGHTS TO FRAME THE PATH AHEAD

In this blog, **C Shambu Prasad and Deborah Dutta** explain the need for initiatives that enable sustainable transitions in the agrarian context, and explore ideas that can kickstart the process.

Green Revolution practices characterised by input-dependent, fossil fuel-driven, monocropping methods have adversely impacted ecological systems, while also pushing farmers into debt due to the induced dependence on external inputs for agriculture. The input intensity has deleterious effects on climate change with the agriculture sector being the largest consumer of scarce groundwater in India. To counter these trends, India has attempted, or initiated, several discussions and roadmaps towards sustainable food systems in recent times. These include policy directives to 'Double Farmer Incomes', the new 'Vocal for Local' and Atma Nirbhar Bharat, along with NITI Aayog's vocal commitment to spearhead natural farming initiatives across the country. These initiatives should also shift the goals of food production and lead to some rethinking, even a reset in a few cases, of our food systems. As the Government of India readies itself for nation-wide food systems dialogues it might be pertinent to situate some of the discussions with alternative discourses for the future, especially following the Covid-19 pandemic.

### ENABLING SUSTAINABLE TRANSITIONS

Among the many discussion starters, the United Nations and FAO's Track 4's is important for its emphasis on the key problem, namely, removing inequality and power imbalances. The need for equitable access to livelihoods and its fundamental connections with sustainable food production systems is well articulated. A fuller expression of these initiatives, however, cannot happen without a significant rethinking of the relations between producers and consumers in food systems.

We suggest that while many technical solutions exist, many more are being discovered by both researchers, practitioners and farmers there is a greater need for institutional reform to align organisations with these objectives or goals.

In short, this entails a commitment to shift dominant paradigms of food production or better management of sustainable transitions. While most of the literature on transitions is focused on urban systems, India has the unique advantage of being in a vantage position to lead this transition in agriculture given both its knowledge and its large farming community. Here, we briefly discuss ten tips on how to enable sustainable transitions.

## TEN GUIDING THOUGHTS

### Reversing unsustainable practices

It would be futile to continue proposing alternatives, unless dominant, unsustainable practices are simultaneously curbed. This entails slowly dismantling the socio-economic and institutional arrangements that support such practices. Policy nudges that incentivise use of organic nutrients, multi-cropping systems, and cutbacks on pesticide and fertiliser subsidies could help level the playing field for alternate practices to become economically viable.



### Recognising multiple pathways and constructive synergies

Rather than designing for a 'one nation one everything', or the grassroot version of a bad design, 'one district one product', it is imperative that plurality of approaches is encouraged. Food systems are often embedded in particularities of regional geography and a diverse set of practices that could include shifting cultivation, dry grain complex, natural farming, pre-monsoon dry sowing, regional water conservation methods and so on need to be fostered. Rather than following a blue-print approach of any particular alternate practice, it is important to acknowledge specificities and encourage regional adaption and innovation.

### Promoting knowledge dialogue and interdisciplinary collaboration

Institutions that are supposed to foster such innovations in thinking and practice are often locked into old approaches of intervention. On the other hand, practitioners having the most valuable knowledge and experience may not exist within formal institutions and state-led extension services. These actors must be supported in explicit ways with formal institutional arrangements to enable transition into sustainable food systems. An example is the Odisha Learning Alliance, a network of multiple stakeholders who approached the problem of food security and its alternative, the System of Rice Intensification (SRI) together, and were facilitated to work across silos.

### Partnering with civil society initiatives focusing on agro-ecology

Initiatives, such as APZBNF and the Odisha Millet Mission are examples of how governments can work with farmers and Civil Society Organisations (CSOs) to upscale substitutes by creating a critical pool of local resource experts and facilitating linkages with public distribution systems (PDS) or FPOs. Academic institutions need to see themselves as facilitators of knowledge dialogues and broker connections between diverse knowledge sources. Marginalised pioneers and creative dissenters within the establishment need to be recognised and supported in proactive ways. Networks have an important role in this.

### Strengthening local institutions

The sheer scale of expected transition demands dynamic, decentralised and situationally-responsive measures, none of which are possible through top-down bureaucratic channels due to the cost and time lag. Instead, local institutions need to be empowered and encouraged to form stable partnerships with grassroots organisations. Hyper-local market linkages and supply systems need to be built that can favour small and marginal farmers.

### Strengthening adaptive capacities of vulnerable communities

Collective institutions need to be strengthened and invested in as they have the potential to address the critical issue of unequal power relations in the market. Building capacities of

these institutions takes both investment and time, especially if they are to enable critical investments in capacities. Most vulnerabilities and shocks are responded to by enhancing the adaptive capacities of vulnerable communities.



### **Building a critically-conscious consumer base Concerted**

Efforts are needed to empower consumers to make conscious choices by supporting local agricultural initiatives. Critical awareness programmes and options can be designed to help consumers create demands that are ecologically responsive and offer fair prices to farmers. Across the world, many community-supported agriculture projects can offer interesting design insights. A small number of initiatives are also gaining popularity in the major metropolitan cities of India.

### **Governance structures to support small-scale urban agriculture**

Rural and urban access to nutritious food can be increased by creating small kitchen gardens for family consumption. Integrated farming is also a promising avenue to supplement nutritional and income requirements, as documented in many case studies.

### **Reskilling in Agriculture**

A neglected dimension of agroecology is its potential to reverse the continued de-skilling in agriculture and providing spaces for newer skills. The education system needs to be framed in ways that value practical skills and labour, as opposed to relegating them as vocational subjects. The artificial dichotomy between intellectual and manual labour has a role in creating livelihood aspirations and societal status. This should be challenged through systematic reforms in the curricula with a

discerning approach so as to avoid being co-opted by other agendas. The Natural Farming Fellow in Andhra Pradesh is an excellent example of agriculture graduates finding their mojo by returning to farms and demonstrating newer skills.



### **Rethinking food system goals**

Finally, healing must begin by re-embedding local economies in ecosystems, increasing business accountability, and strengthening democratic structures. Newer health, economic and food system goals must be defined based on ecological wellbeing and success rather than abstract figures that are supposed to indicate GDP.

### **END NOTE**

These ideas are not sequential but synergistic, and it is hoped that the renewed focus on food systems will help us rethink agriculture for a climate-stressed world. Operationalising these ideas requires creative facilitation of generative dialogues across different stakeholders and institutions. The wicked sprints by Socrates shows promise by applying practical systems thinking to collective problem solving. Managing sustainable transitions will demand institutional innovations of various kinds that could lead to empowered civic action bodies, farmer collectives and social enterprises.

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## STREAMLINING PUBLIC AGRICULTURAL EXTENSION IN INDIA: INDICATORS BEYOND REVENUE EXPENDITURE CONSIDERATIONS

Calls for reducing staff strength in public agricultural extension services is increasingly visible in policy circles, mainly due to revenue expenditure commitments and penetration of modern information and communication technologies. In this blog, **A Suresh** examines the argument in detail and emphasises the need to have a comprehensive overview.

Agricultural Extension and Advisory Services (EAS) have played a critical role in increasing agricultural productivity and enhancing food and nutritional security in India and elsewhere. In India, the public sector EAS, represented mainly by the Department of Agriculture (DoA) at the state level, continues to play a very important role in supporting farmers with new knowledge. Some reports indicate that state agricultural departments are over-staffed, and therefore, the number of staff is to be reduced in view of revenue expenditure commitments as was reported in the case of Kerala's DoA (Department of Agriculture Development and Farmers' Welfare) recently (Indian Express 2021). While such analyses help to monitor the staff position, it suffers from a methodological weakness leading to far reaching, but faulty, conclusions.

The major issues include: use of a proper indicator for measuring staff strength keeping in view the extent of substitutability of public extension with private extension, the importance of a personal farm-specific advisory appropriate to the specific strengths and opportunities at the farm level, and the potential of using artificial intelligence (AI). At the same time, there is a need to curtail the common perception that public services, including agricultural extension services, in general are inefficient and wasteful. Each of these calls for deeper analysis.

### IMPROPER INDICATORS

The total area under cultivation under each extension official is one indicator commonly used to measure the allocation of extension staff. A higher value is considered as more efficient in economic terms. But using this type of indicator often leads to conclusions serious enough to affect the future staffing pattern for agricultural extension, and thereby agriculture itself. Further, it could raise allegations about the efficiency of the staff of DoA – where the values are low.

One major issue in this type of analysis is the lack of consideration of the number of agricultural holdings, or the number of farm families and average size of holdings, which are critical for organising an effective EAS system.

Considering only the total agricultural land of a state in comparison with total staff and ignoring the number of agricultural holdings and average size of holdings hides more than it reveals. Agriculture departments – comprised of allied departments, including Horticulture – in every state are primarily responsible for extension activities with regard to the dissemination of new agricultural technology, providing problem solving advisories and supporting development of appropriate skills that are needed to apply new knowledge. This is true for livestock and fisheries sectors as well. The basic unit of technology and knowledge dissemination even today continues to be farmers and farm holdings, and increasingly farmer organisations.



The Report of the Committee on Doubling Farmers' Income (Volume XI, 2017) of the Ministry of Agriculture, Government of India, shows that agricultural extension activities are under-staffed in comparison to the desired level. The Committee recommends that one extension official is to cater to the desired number of operational holdings – 400 in hilly regions, 750 in irrigated regions, and 1000 in

rainfed regions. A higher value in this type of an analysis most probably indicates under-staffing and deterioration in quality of service. At the national level it is to the tune of 1162 holdings per official. The respective figures for some states are: Andhra Pradesh (undivided including Telangana) (3162), Karnataka (2428), Uttar Pradesh (1798), Kerala (1737), Bihar (1583), Gujarat (1395), Rajasthan (1254), Odisha (1230), West Bengal (1156), Tamil Nadu (976), Himachal Pradesh (886), Maharashtra (869), Madhya Pradesh (823), Punjab (753), Haryana (536), and Jammu and Kashmir (249) (GoI 2017). The figures within parenthesis indicate the number of holdings to be attended to by an extension official. Though the above values indicate only the number of officials in the public sector and excludes the private sector, given the low penetration of private sector in agricultural extension, it can be considered as an indicator that approximates the ground situation.

Another serious issue is the extent to which the indicator covers the uniqueness of the farming system and cropping pattern in vogue in any particular state. The same piece of land is cultivated multiple times in a year leading to higher cropping intensity. Homestead farming with a large level of crop diversification is in practise in some states – for instance in Kerala, where several crops are cultivated on the same piece of smallholding in the perennial crop dominated cropping system. This diversified cultivation demands a range of information, training and skills, for implementing the diversified crop-targeted schemes and programmes of the government. This makes measuring agricultural extension staff requirement based only on the total cultivated area inadequate and misleading. Similarly, considering food production per official also turns out to be inadequate as several crops are of a commercial nature such as cotton, rubber, and spices. Using value of output for crops per official would make it overly sensitive to crop combinations and market forces.

The spectrum of services being undertaken by public extension service is quite diverse and doesn't stay confined within the limited role of 'extension services', in its true meaning. In addition to the regular duties of dissemination of knowledge and technical intervention,

the staff of agricultural departments, such as agricultural officers, undertake multiple responsibilities. It includes implementation of government schemes, government-sponsored crop insurance, support to procurement and marketing operations, supply of agricultural inputs including seeds and fertilizers, quality checking and certification, disbursal of subsidies and other financial support, crop loss estimates,

etc., just to mention a few. These activities and responsibilities are to be factored in while evaluating the effectiveness of the department and its activities. Thus, the indicators to be used for determining adequacy of staff need to be sensitive to the uniqueness of the farming system and changing pattern of professional responsibilities.



Training of farmers under Bharaitya Prakritik Krishi Paddhathi



Distribution of coconut seedlings through the DoA



### **Contextualising private extension services**

Predictions were ripe even two decades back that private extension would replace public agricultural extension services in India. Indeed, many new service providers and institutional arrangements in agricultural extension have emerged, especially during the last two decades (Sulaiman 2012). Private extension services found a place particularly for high value commercial crops, livestock and fisheries. However, private extension services did not replace the demand for public extension services. Three significant variables need to be factored in here.

Firstly, the demand for agricultural extension (say, information) could be elastic with respect to farm income. There are not many studies that have inquired into the economic aspect of demand for private extension services, except a few isolated attempts covering selected crops/enterprises and regions. However, it can be safely anticipated that the demand would be income elastic and sensitive to farm income in the sense that a change in farm income would effect a more than proportionate change in the demand for extension services. Given the slow growth of farm income on a unit level, as has been widely reported in India in the context of farm distress, demand growth would be much lower. This could largely explain the slow growth of private extension in India for several crops and vast geographical regions.

Secondly, the capability of private extension to cover demand for diverse agricultural extension services in the varied geographical regions of India is yet to be established (Sajesh and Suresh 2016). Agriculture, by and large, happens in the remote corners of the countryside with low infrastructure development, which precludes fast emergence of private extension. Private extension largely happens along with contract farming and as promotional efforts by companies offering inputs like seeds, fertilizers, and chemicals in crops; veterinary services in livestock; and feeds and fingerlings in fisheries. The demand for private extension to a large extent comes about due to the relative unavailability of public extension services due to poor recruitment of extension staff and inaccessibility to their services, mainly due to inadequate infrastructure development and pre-occupation with paper work. Therefore,

the rising demand for private extension in non-commercial agriculture can be largely viewed as mere filling up of the space being vacated/ not occupied by public extension personnel on account of the inadequate staff strength rather than as a demand for better quality extension. This is not to convey any disrespect on the quality of service offered by private or public extension, but to highlight that demand for extension is primarily an issue of availability and accessibility rather than an issue of quality – to the great mass of Indian peasants. Quality issues follow quantity issues, including accessibility.

Thirdly, the common property nature of agricultural information and extension requirements largely warrant development of public extension. The issues facing agriculture in a region largely dependent on weather, availability of resources including water, management of pest and diseases infestations, livestock diseases (for example, foot and mouth disease), water quality issues for aquaculture in common waters (water contamination), market forces (prices and market intelligence), agronomic requirements, etc., which are all of a common nature can be solved effectively when a large number of persons adopt better management measures. Rivalry and excludability, the major attributes that characterise private resources, are not tenable in such cases.

### **Substitutability of extension personnel with technology**

One widely propagated myth is that the newer developments in modern Information and Communication Technologies (ICTs), including Artificial Intelligence (AI) would reduce the need for extension personnel. At the outset, it appears true to a limited extent as disseminating simple information to farmers is relatively easier through mobile phones. The penetration of internet and mobile phones has helped agricultural extension services to overcome the boundaries of scalability and geographical constraints (Mittal et al. 2009). Research suggests that ICTs have helped farmers in sharing information and its wider adoption. AI is capable of effecting a tectonic shift in all spheres of human activity. Together with space technologies, AI can be effectively used for management of agricultural operations.



**Promoting vegetable cultivation under fallow lands**

However, it cannot be anticipated that it would result in large-scale displacement of personalised agricultural extension services, given the social and economic milieu. Experience suggests that developments in ICTs cannot be a substitute for human intermediation in solving problems of agriculture - ICTs can only be an aid (Sulaiman et al. 2012). This is because farmers need not only information, but also motivation, training, and skill development for behavioural change. Smallholder dominated agriculture (accounting for more than 82% of total farm holdings) make it more nuanced. Another issue is the perceptible digital divide (both social and gender related) that exists in India in terms of access to internet and mobile telephony. The COVID-19 pandemic has thrown open the issue of unequal access to resources and technology more glaringly. With the emergence of newer value chains and institutions, economic activities would be more and more diversified and the matrix of information and services demanded would be diverse. Therefore, co-existence of various agencies and aids that harness complementarity rather than substitution of personnel with technology is a more plausible scenario in the near future.

Economic contribution of extension services  
 There is a need to evaluate the contribution of agricultural extension activities in enhancing agricultural productivity and meeting the food

and nutritional security of India. Agriculture being a state subject, the public extension service primarily operates through the state line departments dealing with agriculture, horticulture, animal husbandry, fisheries, soil and water conservation, etc., to mention a few. The Union Government undertakes various extension activities mainly through the district level Krishi Vigyan Kendras (KVKs), supported by the Indian Council of Agricultural Research (ICAR). The research institutions under ICAR and state agricultural universities (SAUs) also undertake extension activities on a limited scale. Various commodity boards are also engaged in commodity specific extension activities (Sajesh and Suresh 2016).

These extension activities have generated commendable economic returns by aiding increase in production and productivity of agriculture in India, thereby remarkably keeping the food production growth above the population growth rate (generally). It has also helped to boost export of agricultural commodities. A meta-analysis done on the contribution of agricultural extension in India has shown an IRR of 75%, one among the highest in the world (Pal 2017). Agricultural research and extension has emerged as investment avenues making it one among those with the highest impact in reducing poverty in India. Still the investment in agricultural extension in India is quite low. Agricultural

extension expenditure as a share of the agricultural GDP in India (extension intensity) is about 0.18%, on average, for the period of 2011-2013. This is less than half of the research intensity (0.40%, which is also low), and much less than that in many other countries (Pal 2017). Given this background, calls for further scaling down of staff strength challenges economic logic.

More nuanced is the philosophy on which the call for scaling down the operation of public departments mostly rests: reducing revenue expenditure of the state (mainly, towards salaries). The size of public expenditure increases with the growth of the economy and population - due to expansion of traditional functions, coverage of new functions, expanding the sphere of public goods, and several other changes (e.g., Wagner's law, Musgrave and Peacock 1958). There could be corresponding changes in public employment, though not necessarily in proportion. The demand for public services could enhance public employment at different levels of administration, central, state and local bodies, depending on the extent of devolution of power. The common belief is that the Indian public administration is over-staffed. The empirical evidence has something surprising to offer in this regard. India has only a fifth as many public servants as the United States of America, relative to population (as on 2011), that is, 1623 public servants per 100,000 residents in India compared to 7681 for the United States (Swami 2012). This could largely get reflected in agricultural extension as well.



### **Pest Diagnosis in Chilli**

One variable that undermines operations of the proportionality mentioned above, is the technological development and automation which enhance the efficiency of the public servant, thereby reducing their number,

given a specific work load. The diversification and expansion of the economy negates the personnel-technology substitution effect to a large extent, and could even lead to an increase in the demand for public servants. This is particularly so as the economy gradually turns into a right-based one and more accountable; for example, the rights to food and information. However, the intensity of such a substitution differs across sectors. The scope for reduction of public servants in agriculture is not as robust as in industry or service sectors, as the number of farm holdings in India is increasing, and every farmer is an entrepreneur in her own way. Further, the newer programmes for the agriculture sector are more and more knowledge and skill intensive.

## **CONCLUSION**

The public agricultural extension expenditure has provided gainful economic returns over a period of time, and helped in transforming Indian agriculture. The increasing call for reducing staff strength based on revenue expenditure largely misses the wood for the trees. The notion that technical developments in ICTs, including AI, would be a substitute for the need for personnel intermediation in extension service is farfetched. Further, it belies the trend in the number of agricultural holdings, diversification of agricultural activities, and intensity of skill and knowledge demanded for agricultural operations in the globalised value chains. The structural rigidities and institutional complexities in a society as diverse as India is another factor to be reckoned with. Notwithstanding the inequity in access to digital technologies, it can be best thought that technological developments will have a meaningful co-existence with personalised extension. The substitution effect would be subdued and a rather complementary relation could be expected. The indicators selected to streamline the extension personnel need to factor-in the complex social, economic, institutional and agro-ecological milieu. The great contribution of agricultural technology and its dissemination in ensuring agricultural growth, meeting food and nutritional needs, and livelihood generation is to be considered while selecting indicators for streamlining agricultural extension activities and staff positions.

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## THE BURDEN OF BEING A KVK

The Krishi Vigyan Kendra (KVK) is an exceptionally well-thought-out concept but at the same time it is an equally badly-executed project. The KVK is seemingly condemned to be a nonentity. In order to provide the much-needed push to agricultural R&D in the country, there are several good reasons for why KVKs need close scrutiny and course correction. Here **Arun Balamatti** dives deep into the KVK system.

The Krishi Vigyan Kendra (KVK) has an enviable role in organically connecting Research and Development (R&D) institutions. But no one cares about it. Recently there were a few adverse comments on the KVKs on a few WhatsApp groups. Someone wrote, 'the KVKs are pathetic; they are still recommending banned pesticides to farmers'. Someone else wrote, 'The KVKs have absolutely no understanding of natural farming; they hardly understand the ideology behind natural farming.' When I recently made a career move, after a 10-year stint at a KVK, a senior bureaucrat exclaimed, 'Wow, from a KVK directly to an international organization!?' (As if KVK employees are not worthy of it!)

The comments sum it all up. The KVKs must be knowing everything, and doing everything, but can't inspire. There are copious comments and opinions; but they are not new to KVKs. In fact, there has never been a dearth of derogatory remarks on KVKs from various corners, whether it's about specific KVKs, or even a general remark about KVKs.

It is indisputable that KVK scientists must be updated continuously. But when some self-made messiah, intellect, or activist comes up with a new concept every other day, for example, conventional farming – organic farming – natural farming – zero-budget farming – non-violent farming, and so on and on...isn't it a bit too much to expect one person to know all of these? Not just know but also get to the heart of each concept, especially when there are only debates around what they are not instead of deliberations on what they are.

It's indeed an uncomfortable feeling and one doesn't get accustomed to the negativity despite hearing it all the time. It's fine to be criticized, but should the KVK be an eternal punching bag? Why does no one speak up for the KVKs?

## THE BITTER TRUTH OF BEING A KVK

In a matter of two more years from now, by 2024, the KVKs will be celebrating their golden jubilee. Incidentally, the KVK is not really an institution. Having been set up as a project in 1974 by the erstwhile Planning Commission, the KVKs continue to be the longest-running project even after the Planning Commission made way for the NITI Aayog. Today, there are 732 KVKs in the country, at about one KVK per district, and still counting.

The KVKs were introduced as vocational training centers for agriculture and allied activities in the district. They were fully funded by the Government of India through the Indian Council of Agricultural Research (ICAR). The KVKs were meant to be trainers' training centers for Extension personnel; eventually, their mandate extended to the training of farmers, farm women, and youth on the necessary skills required for different agricultural activities. As agricultural research progressed during the 1990s, from the typical Green Revolution technologies such as high-yielding varieties (HYVs), hybrids, chemical fertilizers, and irrigation, to exploring new possibilities such as short- and medium-duration varieties, pest and disease tolerant varieties, crops demanding less water-fertilizer and management, etc., the role of Rural Advisory Services (RAS) or Agricultural Extension became a lot more complex. The one major challenge facing agricultural research was the realization that not all technologies developed are equally applicable to every agro-climatic zone. In order to deal with this challenge, the KVKs were transformed into centers mandated to undertake technology assessment and refinement and organize frontline demonstrations to validate the location specificity of new technologies. The skill training was pushed down to the third priority of the KVKs. Surprisingly, the metamorphosis of the KVKs from being skill training centers to technology assessment centers doesn't find any mention in the public domain.

Despite their active and rather rigorous involvement in the long history of the agricultural development process, the KVKs haven't been given a deserving identity, recognition, and dignity within the R&D

institutional landscape. The KVKs are the most abused entities and continue to be given an inferior status largely because of its positioning, perception, and performance.

## WHAT REALLY AILS KVKs?

The KVKs never had a central role in the mainstream RAS/Extension Service; rather, they were meant to lend technical support to Extension agencies. This does not imply that KVK scientists are not meant to be updated. Instead, they should be a step ahead of all other players. It's just not happening because their positioning does not provide a space for this.

From the positioning point of view, the KVKs are expected to play the role of a link agency between the R&D institutions in the lab-to-land continuum. That is the role the ICAR has defined for the KVKs. However, for this role the KVKs need to be accepted by the two ends of the lab-to-land spectrum – whether it be the research institutes or the extension agencies – but there is simply no formal structure in place. As a result, the research institutes such as the state agricultural universities (SAUs) or even the ICAR institutes do not consider the technology assessments of the KVKs as research and do not involve the KVKs in their research deliberations at all. On the other hand, overwhelmed by the burden of implementing the various state and central schemes the always-understaffed state development departments happily utilize the KVKs in all their campaigns, workshops, and training events, thereby jeopardizing the perception of KVKs on their true role.

From the positioning point of view, the uniformity and consistency of delivery of the KVKs' role took a beating for another reason, that of the different institutions hosting them. Although the full funding comes to the KVKs from the Government of India through the ICAR, out of the 732 KVKs in the country to date as many as 506 (69%) are being hosted by the SAUs, 103 (14%) by different NGOs, 66 (9%) by the ICAR research institutes, 38 (5%) are being managed by the state development departments whereas the others are operating under the deemed or central universities and other government institutions. Although all the KVKs have the same mandates, their technical

abilities, modalities of program implementation, and hence the results and impacts are directly influenced by the specific objectives, goals, strategies, and the institutional culture of their respective hosts. Therefore, their variability is inevitable.

The deplorable part of the KVK management story is that its biological parent, ATARI (Agricultural Technology Application and Research Institute), the zonal coordinating unit of the ICAR, looks on helplessly as the KVKs undergo different acculturation processes at different host institutes. There is a lack of clarity on the role of ATARI while most policies are host-institute driven. ATARIs remain too small in staff size and are overdrawn with administrative roles, thus compromising on their crucial technical support to KVKs. Except for the occasional induction training organized by ATARI no other institution has a plan to constantly train and update the KVK staff.

It is unfair to judge the KVKs without understanding the many other critical issues that influence KVKs' performance.

### **THE EXISTENTIAL QUESTION TROUBLING THE KVKs – WHO AM I?**

The fundamental issue facing the KVKs is their identity. Apart from the support, guidance, and autonomy that the KVKs presumably get from their respective host organizations it is about how the farmers, R&D agencies, and most importantly the KVK employees perceive the KVKs and their role in the R&D ecosystem.

Majority of the KVKs – nearly 70% – are managed by the SAUs. The SAUs are often deploying the KVK scientists for their teaching, research, or any other work, or the KVK scientists volunteer to engage in these activities to build their scorecards, thus compromising on the KVK mandates. The NGO KVKs, on the other hand, by their proximity to the communities, with their creative and innovative approaches that help them break the shackles of 'prescriptive science' and despite their better strike rate in terms of bagging the zonal and national awards, are considered as 'technically weak'. The district development departments are always eager to achieve the targets of

their technical programs largely by using the KVK scientists. And what do the farmers think of the KVKs? Their position is straight and simple: "Don't lecture us about who you are or what you are not, we have problems, please offer a solution!" The KVKs invariably end up being perceived by each stakeholder as mere event managers. This 'in limbo' position of the KVKs, unfortunately, has a direct impact on recruitment, staff morale, etc., and hence, eventually on the performance of the KVKs. No surprise that the KVKs have ended up being seen as places not meant for the meritorious; they are instead treated as 'temporary parking places' until one gets a call from either the SAUs or the ICAR institutes.

Barring a few exceptions, if one agrees with the above conclusions as the predominant public opinion on the 'state of KVKs' it is not difficult at all to discern that we are looking for the basic ingredients needed for good performance, such as pride, professional commitment, and motivation, in the wrong place.

### **KVKs ARE NECESSARY, BUT NOT THEIR ASPIRATIONS**

Until one thinks of an alternative institutional mechanism, we need the KVKs for two important functions in the R&D institutional architecture.

The first is to provide timely, clear, accurate, and scientific feedback on the location specificity of new farm technologies, to the research system as to whether the technology is working as expected or does it require modification to suit the local agro-ecological conditions and/or farmers' needs.

The second function is to periodically list the successful technologies tried out locally with a select few farmers and pass them on to the Extension agencies by skilling the Extension functionaries for large-scale promotion.

Although this is the defined role of the KVKs there is, unfortunately, no formal mechanism in place either for the KVK to deliver its role or for the R&D agencies to patronize the KVKs. So, what are the KVKs doing then? They are still meticulously implementing their on-farm trials

their on-farm trials (OFT, technology assessment) and frontline demonstrations (FLDs) and sitting on precious data unable to push it meaningfully into the Research and Extension continuum. The related training events on OFTs and FLDs are being conducted. Some KVKs are producing and sharing excellent quality planting material with farmers. However, of late, most of the time the KVK scientists are being drawn into organizing event after event popularizing the various central schemes, mobilizing hundreds of farmers every time, inviting the Members of Parliament (MPs) and the Members of the Legislative Assembly (MLAs), literally feeling bruised and bitter. By doing this, the KVKs are running the risk of being seen as aligned to certain political parties, losing the credibility and goodwill that they have built with farmer communities over many years, and in the process, diluting their mandated responsibilities. Under the circumstances, if they continue working this way, a celebration would be the last thing on their mind, no KVK is likely to feel even a minimum sense of accomplishment as the KVKs approach their golden jubilee year in 2024.

Maybe, the Government of India, or more hopefully the ICAR itself, will feel the need to take a relook at the current state of KVKs. Here are a few issues and suggestions to salvage much from the KVKs that help R&D agencies, and of course, farming and farmers in India.

## **ENERGIZING THE KVKs – CHALLENGES AND SOLUTIONS**

While the government is keen on establishing newer KVKs and covering every district in the country there is a need to take a balanced view on the expansionist policy, especially if it is at the cost of strengthening the existing KVKs with the necessary infrastructure. What's the plan for moving towards self-sufficiency? Although this was the original plan, it was eventually dumped and the KVKs continue to function under a perennial fund crunch.

### **Positioning of KVKs at the district level in the Lab-to-land and Land-to-lab continuum**

On account of their role as the link agency between the R&D institutions, the KVKs must liaise with the research institutes at the central (e.g., ICAR), the state level (e.g., SAUs), and

the state Extension agencies at the district level such as the Department of Agriculture, Horticulture, Animal Husbandry, Sericulture, Fishery, Forestry, etc. But each one has its own character and culture. It calls for a review, by the ICAR, to think of the proper positioning of the KVKs so that they get the necessary attention, and also ensure that the KVKs are part of a formal chain of command. A realignment of the KVKs will have a double advantage – it will increase the accountability of the KVKs on one hand, and on the other, bring value to the precious data they keep generating from the grassroots.

### **Establish a National KVK Academy**

Agricultural development is a dynamic process; there are new opportunities as well as newer challenges every other day. This calls for the KVK scientists to be up to date, which is also an ongoing process. Although structurally the KVKs are rather small, each member has a distinct and important role to play. The head of a KVK must be conversant with technical, administrative, and financial matters along with the skills necessary for handling relationships with farmers, development departments, and the media. Each scientist is supposed to be an expert in his discipline and at the same time should also be a skilled generalist in offering solutions to a wide range of agricultural problems that the farmers bring to them on a day-to-day basis. The scientist handling the soil testing laboratory must be competent to analyse, diagnose and offer timely management solutions and guidance.

It is mandatory for each KVK to have a minimum of 21 hectares of its own farmland, the management of which is the responsibility of the Farm Manager – a highly underrated role. While the present qualification and experience required for a farm manager are that of a beginner it was envisaged during the early years of the KVKs that they would generate at least a part of their annual budget from the 21 ha land at their disposal. The 21 ha land is a great resource to demonstrate frontier technologies, try out innovations, develop nurseries and mother orchards, and garner income to showcase what it means to apply science and technology in farm management. This role certainly demands the capacities of a higher order.



Competence with handling digital technologies is another area that is confined only to one staff, the Program Assistant (Computer). While the person should be able to manage the compilation of technical and financial data she/he must regularly keep feeding the data into the zonal level MIS software, the KVK website, as well as the national KVK portal. This apart, with the advent of social media, there is immense demand for developing apps, short videos, and infographics for sharing knowledge with various stakeholders. This means that it is not enough for one staff but for all the KVK staff members to acquire not merely basic digital literacy but many other skills as well.

Given the need for this amount of diversity in roles and skills the frequent staff attrition and new recruitments don't help; it keeps disrupting knowledge management at the KVK as also at the zonal level (ATARI) where the data is aggregated. Therefore, there is great need for regular capacity development of the KVKs' staff, which cannot be handled at the KVK level. A national institute along the lines of National Academy of Agricultural Research Management (NAARM) is necessary for the KVKs to regularly conduct various training events, such as induction, role clarity, collection and processing of scientific data, refresher training, reporting, and communication skills using digital and social media, and so on.

### **Make KVK service mandatory for teachers and scientists in the SAUs**

The government has made it mandatory for doctors to serve in rural areas for a minimum length of time. The rationale here is different. The reason it is necessary for every agricultural researcher and teacher at the ICAR and SAUs to be serving in a KVK is different. It calls for a closer analysis of what is happening to agriculture graduates being produced by the SAUs year after year. It is apparent that over 90% of the graduates go on to pursue higher studies. It is indeed good for them and good for society. But what exactly is the goal of higher education? It is not simply a search or hunger for knowledge. The graduates pursue post-graduation to become researchers or teachers. Again, it is not really a wrong aspiration. But the painful point here is the fact that no one wants to go back to farming or work closely with

farmers. The aspiration for higher studies is to get into a white-collar job and not to perspire in farming or to work with farm families.

RAS/Extension, unfortunately, is not a preferred occupation. The implications of someone becoming a teacher or a researcher without hands-on experience is that their teaching lacks substance and the research lacks an agenda or hypotheses that emanate from the grassroots. One must understand that agriculture is not merely a body of knowledge, it is also a skill. And the skill can only be acquired by practicing. The ICAR, therefore, must find ways of incentivizing Extension or Rural Advisory Services (RAS) primarily to strengthen agricultural education and research. A 3- to 5-year tenure upfront for every agricultural professional at a KVK has a multiplier effect on RAS, research, and education.

In fact, it is generally acknowledged that most of those who have had a stint with the KVKs early on in their careers owe their later success to the perspectives they gained from their KVK service.

### **Revisit the roles and responsibilities of KVK staff**

In the present system, the head of the KVK is burdened with an excessive workload. It is but natural that the head must be responsible for everything. This doesn't necessarily mean he or she does everything. An annual plan demands at least a week's time for preparation and another week for travel and participation in the zonal planning meeting. Ditto for the annual review workshop. At least one week to take part in the national KVK conference. Another fortnight to convene, prepare and complete the scientific advisory committee meeting at the KVK level. Add to these the planning and review meetings of different central schemes and projects each KVK handles. Plus, the quintessential field visits to monitor the OFTs and FLDs.

The head is literally expected to be on wheels continuously and in the forefront of all these events. On the other hand, there is one or the other report, data, or updates to be sent to the ATARI almost every day, including the replies to questions in parliament. This means the head

must be in front of the computer every day. Being on the toes and before the computer simultaneously isn't something one can manage without support and cooperation from the team. However, when the other scientists in the KVKs are qualified and talented it is but natural that they would have their own aspirations. But when they know they are not getting relevant exposure or platforms to showcase their talents, nor the opportunities to lead any of the activities how will they feel a sense of belonging? Why would they feel accountable when it is the head who will be facing the music all the time? Once this thought seeps in it really puts the head in a precarious situation. The sharing of roles and responsibilities and the delegation mechanism therefore calls for a reality check.

Safeguard KVKs from being overdrawn into non-technical and political events

The KVKs provide direct access to the farmers at the grassroots level for the Central Government. Unfortunately, this has become quite a burden for the KVKs in recent years. For every agriculture-related event, occasion, launch, or live telecast the KVKs must mobilize farmers, invite MPs and MLAs, prepare a report and video clips, and dispatch them on the same day. If the KVKs are drawn into such activities, especially when such activities have nothing to do with the KVKs' mandated activities, the KVKs are not only likely to get distracted but also

tend to lose the goodwill built with the farmer communities so painstakingly over the years. The KVKs must identify themselves among the stakeholders only from their mandated work and nothing else.

## CONCLUSION

Dr Peter Kenmore, the then (2012) Country Representative in India, Food and Agricultural Organization of the United Nations, New Delhi, said that the KVKs are brilliant institutional innovations inspiring the world in the 21st century. Around the same time, the ICAR was mulling the idea of replicating the KVK concept in African countries. Every deliberation on the KVKs ends up with singing paeans on how important the KVKs are and why it is necessary that they must be strengthened; yet somehow no one bothers to walk this talk.

There is an apocryphal story told about Sir M. Visvesvaraya, a modernist visionary. It is said that when he saw the white cascades of water at the Jog Falls in Karnataka, he exclaimed: "What a waste!" His engineer's mind saw hydroelectric potential when others saw the raw beauty of the waterfalls.

The KVK potential is certainly being wasted; ironically, there is no beauty around the KVKs that one wishes to bask in.

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## HUMAN RIGHTS AND SEA-GOING FISHERS - A PERSONAL TROPICAL REFLECTION

As humanity prepares to celebrate the Ocean during the World Ocean Day on 8 June, **C Ramachandran** reminds us of the need to protect the human rights of sea-going fisherfolk through adequate legal instruments.

*"Acting responsibly is not a matter of strengthening our reason, but of deepening our feelings for the welfare of others"*

**- Jostein Gaarder in *Sophie's World*<sup>1</sup>**

The most striking outcome of the recent verdict<sup>2</sup> by the International Tribunal on Law of the Seas (ITLOS) on what is generally known as the 'Enrica Lexie incident', which India wanted to be known as the 'St: Antony incident', is that nobody vouches for protecting the right to life, the most fundamental of all human rights, of those who do fishing for a livelihood in our Exclusive Economic Zone. Everyone waxes eloquently on the way these instruments as well as the rhetoric (peer reviewed and avant garde) are going to play a radical role in making a better, safer and more sustainable world for the fisherfolk of the world (Box 1).

### Box 1: No dearth of rhetoric

The Universal Declaration of Human Rights (UDHR)<sup>3</sup> is owned, in principle, by all the human beings currently inhabiting the length and breadth of 193 member countries under the UN umbrella.

There are legal mechanisms and tools to uphold the 30 rights enshrined in UDHR at international, national and state levels of governance.<sup>4</sup>

There are also internationally accepted guidelines for protecting the human rights of fishers.<sup>5</sup>

There are innumerable social scientists and legal experts writing pages and pages on the way fisheries governance, by embedding the human rights aspirations, would lead to inclusive development.<sup>6</sup>

There are bestselling books and videos exposing the human rights violations happening in the global sea- space.<sup>7</sup>

But I find that none of this academic effervescence on human rights have apparently come to the court rooms<sup>8</sup> that tried to resolve a case where two Indian fishermen who, while engaged in legitimate fishing activity in the Indian EEZ, were killed by two Italian military officers who were on private security duty on board an Italian oil tanker.<sup>9</sup>

I should add a small correction here. It is not correct to say that no reference at all was made on human rights in this case. It appears that the Italians were the first to take the human rights route, probably due to the presence of a human rights legal expert in their team. They argued that the human rights of these two accused Italian citizens were violated by the Indian government by not giving a charge sheet to the accused even after two years of litigation, and by denying their humanitarian requests for medical treatment and spending Christmas days with their dear ones!

It seems that the human rights argument came to the Indian team as an after-thought, but thus fortuitously making the issue an unprecedented two-way affair, throwing legal luminaries into a tizzy of legal debates and discourses around human rights in the context of the Law of the Seas.<sup>10</sup> But the most important point is that neither party raised any specific human right in this case (Papanicolopulu 2015).<sup>11</sup> Why did the issue of Human Rights not get the attention it ought to have received<sup>12</sup> while the case remained so explosive? What can be done now?



## HUMAN RIGHTS OF FISHERFOLK

Answers to these questions cannot be sought in a neutral space, for human life is not an academic abstraction. It is a lived reality written in blood, bones and tears. (Box 2). To paraphrase Taleb,<sup>13</sup> a fisherman does not need to win arguments, just fish. But when it comes to the question of his or her life as a

question of law, we have to see that he wins in arguments too. It is here, I argue, that we lost a crucial opportunity in ensuring the human rights of fishers, not only Indian but from anywhere in the world, who are fishing in their respective EEZs. I would like to avoid the small scale fisheries label here, for the simple reason that human rights cannot be relegated to such undefinable<sup>14</sup> polarities of big and small.

## Box 2: Do we really care about the human rights of fishermen?

At least some of the authors who think, talk and write about human rights in the context of fisheries are personally known to me. And many more in this discourse break fraternity barriers simply because of their increasing presence in my living room, thanks to the social media, especially YouTube! I consider all of them as my colleagues and I am always in solidarity with them.

Nevertheless, let me share an embarrassment I have had recently. In fact, the immediate trigger for my random reflections has been this embarrassment. While a welcome mention was made of George Floyd in a panel discussion titled 'From words to action for small scale fisheries - too big to ignore' that was streamed live (on 8 June 2020) neither Valentine Jelastine nor Ajeesh Pink, the two Indian fishermen who while engaged in legitimate fishing in the Indian EEZ were killed by two Italian military officers (who were on private security duty on board an Italian oil tanker), were mentioned. I strongly feel that both of them should have become the icons of our global struggle towards fishers' human rights. Why didn't both of them become a rallying point, like Floyd, for the human rights activists? Why did they not get the media attention in that angle? Why did influential dailies like New York Times or Guardian not carry articles on the human rights violation perpetrated on these two poor fishermen? I don't blame the panellists. I am afraid that even Indian fisheries spokespersons have forgotten them, probably because of the 'big-small' dissonance which leads to a kind of demonization of the trawler fishers versus the non-trawler fishers or artisanal ones.

It is perhaps an ontological paradox that born in traditional fishing families most of these fishers lose their artisanal, small scale status if they work on a trawler! The case of small scale fisheries may be 'too big to ignore', but when it comes to the very lives of these protagonists they become too small an entity to reckon with. Fishery scientists, including social scientists, hardly try to view the individual sea-going fisherman (it is 99.9% of men who are on board our fishing vessels and no gender bias intended) as an epistemological factor unless the fishing profession is construed as an arena of criminalisation!

Criminalisation of fisheries is an unfortunate outcome of the otherwise genuine concerns pinned around international parleys on topics like Illegal, Unregulated and Unreported (IUU) fishing, Piracy, and Big vs Small polarisation. Are we missing the woods for the trees? Is it that the discourses are dominated by those who lack skin in the game? Of what use is our academic brilliance if it is not for finding a praxis, at least when it is most demanded?

I am appalled by the tons of management recommendations which invariably illuminate the conclusions of every academic paper written on fisheries management or governance. It is an irony that most of them are pay-wall protected from the very public who funds the fisheries R&D in most of the tropical region fishing nations. Is limited access to that erudite scholarship a deterrent in espousing our cause by legal experts?

It is high time we abandon our careerist penchant for high impact factor thamasha and leave it for those who don't have to rely on taxpayer money for the esoteric research that they are free to pursue. On a lighter note, fishing continues to be in the 'realm of the illiterate', which one should re-read as the 'celebration of phronesis'<sup>15</sup>, (thanks to Jentoft, for introducing this Aristotelian concept to me) probably the very reason we still have fish on our dining tables! Or until they are replaced by sea-going robots empowered with all virtues like *techne*<sup>16</sup> and *phronesis*. Another reason why the case has not ignited the human rights passion in India to reach a critical mass could be the way the issue got diluted by the parallel attempts by the Church to yield a hefty compensation for the family of the victims. Taking all these points together, I wonder how the world would have reacted if there was a role reversal in this case!!

Whether big or small, black or white, the right to life is a fundamental human right for all homo sapiens. So the rights of even those who use the sea space of this planet for livelihood – whether legal or illegal until proven by due course of law – needs to be defended, protected and sustained.

### MY TAKE ON POSSIBLE REMEDIES

- a. UN should urgently bring reforms in the UNCLOS.<sup>17</sup> A clarification regarding the rights and authority of a coastal state in taking criminal procedures against anyone who takes the life of their fishermen who

are normally pursuing a livelihood in the EEZ is immensely important in preventing our fishing grounds from turning into killing grounds.<sup>18</sup>

- b. We must be less enthusiastic in trying to implement international guidelines which are touted as voluntary. While honouring the normative intent and importance of such instruments<sup>19</sup> with sincere respect, I dare to say that it is a waste of precious resources if no attempt is made to draw up binding rules from these guidelines before implementing them in signatory countries. I think assessing 'implementability' must be a prerequisite before pushing it as international agreements so that member nations have a clear idea about its policy/legislative instrumentality. And also to see whether it is in sync with the socio-economic and ecological nuances existing in the respective fishery contexts. The real litmus test here, is to answer the question "who owns it"?<sup>20</sup> Reification may engender a false answer.
- c. National Human Rights Commission (NHRC) should come out with a legal instrument for protecting the rights of fishers in India.<sup>21</sup>
- d. The Committee on Fisheries (COFI) of FAO should moot a similar international instrument and make it binding.
- e. All merchant vessels should be equipped with an SOP, including state-of-the-art devices such as high quality telescope, warning mechanisms which are functional during day and night (all weather conditions), and there should be a mechanism to ensure that they are in constant communication with the Coast Guards of the respective coastal states.
- f. Any fisher stakeholder who is given a licence or registration should sign a mandatory declaration on human rights under a modified Marine Fishing Regulation Act or other policy instruments.
- g. Indian fishers should be made aware of the inevitability of multiple and transnational uses of the sea space and the crucial need for following sea security protocols stringently.<sup>22</sup>
- h. Building up a global community of all those who have a concern towards, as well as are

willing to voice the human rights issues faced by all those who 'journey the last frontier' is the need of the hour.<sup>23</sup> Fisheries Extension professionals may play a role in synergising the translation<sup>24</sup> among legal experts, fisheries scholars, fishers and others. Experts-mediated transparency as a way to ensure right to information is essential, given the legal complexities involved in HR issues.

- i. An honest judiciary as well as executive introspection on the case will be of much value to all human rights crusaders.<sup>25</sup>
- j. Declare 15 February as International Day for Human Rights at Sea.
- k. Concluding this personal reflection, I fervently hope that a well-reformed UNCLOS and new international instruments geared towards human rights at sea will provide the necessary arbitrational armour and moral strength for all those who wish to fight for justice for seagoing fishers anywhere in the world.

Let me urge each one of you who honour the call by UN in dedicating this year's World Oceans Day for Human Rights at Sea to remember two names in the silence of your heart: Jelastine and Pink.

## ACKNOWLEDGEMENTS

I am grateful to Dr Rasheed Sulaiman V, for inviting me to write this blog. I have avoided the conventional style and instead chosen the 'footnote framework'. I think this style enables quicker understanding especially when we have the benefit of living in a Google world. I have omitted many important references, which I have benefited immensely from, for the simple reason that they are paywall-protected. And it is not a secret the way I got access to them! I am sure that this blog may not jell with the political correctness of many who happen to go through this. I take the sole responsibility for all the personal opinions expressed here and I don't intend any malice towards anyone. Nor are the views expressed here not subject to correction. I would be extremely happy to receive comments and criticism. But my only request to you is if you are not lucky enough so far to have ever gone on a sea-fishing trip,

kindly do so at the next best opportunity you get. And read this blog again ..... And anyone who enjoys the unique status of simultaneously being blessed with any knowledge from any branch of fisheries science and fish as well, at least occasionally, I request them to be kind enough to have a conversation with me. The future belongs to them.

My special regards are always with Ms Meryl Williams (eminent Australian agricultural research leader and former Director-General of the World Fish Centre from 1994-2004). I dedicate this blog to the painful memory of Valentine Jelastine and Ajeesh Pink.

**Disclaimer:** The author's perspectives are his own and are not to be considered as endorsed by the organisation he belongs to.

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## ENDNOTES

<sup>1</sup>Sophie's World (Norwegian: Sofies verden) is a 1991 novel by Norwegian writer Jostein Gaarder.

<sup>2</sup>Permanent Court of Arbitration award on case No. 2015-28 dated 21 May 2020, could thankfully settle an eight- year long dispute that badly affected diplomatic relations between India and Italy.

<sup>3</sup>UDHR of 10 December 1948 is the most famous international legal instrument, though not binding, on human rights. Human rights are a legally protected interest inherent to man and intended to ensure his or her dignity as a human being from the State and from other human beings (Ndiaye TM. 2019. Human Rights at Sea and the Law of the Sea. Beijing Law Review 10:261-277). India imbued the spirit of the UDHR while framing the Constitution of India. Articles 14--30, 32, 226 of the Constitution of India (1950) ensures human rights under the fundamental rights. Articles 5-11, 325-26 also reflect UDHR aspirations.

<sup>4</sup>The architecture is well known and not dealt with here. RP Remanan (2014), Mehtha and Verma (1999) could be handy references.

<sup>5</sup>FAO Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the context of Food security and Poverty Eradication (2015 first edition and 2018 second edition, often referred to as FAO SSF Guidelines) is a landmark publication. Though the FAO Code of Conduct for Responsible Fisheries (CCRF 1995), which is considered as the bed rock of global fisheries management, is conspicuous by the absence of any reference to 'human rights'. FAO's (2009) 'CCRF and indigenous peoples - An operational guide' tries to address this lacuna.

<sup>6</sup>Google search yielded 131,00,000 results for two key words (Human rights, fisheries governance), and together with the third word (+India) threw up 734,00,000 results.

<sup>7</sup>The Pulitzer-prize winning book by Ian Urbina, *The Outlaw Ocean* (2019), tops the bestseller chart in this genre.

<sup>8</sup>I don't have access to the court documents and I have resorted to indirect measures. For instance, the Google search with four key words (Human rights violation, Enrica Lexie case, UNCLOS, FAO SSF ) yielded just 29 results, out of which only one publication honoured all the key words. It is titled 'The future of ocean governance and capacity development: Essays in honor of Elisabeth Mann Borgese (1918–2002)' / edited by the International Ocean Institute-Canada, Dirk Werle, Paul R Boudreau, Mary R Brooks, Michael JA Butler, Anthony Charles, Scott Coffen-Smout, David Griffiths, Ian McAllister, Moira L McConnell, Ian Porter, Susan J Rolston and Peter G Wells (2018).

<sup>9</sup>This incident happened on 15 February 2012. The mechanised trawl boat (St Antony), registered under the Tamil Nadu Marine Fisheries Regulation Act (1983) and Marine Product Export Development Authority (MPEDA) Act, had 11 fishermen on board and was fishing 20.5 nautical miles off Kerala coast in what is known as Contiguous Zone, but outside Territorial Waters which is reserved for non-mechanised fishing vessels. Whether Indian government, being the coastal state has the power to charge criminal procedures under the Indian Penal Code (IPC) on the Oil tanker whose flag state was Italy, was a crucial point in the legal tussle. The argument that Italians could avail the benefit of immunity under United Nations Convention for the Law of the Sea (UNCLOS) was upheld by ITOLS raising many legal brows.

<sup>10</sup>Notable and freely accessible ones are: Irimi Papanicolopulu. (2015.) Considerations of humanity in the Enrica Lexie case QIL – Zoomin 22:25-37. Grover & Gupta. (2021.). Violations of human rights under the semblance of sovereign

immunity. The Daily Guardian. Honnibal. (2020.) CIL, Singapore. Atul Alexander. 2020. opiniojuris.org, etc.

<sup>11</sup>I would like to consider this as the most abominable lapse because the winning argument of immunity, which Italy has been consistently arguing, could have been counterweighted by the Human rights argument.

<sup>12</sup>There were attempts to attribute terrorism (Gardiner Harris 2014, The New York Times), but not human rights.

<sup>13</sup>Taleb NN. (2018). 'Skin in the game - hidden asymmetries in daily life', like many of his other books, is a hilarious read. Thank you Taleb.

<sup>14</sup>The current thinking is short of a universally acceptable definition, let each nation bring its own definition. No wonder there is a 'not small enough cry' in the air, similar to the reservation clamour we are familiar with. One is reminded of Sainath's Everybody loves a good drought.

<sup>15</sup>Phronesis is a Greek term which means 'practical wisdom' that has been derived from learning and evidence of practical things. Phronesis leads to breakthrough thinking and creativity, and enables the individual to discern and make good judgements about what is the right thing to do in a situation.

<sup>16</sup>An art, skill, or craft; a technique, principle, or method by which something is achieved or created.

<sup>17</sup>United Nations Law of the Seas convention (10 December 1982) is considered as the constitution of the sea. This is not a human rights instrument per se. As Papanicolopulu, a well-known scholar on human rights and law of the seas, observes in her book, 'The problem with UNCLOS and other laws of the sea instruments is that they are designed for States and not for individuals. The law of the sea is a State-centred regime, in which States have the rights (and obligations) while people may at most be considered as beneficiaries.' Human rights as per UNCLOS is an incidental issue. Being the dominant legal instrument applicable to the seascape it is essential to remedy the grey areas as revealed in the context of the Enrica Lexie case. It seems to me that the PAC circumvented a reformist nudge by endorsing the immunity argument instead of addressing the Indian question on the authority of a coastal state to exercise its domestic legal instruments in its EEZ in cases where human rights of its citizens are violated. The international legal community has to allay the concerns of a fisher when he asks "What is the guarantee that I will not be shot dead while I do legitimate fishing in our own waters?"

<sup>18</sup>This is all the more important given the fact that instances of our fishermen interfacing with merchant ships, often leading to casualties, are on the rise these days. As inshore waters are becoming less productive, and given the technological advances changing class and labour-relations (demanding new interpretations in coastal/shorelines-conflict) our fishers are at risk in such encounters. Another reason is the proximity of their fishing grounds to international shipping channels as in the case of Kerala coast. The question of piracy needs to be addressed as a multi-factor (tax havens, bunkering facilities, poverty & inequity, structural adjustment, etc.) developmental issue.

<sup>19</sup>Both the FAO voluntary instruments (CCRF as well as SSF guidelines) were translated by me into Malayalam and I have developed various extension tools for the promotion of these concepts among the fisherfolk stakeholders in India. I must also mention that I got a very rare opportunity to be part of an international expert group that conducted a multi-country 'Evaluation of FAO's support to the implementation of the Code of Conduct for Responsible Fisheries' under Dr Meryl Williams. I also invite your kind attention to my book titled Teaching not to Fi(ni)sh - A constructivist perspective on reinventing a responsible fisheries extension system. It is also worth mentioning here that the FAO SSF guidelines are dedicated to the memory of Chandrika Sharma, of the International Collective in Support of Fish workers (ICSF) which is the main driving force (formulation and advocacy) behind the instrument.

<sup>20</sup>I remember Simon Funge-Smith, who pointed out the irony in probing the implementation of a voluntary instrument.

<sup>21</sup>The NHRC plays a crucial role in addressing the human rights issues faced by those fishermen getting jailed in Pakistan and Sri Lanka. It is strange that despite the availability of various IT-based forewarning alert devices our fishers still trespass into the international maritime border inviting jail terms in foreign countries.

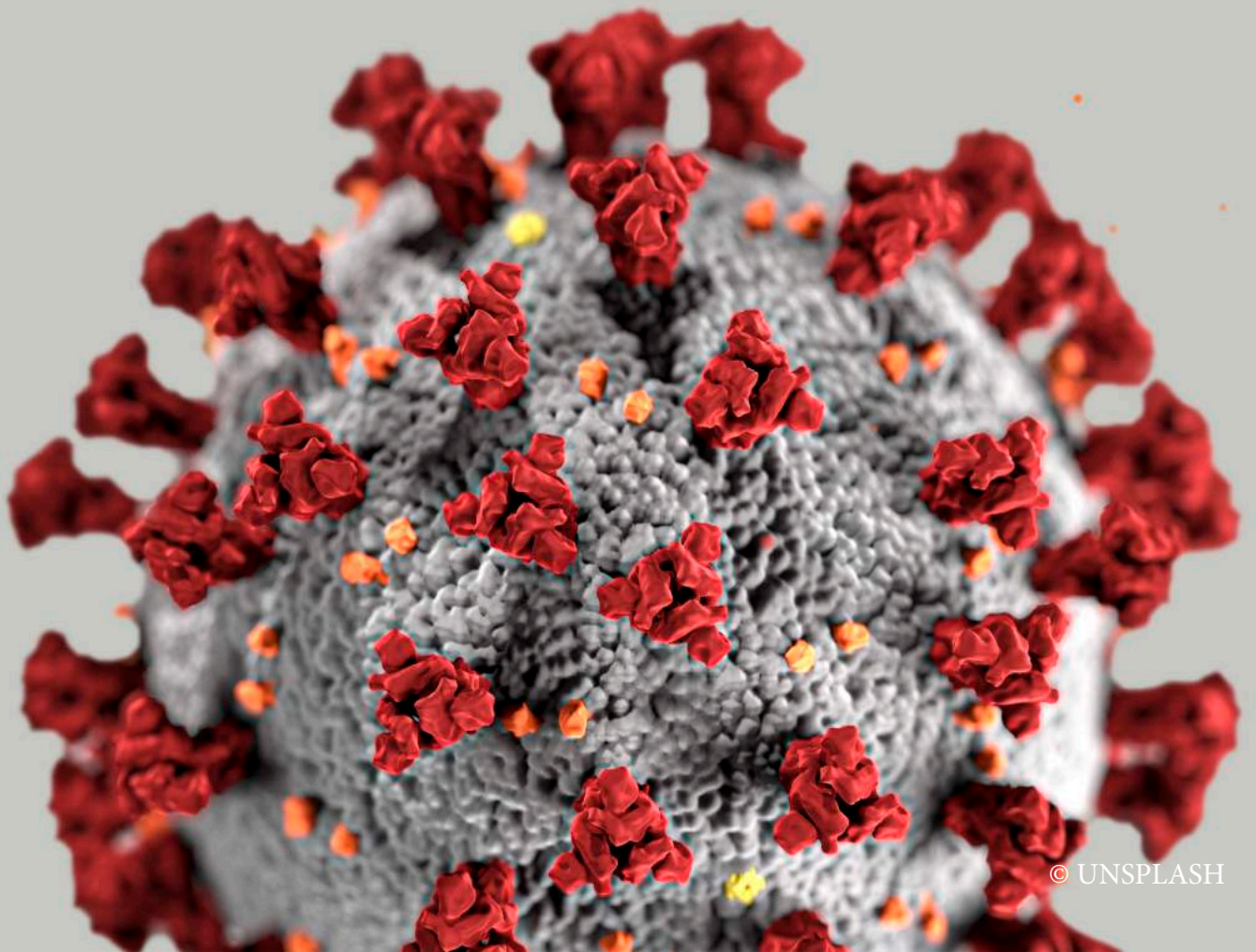
<sup>22</sup>It is pertinent to note that Italian security officers, in their plea, alleged that the absence of an Indian flag on St Antony was a factor in deeming the unidentified boat as a pirate boat. They also questioned the validity of the licence issued by the Tamil Nadu government, which has jurisdiction only in Territorial waters, for fishing in the Contiguous Zone. India argued that the vessel had MPEDA certificate of registration, but not under Merchant Shipping Act. Though the tribunal dismissed Italy's allegations in this regard, there seems to be a grey area vis-a-vis UNCLOS. I have the impression (shared by many like Byron Sequiera of the Daily Guardian) that such grey areas can turn into opportunistic green areas in international litigations or arbitrations, and no opportunity should be missed in plugging the loopholes. A positive fallout of this case is the recent insistence on following colour code for all fishing vessels.

<sup>23</sup>The Enrica Lexie incident has thrown open a unique chance to examine the legislative vulnerability of tropical fishing nations - where fishing is dominated by vessels under 20 m length - vis-a-vis human rights issues at sea.

<sup>24</sup>In an Actor-Network Theory (ANT) perspective. Thank You Latour. Engagement with the legal/legislative realm is unique to marine fisheries innovation system, unlike in agriculture.

<sup>25</sup>Echoing the sentiments of Vivek Katju (6 July 2020, The Hindu). Without eliminating the probable abuse of the immunity argument - likely to be quoted as a precedent - no discourse on human rights violations in the seascape will be meaningful.





# **RESPONSE OF EAS TO COVID-19**

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## COVID-19: WHAT CAN EAS DO TO SUPPORT INDIAN FARMERS?

As a community of people closely associated with farming and farmers, Extension and Advisory Services (EAS) have to support farmers to deal with the present crisis. Are we effectively fulfilling this responsibility? In this blog, **Mahesh Chander** examines how EAS providers can support farmers to deal with these challenging times.

We are passing through difficult times due to an unprecedented crisis situation caused by [Coronavirus disease \(COVID-19\) pandemic](#). Many countries across the world, including India, are under lockdown and have issued health advisories asking people to remain indoor and not venture out. This has been disrupting. Farming activities in India are adversely affected due to disruptions in the input and output value chains (Box 1). Farmers engaged in all sectors (food grains, vegetables, fruits, milk and poultry) are affected as they are finding it difficult to harvest and transport their produce.

### Box 1: Covid -19 and Impact on Indian Agriculture: Reports from Newspapers

- COVID-19 will have major economic implications for rural India
- Farmers may not be infected but are certainly affected
- Lockdown: After Karnataka farmers dump produce; govt decides to direct it towards needy
- Covid-19 rumours hurt India's poultry industry
- Dairy sector lets 1.2 cr litres of milk go down the drain daily
- Nashik's grapes rot as exports to EU and local sales grind to halt
- Coronavirus Lockdown Having an Adverse effect on Agriculture Sector in India
- COVID 19: Punjab's rural economy takes a big hit
- Lockdown: Fishing community in deep waters

### EAS AND COVID 19

The Extension and Advisory Services (EAS) are expected to be closely associated with farmers for purposeful and effective sharing of information. Citizens in general trust Extension as a credible source of locally relevant information and appreciate Extension's effective connections with other organizations. Currently, when farmers and other agri-value chain actors face unprecedented challenges, the proactive role of EAS can not only enhance its prestige, but it can also build trust in

the farming community. It is also our moral responsibility. The major strengths of EAS lie in its dedicated staff, methods and good practices in dealing with farmers and other stakeholders for agricultural development and farmer empowerment.

### **Extension's response to COVID-19**

India has a pluralistic extension system. The Departments of Agriculture at the state/ UT level have the most number of staff for EAS on the ground (district, block level and below). Staff at the state level are supported by the National Ministry of Agriculture and Farmers' Welfare and the Indian Council of Agricultural Research (ICAR). Both organizations are trying to intervene in this situation and have issued advisories to farmers on dealing with current challenges. For instance, the Ministry of Home Affairs (MHA) vide its order no 40-3/2020-D dated 24 March, 2020, issued guidelines to various ministries (Central/State including Union Territories) for containment of COVID-19 epidemic in the country. The Ministry of Home Affairs further issued an addendum to the guidelines on 27 March, 2020. Besides restrictions on public movement, these guidelines have made exceptions in the interest of farmers to include delivery of food items, operations of cold storage and warehouses, etc.

Following the MHA order, the Agricultural Extension Division of ICAR has developed Guidelines for farmers and farming sector during lockdown period due to COVID-19. These guidelines indicate that many activities concerned with farmers and farming are considered essential and thus, exempted from restrictions during the lockdown. These include:

- Veterinary hospitals,
- Agencies engaged in procurement of agriculture products, including MSP operations,
- 'Mandis' operated by the Agriculture Produce Market Committee or as notified by the State Government,
- Farming operations by farmers and farm workers in the field,
- Custom hiring centres (CHC) related to farm machinery,
- Manufacturing and packaging units of fertilizers, pesticides and seeds, and
- Intra and inter-state movement of harvesting and sowing related machines like

combined harvesters and other agriculture/ horticulture implements.

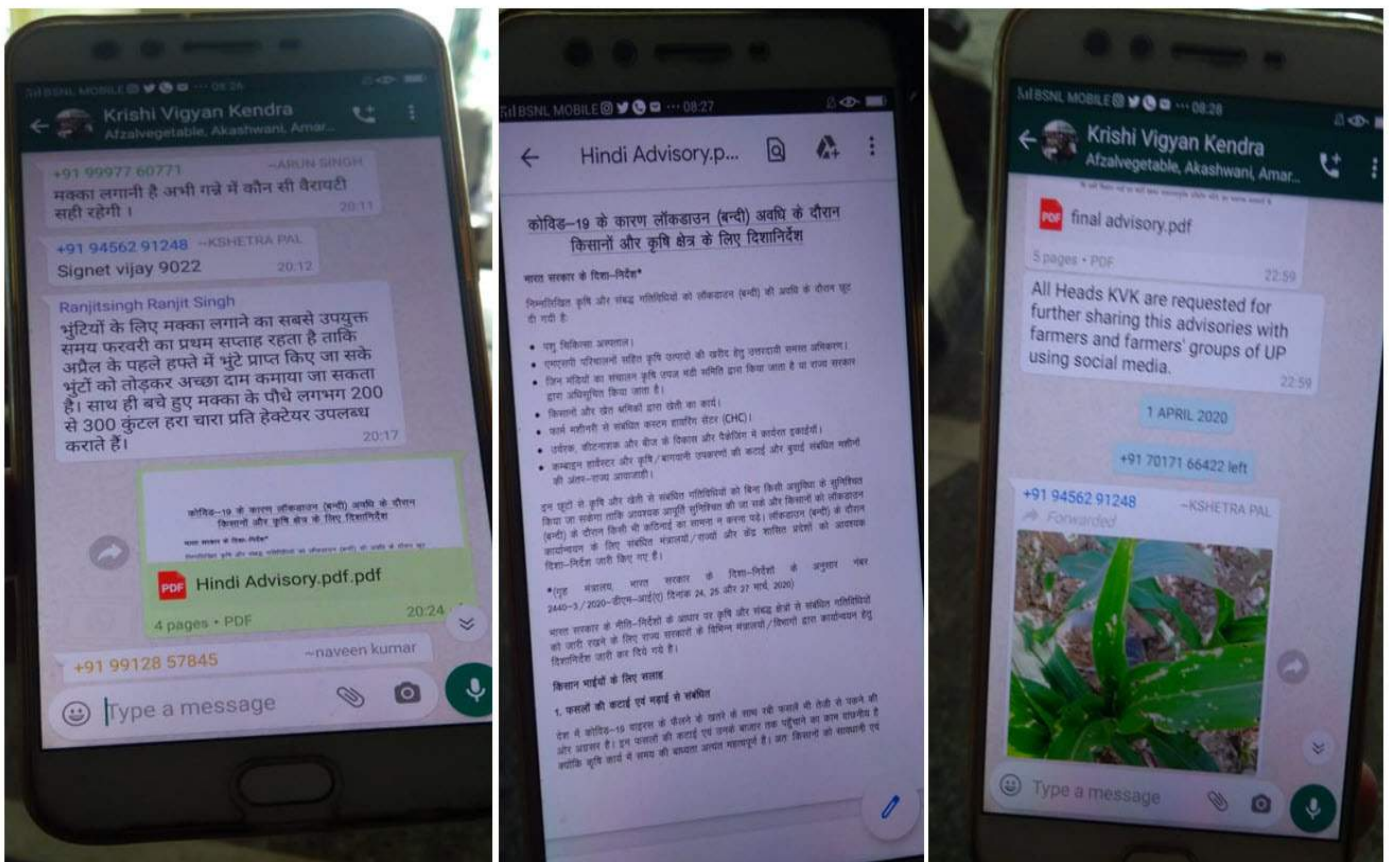
These exemptions are likely to facilitate unhindered activities related to agriculture to ensure essential supplies and farmers do not face difficulties during the lockdown. Necessary directions to concerned ministries/department of States and UTs have been issued for implementation during lockdown. Additionally, advisories have been given in the same circular about harvesting and threshing of crops, post-harvest, storage and marketing of farm produce in addition to those about standing field crops.

Farmers have been advised and are expected to follow precautions and safety measures to prevent the disease's spread. Simple measures include social distancing, maintaining personal hygiene by handwashing with soap, wearing of face mask, protective clothing and cleaning of implements and machinery. The EAS can spread awareness about these guidelines using their contacts with farmers via channels like WhatsApp or other suitable mechanisms. Many Krishi Vigyan Kendras (KVK) operate WhatsApp groups connecting several farmers groups for intergroup information sharing.

These advisories need to be disseminated among the farming community rapidly and if possible, in local languages. As soon as these advisories were posted on ICAR's website, I circulated these in several of my networks, mostly WhatsApp groups, for further sharing. In the WhatsApp group, 'ICAR Extension Research-2020', Dr A K Singh, DDG (Agricultural Extension) appealed, "These advisories may be shared with farmers and other workers to bring awareness". His appeal was positively responded to by many ICAR Extension scientists, with some of them making available translations in regional languages. Likewise, the ATARIs and KVKs across the country are expected to spread these advisories and help farmers by providing guidance on farming matters in the prevailing circumstances. If we, as extension service providers, do our job well, farmers will develop confidence in us. So COVID-19 is an opportunity in disguise to develop our skills and preparedness to handle such exigencies. Though EAS has supported farmers during natural disasters (Box 2), COVID-19 is a totally different disaster. Not many have experienced such a pandemic in their lifetime.

## Box 2. EAS and Natural Disasters

On 4 January last year, I published a blog for AESA entitled, 'Natural Disasters and Extension & Advisory Services (EAS): Lessons for Better Preparedness'. In this blog, I discussed what and how EAS can contribute to disaster reduction, adaptation and mitigation during different phases of natural disasters viz. before, during and after. This blog gives some idea about how EAS professionals can play meaningful roles in times of natural calamities. The ICAR-IVRI organized animal health cum awareness camps in Odisha in the aftermath of cyclone Phani. The IVRI team led by me assessed the situation and addressed various challenges and problems faced by farmers. The farmers were apprised about steps to be taken, including dos & don'ts, for restoring animal health as early as possible. I also shared this field experience through Facebook posts for wider awareness. Besides IVRI, many other ICAR institutes and several NGOs played a crucial role in providing relief and rehabilitation for recovery from Phani's impact. Many institutions worldwide are now better prepared to cope with common natural disasters by drawing lessons from varied experiences over the years.



World over, the experience of handling the present situation is very limited. It is truly unprecedented, so we need to be innovative and creative to come out with ideas towards solving the crisis. Some of the state Departments of Agriculture are now currently trying to help farmers to deal with the situation.

For instance, the Department of Agriculture, Punjab, is working on a strategy to ensure that social distancing is followed during the procurement of food grains. The middlemen and related government departments are being taken on board to decongest mandis and ensure that close human interactions are

avoided. In Haryana, preparations are being made to delay wheat procurement to 20 April and the state has prepared a staggered procurement schedule to make crop arrival steady and cut gluts in mandis. Haryana has requested the Centre to approve higher Minimum Support Price (MSP) for farmers who delay the arrival of their produce of wheat. In a letter to the Centre, the state said staggered arrival would allow smooth procurement and help contain spread of the disease as well. The EAS functionaries can help farmers in direct marketing of their produce to consumers by developing producer-consumer alliance. We can promote startups that can take up

various roles along the value chains. For instance, some startups are supplying farm fresh fruits and vegetables to consumers by linking farmers and consumers. Also, many initiatives are being taken by farmers to help themselves. For instance, small farmers in Maharashtra are joining hands to take vegetables and fruits to the doorsteps of housing societies as big markets and Agricultural Produce Market Committees (APMCs) are not fully functional because of lockdown. In many places, the district administration is connecting farmers' groups to housing complexes. As a result, profits earned are directly accruing to cultivators instead of getting divided among middlemen and wholesale dealers while consumers are getting a better deal. In Meghalaya, the

Department of Agriculture & Farmers' Welfare, Government of Meghalaya (India) is using ICT solutions to support farmers who are facing marketing issues resulting from the lockdown imposed due to COVID-19 Pandemic. EAS in South Asian countries need to enhance their capacities to deal with disasters, something similar to what Extension Disaster Education Network (EDEN) is doing in the USA (Box 3).

Can we create something like EDEN in South Asia? If yes, who will take the lead? We know creating something is easier than maintaining it, which calls for dedication and commitment. We should also share our experiences with the GFRAS and AESA through the dedicated pages created on their websites.

### Box 3. Strengthening EAS capacities to better respond to disasters

The Extension Disaster Education Network (EDEN) serves as a disaster-related resource portal for extension personnel to share with their clientele to help the latter prepare for, stay safe during, and recover from disasters. Several disaster-related educational programs are available through EDEN. Currently, it is a hub of extension resources related to the COVID-19 situation.

Global Forum for Rural Advisory Services (GFRAS) has created a dedicated section on its website to collect tips and best practices; to better address the problems created by COVID-19. This section is divided into three categories:

1. Technical information on how to promote and move towards e-extension;
2. Initiatives and recommendations around the globe on how to keep agricultural production functioning and delivering during the lockdown. This initiative is called 'When no global, go local - how to ensure food security during the COVID-19 pandemic by reinventing value chains';
3. Practical information for extensionists, rural service providers and farmers on how to protect themselves while carrying out their job.

The Agricultural Extension in South Asia (AESA) too has created a new section on COVID-19 and EAS to:

- a. discuss how EAS can support farmers in dealing with the impact of COVID-19,
- b. share good practices from EAS, primarily from South Asian countries and
- c. promote tools and frameworks to help EAS better address these challenges.

This gives an opportunity to everyone concerned to share their experiences on:

- a. nature of the challenge including location and the type of farmers
- b. specific interventions including the organisation behind the initiative
- c. how these interventions are being implemented and
- d. what impact of interventions is being witnessing currently.

The Farmers Producer Companies (FPCs) are selling fruit and vegetable baskets in line with the demand from individual consumers or housing societies. The EAS can make efforts to expedite formation of FPOs. Already, the KVKs have been given target to promote and organize FPOs in every district. Shri Kailash Choudhary, Union Minister of State for Agriculture & Farmers' Welfare, while inaugurating the one-day Review Workshop of Krishi Vigyan Kendras emphasized KVKs' role in technical backstopping of Farmer Producer

Organizations (FPOs) and helping in marketing of agricultural produce. Shri Roul, the then Secretary, ICAR, said FPOs can reduce the input cost, give farmers more stake in marketing and value chain. Organizing FPOs is not a simple task; not many KVKs are successful in doing it. Yet, there are success stories of KVKs collaborating with FPCs. MANAGE has documented issues, challenges and successful FPCs across the country. EAS providers can draw lessons from such documents to speed up FPC formation.

The need for linking farmers to the market is being strongly felt, suggests recent extension literature. To meet this emerging demand, farm universities and KVKs can launch online initiatives to directly link farmers with consumers. Agricultural experts of KVKs may be immediately involved by the government in launching such marketing initiatives so that farmers can find solutions within their districts. Farmers may be allowed to directly sell to consumers at local and district levels by making available places for organizing farmer markets.

As rabi harvesting is likely to pick up in the coming days, the ICAR asked farmers on 28 March, 2020, to follow social distancing and safety precautions while handling farm machines and working in the fields. For tackling emerging issues related to managing crops, livestock and fisheries, farmers should consult and be in touch with agri-scientists in KVKs, ICAR research institutes and state agricultural universities for timely advisories, Dr Trilochan Mohapatra, Secretary, DARE and Director General, ICAR, said.



## LESSONS FOR THE FUTURE

Only a few possible ideas and actions have been discussed here. There could be several other initiatives which EAS can undertake to minimize the suffering of farming communities. COVID-19 like situations demand more online services. Extension functionaries should have the knowledge and skills in social media and its uses, including the current tools, methods and models for crisis communication. Extensionists need to be equipped to use Facebook, WhatsApp, Twitter, YouTube, etc. They need to learn and master skills to disseminate information and monitor, track, measure, and analyse social media traffic. Besides, skills in mobilizing farmers and facilitating interaction are very much needed to secure coordination of different agencies to broker gains for farmers.

In recent times, WhatsApp has become very popular among farmers to share information on farming practices, which could be even more useful during COVID-19 like situations. But social media channels, especially WhatsApp, can be harmful too, due to spread of fake, misleading information and rumours. Poultry farmers are currently suffering huge losses due to fake information circulated via WhatsApp forwards that linked consumption of eggs and poultry to corona virus infection.

Every crisis gives an opportunity to learn and do better. So is the case with COVID-19. Hope we will be able to better serve the farming community now and in the coming days.

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## MITIGATING IMPACT OF COVID-19 ON FOOD AND AGRICULTURE IN BANGLADESH

Extension and Advisory Services should now support farmers by providing market information, organising inputs and provide other services to help them cope with restriction arising out of country-wide lockdown. But in the long run, the Ministry of Agriculture and the Department of Agricultural Extension should invest wisely to promote diversification that can potentially reduce financial vulnerabilities of small farmers and enhance more resilience to shocks similar to Covid-19, argues **Ranjan Roy**.

The coronavirus disease (COVID-19) continues to wreak havoc in many countries. It has become one of the biggest threats to the global economy and financial markets. The World Bank says the COVID-19 pandemic might take a heavy toll on Asia's economy; in the worst-case scenario, the region could face the sharpest downturn since 1997-1998 currency crises. The Organisation for Economic Co-operation and Development (OECD) in its Interim Economic Outlook predicts the impact of the COVID-19 outbreak on China and the rest of the world's economy to be extremely severe. The UN warns that COVID-19 measures could cause a global food shortage.

Nation-wide lockdowns are being imposed by several countries. This strategy puts in place a plethora of COVID-19 protecting measures (such as border closures, restrictions of movement, closure of restaurants, and community quarantines) resulting in restricted access to sufficient/diverse and nutritious sources of food. Restrictions significantly affect agricultural production, food supply and demand. Protectionist policies and a shortage of workers could see problems start within weeks, FAO shows.

### COVID-19 IN BANGLADESH

On March 8, the Institute of Epidemiology, Disease Control and Research (IEDCR), reported the first COVID-19 case in the country. As on April 5, 2020, Bangladesh reported 88 confirmed cases of COVID-19. Among these, there have been nine deaths. In a bid to contain the spread of coronavirus, the government extended the ongoing shutdown until April 11. Agriculture products, fertiliser, insecticides, foods, goods, medical equipment, daily essentials, kitchen markets, restaurants, drug stores, and hospitals remain out of the purview of the shutdown. Public transportation and banking services are limited. Bangladesh Bank, the country's central bank, issued necessary directives



to keep banks open on a limited scale during the shutdown.

The government of Bangladesh has advised everyone to stay home during this period. The army has taken stern actions from April 2 against violations of the government's directive on maintaining social distancing and home-quarantine. It is being reported that people in many places are not complying with the directives. There is movement, mainly for securing livelihoods. Prime Minister Sheikh Hasina has been directing authorities to provide food aid to daily wage earners. The Ministry of Disaster Management and Relief reports that food support is being provided to farm laborers and other beneficiaries. The government of Bangladesh announced Tk. 5,000 crore (\$5.9 million) stimulus package to help export-oriented industries to counter the economic impact of COVID-19.



## IMPACT ON AGRICULTURE

The COVID-19 impact on agriculture is substantial, although it is still unfolding. Initially, the country's fish and dairy producers bore its brunt. For instance, farmers involved with crab, shrimp, and fish production face several export bans resulting in significant economic loss. Bangladesh's exports make up more than 70 percent of the crabs in the Chinese market. An export ban in China means a significant loss for the Bangladeshi crab industry.

There are unofficial estimates that the current market price of milk is down 40% compared to January's price. COVID-19 could have a catastrophic impact on the dairy sector in the country, according to a leading industry group. Prices for vegetables, paddy, cattle and other farm goods are also falling. Small-scale farmers are vulnerable to the impacts of COVID-19 as they might be hindered from working on their

land or accessing markets to sell their produce, buy seeds and other inputs. A leading think tank mentions that the pandemic is adversely impacting segments of agriculture as the demand for food has dramatically increased, while orders and events are getting canceled.

As of now, disruptions are minimal as food supply has been adequate and markets have been stable. Experts opine that close of transport routes, restrictions and quarantine measures, shortage of labor and spikes in product prices are obstructive for fresh food supply chains and might also result in increased levels of food loss and waste. The people in Bangladesh are wasting about 5.5% of the total procured food, a study says. These obstructions are likely to impede farmers' access to markets, curbing their productive capacities and hindering them from selling their produce. Shortage of labor could disrupt the production and processing of food, notably for labor-intensive crops.

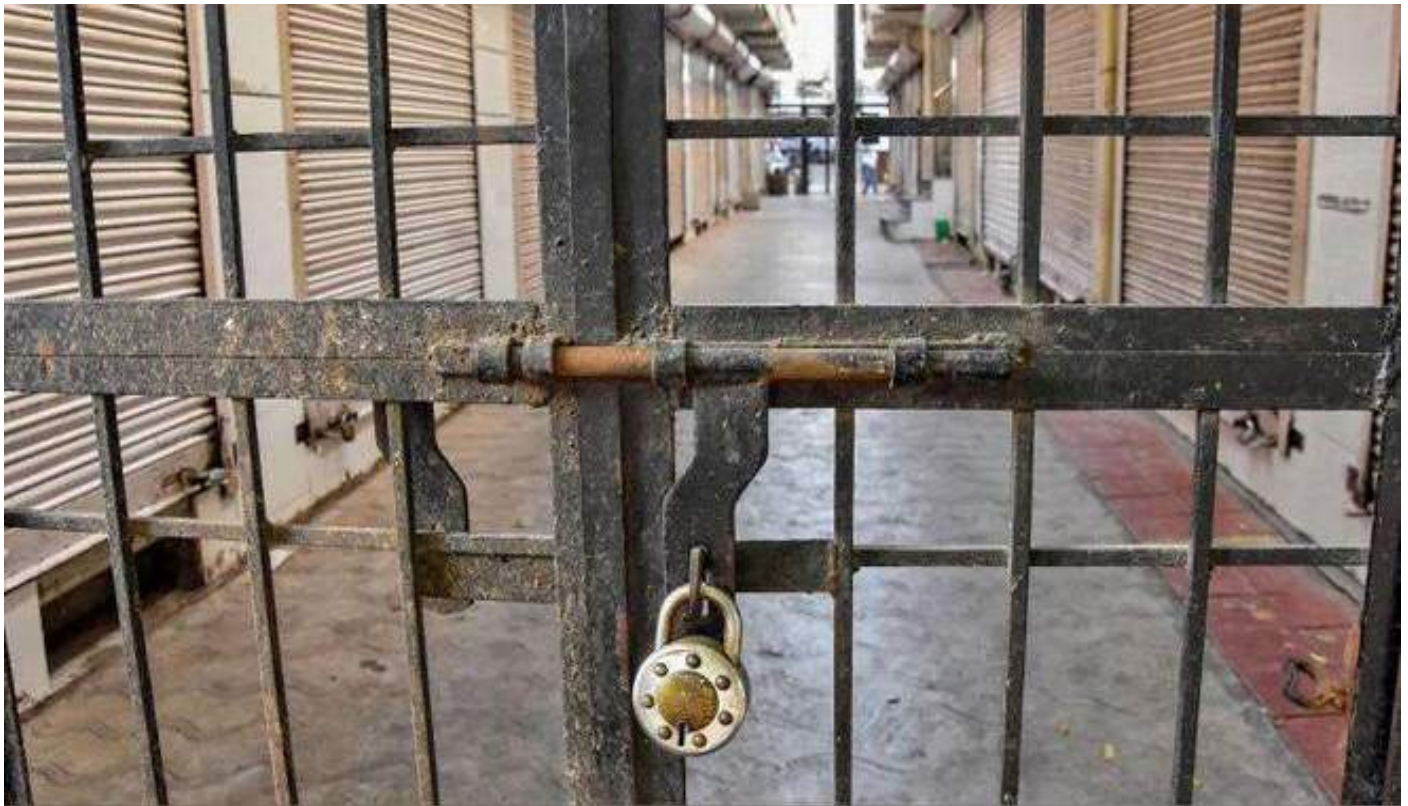
Panic related to food and agriculture is an additional concern. Panic-buying disrupts food distribution. As COVID-19 spreads, staples are stockpiled, leaving markets empty. Evidence indicates that quarantines and panic-buying during the Ebola Virus Disease outbreak in Sierra Leone (2014-2016), for example, led to a spike in hunger and malnutrition.

COVID-19 could affect food demand in various ways. Usually, when reduced income and uncertainty make people spend less and result in shrinking demand the sales decline. So does production. In the period of lockdown, people visit food markets less often, affecting their food choices (buying more cereal crops) and consumption, i.e., a rise in eating at home. Food demand is linked to income. Hence, poor people's loss of earnings could impact consumption.

Agricultural production and trade are likely affected by many policy measures (e.g., implementing higher controls on cargo vessels) aimed at avoiding further spread of COVID-19. Production could be hampered due to restrictions of free movement of people as well as a shortage of seasonal workers. These barriers ultimately affect market prices. Agricultural trade restrictions hinder trade and

mobility of commodities, including food, feed, and input supplies. Suspending nation-wide transportation might affect agricultural and food trade. The slowdown in fertilizer, fuel and other input movement, and their reduced availability, is already a growing concern for the upcoming

season. Studies show that trade barriers will create extreme volatility. The UN's food body warns, "Protectionist measures by national governments during the coronavirus crisis could provoke food shortages around the world." season.



## RESPONDING TO COVID-19 IMPACT ON AGRICULTURE

The coronavirus pandemic is causing significant economic slowdowns (when economic activity is growing at a slower pace) and downturns (when there is no growth, but only a period of decline in economic activity), which are associated with rising hunger levels as FAO reports. Bangladesh government must adopt useful measures to mitigate the food and agriculture crisis.

First, meeting the immediate demand (e.g., food needs) of profoundly affected people. Emergency food needs can be ensured by distributing food to the most vulnerable families and improving communication about access points for food deliveries, distribution times and measures to reduce the risks. The Department of Agricultural Extension (DAE) and allied organisations must take initiatives like observation and monitoring for smooth agricultural production by providing market information, inputs and other services. The DAE, NGOs and private organisations (input

dealers) have to play a crucial role in promoting public health—the science and art of preventing disease. Lessons have to be taught about biosecurity measures such as handwashing, wearing masks, staying home if sick and maintaining social distancing.

Second, boosting social protection programs to protect incomes and purchasing power. The government has already introduced some protective measures to combat the impacts of the pandemic on people's livelihoods. The agricultural extension and advisory services might advocate for conditional or unconditional cash transfers, public works programmes that help reduce unemployment or policies aimed at stabilizing food prices, and protecting incomes from damaging out-of-pocket healthcare costs by ensuring coverage of essential health services. Using the DAE and NGOs networks, the central bank could inject funds in the agricultural sector through a grant facility, which might help agro-based micro, small & medium enterprises (SMEs), casual laborers and salaried staffs.

Third, relief from trade restrictions to keep food, feed and input supplies. Active measures (such as providing subsidies for food consumers and reducing import tariffs) are required. The government could temporarily reduce VAT and other taxes, review taxation policy to imported goods to compensate for potential cost increases, and assess exchange devaluation's potential impacts. The DAE says we essentially need monitoring and care to avoid accidentally tightening food-supply conditions. In this regard, extension personnel and digital technologies have a role to play in anticipating problems and managing temporary shortages.

And fourth, resolving logistics bottlenecks and efforts to slow the spread of the virus. The government requires stimulus and safety-net measures (like health screening before leaving the factory) to reduce impacts on farm product delivery, pickup workers and processors. The Ministry of Agriculture (MoA), DAE and Bangladesh Agricultural Development Corporation (BADC) must implement measures for mitigating impacts incurred by the slowdown in agricultural inputs movement and availability.



## WHAT MORE NEEDS TO BE DONE AND HOW?

As a global crisis, the COVID-19 pandemic demands a coordinated response. The DAE, as a flagship organisation in Bangladesh engaged in agricultural policy development and technology dissemination can perform other major roles to mitigate COVID-19 impacts on food and agriculture. These include:

- Conducting participatory COVID-19 impact assessments to map the pandemic's effects on people's food security and livelihoods, derive proactive measures and to

determine what assistance the Bangladesh government requires from development partners such as FAO, IFAD etc.

- Highlighting critical gaps in (district/ regional) agricultural emergency preparedness. Developing (district/ regional) an agricultural contingency plan would be vital to take action when faced with upcoming economic slowdowns and downturns in a timely and effective way.
- Diversifying and enhancing agricultural production to combat the current and imminent crises in this country as well as to contribute to achieving global food security.
- Building resilient agriculture is essential. Lack of comprehensive agricultural planning and preparation for the outbreak has starkly demonstrated the importance of resilience—the ability for human systems to anticipate, cope and adapt.
- Inculcating lessons from the COVID-19 pandemic – this pandemic is a stark warning of what can happen when we fail to prepare for climate crisis. In the context of prevailing climate emergency, the impacts of COVID-19 re-teach us that an ounce of prevention (e.g. initiatives for reducing GHGs) is worth a pound of cure, i.e. avoiding climate catastrophe.

## CONCLUSIONS

The COVID-19 challenge seems unprecedented, but the governments and its agencies, in particular the agricultural extension services, can and should adopt proactive measures both to contain the spread of the disease and to safeguard the economy. In the short term, the DAE and other organisations must meet the farming community's demands, support them in increasing their income, ease food-supply conditions and take other measures to counteract economic adversity. In the longer term, the Ministry of Agriculture (MoA) and the DAE have to invest wisely to diversify the agrarian economy from commodity dependence, which reduces financial vulnerabilities and builds capacity to withstand and recover following economic turmoil.

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## COMBATING COVID-19 AND ITS IMPACT ON AGRICULTURE IN KERALA: SIGNIFICANCE OF GOVERNMENT SUPPORT AND COMMUNITY ACTION

Kerala's experience with mitigating the impact of COVID-19 reveals the importance of State support, community action, and effective governance focusing on equity. In this blog, **Jiju P Alex** illustrates the role of the State in addressing the challenges of COVID-19 and discusses the role of Extension and Advisory Services in supporting farmers to tide over this crisis.

Many a time, crises open up unforeseen opportunities for evolving and testing alternatives. The Covid-19 pandemic is such a historical event, which is, incidentally, trying the mettle of our systems, organisations and even the collective wisdom of humankind as a whole. The ways by which countries struggle to contain the disease and its impact on its people are going to be test cases of historic importance, that will go on to help us design strategies to establish enduring and resilient communities. Though it is definite that every segment of the economy would be affected, the rural and urban poor and peasants would be affected most severely.

Covid-19 has had tremendous impact on farmers in scheduling harvest, procurement, transportation and marketing, initially. However, conditions were relaxed later to facilitate a hassle-free harvest and transportation. Lack of labourers for these operations has been reported from across India, particularly from places where manual harvesting is predominant. In Kerala State (India), extension support to farmers has been reoriented to deal with the unprecedented situation carefully even as agricultural operations are being undertaken minimally. One pertinent lesson from the experience of Kerala is the need to strengthen public sector institutions with more resources and professional capabilities to serve the people better, and along with that a greater thrust on equity in providing basic services to all citizens.

### COMBATING COVID-19 IN KERALA: PRECAUTIONS AND ACTIONS

#### **Breaking the chain of infection**

Kerala is the first State in India to report the presence of Covid-19 when a few students who returned from Wuhan province in China was diagnosed with the disease. Firmly grounded on the experiences of handling the deadly Nipah virus attack during 2018,

the medical contingent of the State could track every one of them, quarantine them well in time, and treat them successfully in a span of two to three weeks. However, the disease which had spread across the world in the mean time again entered the State through non-resident Keralites who had returned from Europe and the Middle East. In spite of the remarkable caution exercised by the State machinery, some of them disobeyed the instructions to remain isolated, and went around and spread the disease in some pockets of Kerala State. This issue was resolved by an innovative method – of publishing the route map of the infected persons in media – so that the general public who might have come into contact with them either directly or indirectly would be alerted and report it to the health centres. The system also meant to track all possible contacts of the infected persons in the course of their travel. There has also been a huge mobilisation of volunteers, neighbourhood groups, and service personnel to help identify suspected cases and keep them in quarantine.

A community kitchen at Trivandrum crore for families with financial difficulties, and INR 1,320 crore for paying two months' pensions in advance. The result of this package began to show up immediately – with free provision of food grains, pulses and sugar to all households; multiple community kitchens in all the 941 Grama Panchayats of the State to feed the poor and destitute; and creation of an army of temporarily recruited volunteers, namely a Rapid Response Team at the local level to monitor people under quarantine and provide them with essential commodities and medicines at their door steps. Along with this a large network of Asha workers, Anganwadi workers and Kudumbasree members were also deployed to facilitate this mission. A big contingent of 626 medical councillors have also been deployed along with 24X7 Disha call centres – a tele counselling service to counsel quarantined families on responsible behaviour and to improve their mental health.

Foreseeing a growing demand for medical supplies at a time of crisis, a team of officials were entrusted to procure the necessary medical supplies, such as masks, sanitizers and personal protection equipment gear. Along with volunteer organizations and companies, even prisoners in certain districts were trained and engaged to produce masks and sanitizers, clearly showing enormous community participation. The Kerala Government also launched a mobile application, called GoK Direct, for users to get information and updates on Covid-19. This initiative from the Kerala Startup Mission and the Information & Public Relations Department has been a huge success in disseminating information and alerts in real time without internet. Earlier, under the 'Break the Chain' campaign, the government had installed water taps along with hand sanitizers at public places prompting people to follow hygienic practices. There is also extensive gathering of information on suspected and quarantined cases on a daily basis to find out whether they are doing well and whether they require any support, counselling, or other material.

People of the State are apprised of the status of Covid infection and the slew of mitigation measures adopted by the State Government



People waiting to buy vegetables while maintaining social distance at Trivandrum

### Mitigating the impact of lockdown

Kerala had declared lockdown from 23rd March 2020 with severe restrictions on movement and social gathering of people. With declaration of the lockdown, the State also declared a revival package of INR 20,000 crore to be distributed through various welfare schemes, and initiated a slew of mitigation measures. The package includes INR 500 crore to strengthen the healthcare sector during this crisis, INR 2,000 crore for loans and free rations, INR 2,000 crore for creating jobs in rural areas, INR 1,000

every day through detailed press meets by the Chief Minister. This has effectively prevented fake campaigns and irresponsible misinformation. While a task force of doctors, civil servants, technocrats and other experts monitor the containment activities closely, such mechanisms work at the district level as well as at the Gram Panchayat level. This vigilant monitoring system is centred around the large network of around 6691 health institutions in the public sector, which includes 568 well-equipped Primary Health Centres at the village level and around 104 referral hospitals at the block and district levels. Preparations for accommodating suspects under isolation in case of severe community spread has been made by renovating defunct hospitals and identifying vacant hostels and guest houses.



**A community kitchen at Trivandrum**

## **EXTENSION SUPPORT TO MITIGATE IMPACT OF COVID-19 LOCKDOWN**

Farmers in the country, including those in Kerala, have suffered considerable distress on account of disruptions in harvest, procurement and marketing caused by the lockdown. However, the decision of the State and Central governments to permit movement of vehicles and harvesters for farm-related operations by observing adequate social distancing measures have eased these concerns to a great extent.

The Department of Agriculture and associated agencies, such as the Vegetables and Fruit Promotion Council (VFPC) and HortiCorp, have made extensive arrangements to procure vegetables and fruits from village level Eco Shops and existing cluster markets. The Department of Agriculture has operationalised 302 markets across the State and VFPC has activated 50 markets.

Later, producers were linked to online home delivery agencies – Bigkart and Swiggy – to distribute fruits and vegetables to customers in cities and suburban centres. One instance shows how market glut of pineapple is being addressed through a slew of innovative measures, such as Pineapple Challenge for urban households, which exhort buying of pineapple to help farmers, for which delivery is arranged by volunteers and agencies.

Early harvest of mangoes by the farmers of the mango growing tract in Palakkad district was facilitated by employing transportation to major outlets. Transportation of fruits to other States which was hindered by a neighbouring State was rechannelled through the RO-RO (Roll on Roll off) facility of the Southern Railways.

Snap melon, a particular melon variety which is mostly consumed as juice in Thrissur district of the State, which could not be sold out by farmers due to the lockdown is being procured and distributed among residential colonies and flats at attractive prices. This is done by engaging the volunteers and marketing personnel of the Department of Agriculture through WhatsApp communication among producers groups and department officials. Daily transactions through this network comes to an average of 2-3 tonnes.

Being a consumer State which depends on other States for about 80 per cent of food grains, 60 per cent of vegetables, and almost the entire amount of pulses required annually, Kerala has been desperately trying to expand its area under agriculture. The State has been emphasising the need to accomplish as much food self-sufficiency as possible by growing vegetables domestically.

The Covid-19 lockdown has paved the way towards creating awareness on the importance of small-scale farming, urban agriculture and nutri-farming in homesteads among a large population who had not considered these options so far. The Chief Minister's request to devote free time during the lockdown to attempt small scale agriculture in homesteads and available spaces, received substantial response from across the State. Taking advantage of this opportunity, the Department

of Agriculture declared its new scheme to distribute 50 lakh vegetable seed packets to households in all the Grama Panchayats across the State through the volunteers of the Rapid Response Team.

Seeds have been procured on a war footing from the farms of the Agriculture Department and other agencies, KVKs, and research centres of the State's Agricultural University Information support required by the new farming enthusiasts is provided through 60 spot videos that explain the production techniques of major vegetables in the State, which is accessed from the web sites of Kerala Agricultural University ([www.kau.in](http://www.kau.in)), Farm Information Bureau, and the FB page of the Directorate of Extension of Kerala Agricultural University.

Bolstering these initiatives, a State wide helpline network with 30 helpline numbers has also been made functional to answer queries and provide advisories on cultivation of vegetables, homestead farming, hydroponics, aquaponics, terrace cultivation and vertical farming, during the lockdown period. The helplines manned by the scientists of KVKs and research stations of the agricultural university are able to address around 1500 questions per day on almost

everything about small scale agriculture from 7am till 7pm every day. The mobile app on cultivation practices of crops in Kerala is also extensively used by people. The new lease of interest created among the general public can be sustained even after the lockdown period, if the channels of communication work promptly.

### Emerging Challenges

Though these efforts are laudable, these interventions are not adequate to address the issues that are emerging from every nook and corner of the State. As days go by, serious problems which require massive interventions are reported by farmers. Severe shortage of labourers for harvesting operations in paddy and vegetables, and planting of tubers are widely reported. As transportation of harvesters from neighbouring States has been blocked, harvesting will be delayed inordinately. Lower demand for produce has really hit the sector as the floating population in urban centres have receded and food outlets have been closed down. Price fluctuation is also reported widely. There is a likely surge in market glut for many of the products in the coming week as harvesting of vegetables are delayed as much as possible by farmers.



Distribution of vegetable seedlings at Malappuram and Thrissur

### CONCLUSIONS

As stated earlier, Covid-19 is an unprecedented phenomenon that has affected all of humanity. However, it has also tested our resilience and the need to look at our systems more critically. In this process, it has also shed light on the inadequacies of our extension delivery systems and how best it could be made responsive to exigent conditions. Covid-19 has advocated the need to invest much more in the social

security sector by governments so as to provide the poor and less endowed with necessary health care and livelihood security. The Kerala experience in dealing with the pandemic and the lockdown has also vindicated its decade-old decision to share financial resources equitably by investing more in education, health, social capital mobilisation, democratic decentralisation, etc. In fact, these interventions have started paying off effectively in building awareness, providing basic necessities, and

deploying human and financial resources at the grassroots level during such crises.

However, there are no reasons to be complacent about other sectors as they are proving to be more vulnerable to such unforeseen disasters. For instance, the fact of the State's excessive dependence on migrant labourers will emerge as a serious issue in the post-Covid phase. There will be severe scarcity of human resources to assist agricultural operations, construction, and hospitality sectors. Inadequate agricultural production is going to be another cause of worry as the State has to depend on external sources for most of its food needs. This will force the State to focus on enhancement of domestic production for nutritional security. Intensification of agriculture in homesteads with due focus on poultry and fisheries will be another offshoot of this crisis. Establishing systems of value chain management to reach out to all categories

of people will be another challenge. In this process, new linkages will have to be devised to make the network of cooperatives and private entrepreneurs work in tandem. Resumption of full-fledged farming operations and revival of agri-based enterprises is going to be another immediate priority. If the current measures that have been drawn up in the context of this pandemic are formalised and followed up, a more effective delivery system may evolve.

Extension Advisory Services in the State will have to draw lessons from this disastrous phase and reorient itself to serve a much larger clientele. This will also open up important propositions for extensionists to ponder upon after the pandemic recedes, particularly on the impact of a pandemic-led lockdown on agriculture and how to manage it skilfully. Certainly these experiences are going to change the course of our road map towards building resilient communities.



**Distribution of millets grains to tribal communities in Palakkad**



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## UNSHACKLING FARMER PRODUCER ORGANISATIONS FROM THE COVID – 19 LOCKDOWN

If empowered, Farmer Producer Organisations (FPOs) can address market disruptions in the wake of pandemics like COVID-19. In this blog, **Vinayak Nikam and Rajiv Kale** examine the roles played by different FPOs in dealing with the challenges.

The COVID-19 crisis in India has left unharvested farm produce to rot in farmers' fields, collapsed supply chains and disturbed the transport network. In times of lockdown, farmers are finding it difficult to sell farm produce sans buyers, while urban consumers are either facing scarcity or are forced to pay a high rate for farm goods. Governments are looking towards Farmers Producer Organisations (FPOs) to be a link between producers and consumers by aggregating the produce of member farmers, collectively transporting them for sale in urban establishments.

### Box 1: Farmer Producer Organisations (FPOs) in India

In India, NABARD (2015) defined Farmer Producer Organizations as one type of producer organization (the legal entity formed by primary producers viz. farmers, fishermen, weavers etc.) where the members are farmers. In India, FPOs can be registered under the Cooperative Society Act or Indian Companies Act or Indian Trust Act. There are about 7,000 FPOs registered in the country (Neti et al. 2019) of which around 30 per cent are operating viably while 20 per cent are struggling to survive and the remaining 50 percent are still in early phases of mobilisation, equity collection and business planning (Business standard, February 29, 2020). Government of India has set a target to form 10,000 new FPOs in the next five years with a funding arrangement of Rs. 6,868 crore. The cluster of 'one district one product' would be created while each FPO will get Rs. 15 Lakh. Three organizations, viz. Small Farmers' Agri-Business Consortium (SFAC), National Bank for Agriculture and Rural Development (NABARD) and National Cooperative Development Corporation (NCDC) are entrusted to look after the FPOs in the country. In January 2020, the Government of India created a farmer connect portal at Agricultural and Processed Food Products Export Development Authority (APEDA) as a platform for FPOs to interact with the exporters.

While many FPOs have come forward to operate during the COVID-19 crisis by procuring and marketing farmers' produce, and giving farmers the much needed income in this hour, their operations are not without struggles. Labour and input shortages, infrastructure bottlenecks and sometimes uncooperative local administrations prevent them from carrying out activities for the benefit of farmers and consumers. These constraints forced some of the FPOs to stop their supply chain operations.

The Government of India is putting more emphasis on FPOs in its response to COVID-19, evident from its various policy decisions and guidelines to the states since the crisis began. For instance, in the last week of March, the central government asked state market boards to allow FPOs to buy from mandis or directly purchase from farmers for trade purposes. The Indian government directed state governments to make efforts to connect FPOs to the processing industry, exporters, bulk buyers and big retailers to maintain the supply line. After the demand from FPOs,

**Table 1: FPOs reviewed**

SI No	Name of FPO	State
1	Abhinav Farmers Club (Pune)	Maharashtra
2	Sahyadri Farmer Producer Company (Nashik)	
3	Pravara Shetkari Producer Company (Ahmednagar)	
4	Kendrainmata Farmer Producer Company (Pune)	
5	MahaFPC- consortium of FPCs in Maharashtra	
6	Aterna Organic Farmer Producer Company (Sonapat)	Haryana
7	Kaushalya Foundation	Bihar
8	Satmile Satish Club (Cooch Behar)	West Bengal

### Awareness Creation

The majority of the FPOs are involved in creating awareness among their members about social distancing and other hygienic measures to be taken during agronomic operations, harvesting, packaging and marketing of the produce. Satmile Satish Club from Cooch Behar of West Bengal, which has promoted about 56 FPOs in the state, reported that awareness is being created through WhatsApp groups. Kaushalya Foundation which promoted more than 16 FPOs in Bihar state has appointed Agriculture Entrepreneur Mentors (AEM) for creating awareness. Mr. Kanwal Singh Chauhan

the government allowed them to sell their produce from FPO premises through e-National Agriculture Market (e-NAM), an electronic marketing platform that does not require the produce to come to markets. This will help FPOs get remunerative prices for their produce and help track transportation online. Various state governments allowed FPOs to sell their produce by facilitating packaging, transport and marketing of their produce by relaxing limitations and providing certificates to them.

### RESPONSE OF FPOs TO COVID-19 CRISIS

During the corona virus crisis, FPOs should ideally support farmers with input provision, providing extension and advisory services to members, procurement of products from members, post-harvest operations, marketing, income support to members, arrangement of loans for working capital or moratorium of loan etc. We looked at the roles played by few FPOs (Table 1) during this period and these are discussed below:

of Aterna Organic Farmers Producer Company, Sonapat, Haryana, stated that mostly the communication related to price of produce, probable date of harvesting etc. are shared through telephonic conversation and WhatsApp groups to the members.

### Support to Marketing

State governments are promoting direct marketing by FPOs as it is the best mechanism to aggregate the produce of a large number of farmers and to sell it collectively in urban centres. Most of the FPOs have directed their activities for the marketing of the produce

in view of the difficulty faced by members in individual marketing and to grab an opportunity of connecting with urban consumers. Considering food supply shortage and loss at farmers' fields, 15 FPOs under MahaFPC started procurement of Tur (Pigeon pea) and gram from farmers of 17 districts of Maharashtra at Minimum Support Price. They were able

to procure 14,000 MT from 20,000 farmers until now. Abhinav Farmers Club has linked 56 new farmers' groups to urban consumers by providing direct marketing services. Many FPOs like Sahyadri Farms and Kendraimata Agro Producer Company Ltd. are making small kits of fruits and vegetables for direct sale to urban consumers.

### Box 2: Success story of ICT enabled Direct marketing: Abhinav Farmers Club from Pune

Abhinav Farmers Club has connected about 2.56 lakh members all over the country through 256 farmers' clubs and is involved in production and marketing of organic products to urban consumers (Ranadive 2018). Mr. Dnyaneshwar Bodke, who heads the organisation, said they have developed a mobile app (Abhinav Cart app) through which consumers can put their demand and also make an advance payment through apps. For this, they have contacted housing societies in urban areas like Pune and made them aware about their products through discussions. Once an order is placed, farmers are directed to harvest the required quantity only. After produce is collected from the farmers, online payment is made to them.

During COVID-19 crisis, they have added 56 more farmers clubs and linked them to societies for providing agricultural produce. After receiving orders from the societies, produce is packaged by taking all precautions, including social distancing, by the farmers. Cleaning and grading are mostly done by women wearing masks and gloves. Packaged produce is delivered at the gates of societies. They were able to overcome many difficulties. For instance, labour shortage was a major problem; however, the persons returning from the cities to the village (because of lockdown) could cushion this shock by working as family labour. Initially, transporters were not ready and those who agreed were charging more. This problem was overcome by using personal vehicles of members to transport the produce. For this, permission from RTO and agriculture department was obtained. Problems of police checking and refusal to enter the cities were solved by contacting the officials and providing required certificates to them.

Thus, during the time of disaster, the organisation could keep supply chains functional and is providing agriculture produce to the consumers at the gates of their societies at lower prices with assurance of hygiene.

### Input provisions

Many FPOs are not involved in the provision of inputs as their priority at this stage is marketing the produce of members. However, a few FPOs such as Sai Pravara Shetkari Producer Company (Ahmednagar, Maharashtra) are involved in input provision to the members at 20-25 per cent less than the market price.

### Post-harvest operations

During a time where surplus produce is available in the fields and supply chain is disrupted, FPOs are adding value so that the product can be sold in the future once normalcy returns. Aterna Organic Farmers Producer Company, Sonapat, Haryana, is involved in the processing of sweet corns, tomatoes etc. Sahyadri FPO in Maharashtra state is involved in processing of most of the fruits and vegetables in various forms. However, the post-harvest operations of these FPOs are running at sub-optimal capacities due to shortage of labour and inputs like ingredients and packaging material.

### Income support/ loan for working capital/ moratorium of loans

Though these activities are also expected from FPOs during the crisis, as of now priorities of FPOs are different and no one is looking into this aspect. However, the FPOs are demanding from the state and central government for income support and moratorium on loans, and making available working capital to the members.



### Box 3: Turning crisis into opportunity: A case of Kendramata Agro Producer company

During the COVID-19 crisis and subsequent lockdown, farmers are unable to sell their produce while consumers are paying higher prices and facing shortage of vegetables. In such a situation, Kendramata Farmer Producer Company located at Kendur in Pune district of Maharashtra state came forward to supply fruits and vegetables to household societies to avoid the crowd in markets. This FPO started supply of packs containing vegetables and fruits sufficient for a family for one week. In other districts, they are supplying semi-perishable vegetables such as onion and potato. The supply of onion from farmers to Tamil Nadu market is also one of the activities prior to lockdown, but it was later discontinued due to lack of transportation. The family pack of 12 kg contains 15 different types of vegetables and fruits such as onion, potato, tomato, cucumber carrot, sugarbeet, garlic, ginger, green chilli, lemon, cabbage, cauliflower, brinjal, guar, bhindi, fenugreek, coriander, spinach, watermelon, sapota, grapes, pomegranate, papaya etc.

This FPO supplied more than 500 family packs and 450 quintals of vegetables to urban consumers in the last week of March. Collective demand from the societies from Pune city was accepted through Whatsapp. Boxes of family packs were supplied at the gate of the societies once or twice in a week. Customers can choose from different basket packages ranging from Rs. 400 to Rs. 999. Since the mode of payment is digital, the delivery is contact-less. Thus, the FPO is helping in providing fair-priced fruit and vegetable to urban consumers and also earns income for its members.



Receipts for vegetables sold as family packs

## CHALLENGES FACED BY FPOs

The majority of the problems are related to transport of the produce from FPO premises to urban areas. Many transporters show hesitation in view of harassment by police or administrations. Though some are ready, they demand two-way fare which increases cost of operation. In one case, a truck operator demanded double the rate for transport from Pune district of Maharashtra to Chennai in Tamil Nadu state (demand was put to FPOs), as his return fare was not assured. Many times, there is difficulty in getting fuel for transport vehicles during lockdown. As FPOs lack mini trucks or tempo, they are dependent on other operators given that purchase of vehicles in the short run is not feasible. Other related challenges include interference by police and local bodies like medical officers, Gram Panchayat resulting in restricted mobility through villages.

Another important problem is labour availability. Because of lockdown and restrictions, workers left their workplaces to go home or are living in temporary accommodation arranged by the government. Unavailability of labour is affecting harvesting, packaging and grading operations. As discussed earlier, those FPOs engaged in value addition are also facing difficulty because of workforce shortage and are working at a reduced capacity. Non-availability of inputs required for marketing like cardboard, bags etc. is also affecting FPO operations. Other related challenges include non-availability of containers, ingredients etc. Aterna Organic FPO from Sonapat reported that they are processing the product at 10 per cent their optimal capacity as labour and inputs are not available at this time. Restrictions placed on the number of workers and social distancing led to halting of operations at some FPOs.

Export contributes significantly to revenues of many FPOs. Lockdown has forced-stopped export. Many FPOs had no alternate strategies and incurred huge losses. For example, some members of FPOs in Nashik district had cultivated their grapes for export purpose (with more cost of cultivation and compliance). As export has stopped, selling the same grapes in the local market at a lower rate would not even cover their cost of cultivation. Mr Yogesh Thorat leader of Maha FPC, a consortium of

FPOs in Maharashtra noted that still many FPOs are not working effectively. Only about 20 per cent of FPOs in the state are engaged in direct marketing as well as online trading during this crisis.

The piecemeal approach of a few FPOs may not cater to the need of urban population if the government takes a decision to extend the lockdown period. Therefore, bringing together all FPOs is necessary to provide regular supply of fruits and vegetables to the cities (Pune city alone requires about 1500 MT of fruits and vegetables every day) in the coming days. Though the government allowed sale of produce through e-NAM from FPOs, the latter demand waiving of mandi fees (0.5 to 2 % of the total value of traded produce) to register on e-NAM.

Most of the FPOs are at a nascent stage and have limited infrastructure like pack-houses with inadequate sanitary measures. They lack cold storage facilities or cold chains that can help avoid losses. They also face problems of more processes and permissions to work during the crisis. Many were not prepared to deal with such situations and lacked consumer databases, online booking capabilities, websites and mobile apps to tap into the demand to participate in a supply chain.

Along with these administrative, economic and systemic problems, FPOs also had to face some social problems. In some instances, truckers who went to deliver vegetables and fruits to Pune and Mumbai, was not allowed to stay in their village on return for the villagers feared they might be carrying the virus. Managing the crowd during delivery and sale of produce is another challenge FPOs face.

## POLICY SUGGESTIONS AND WAY FORWARD

To cope with a crisis like COVID-19, FPOs have to be managed like businesses that benefit farmers. Some of the suggestions in strengthening FPOs from our analysis are listed below:

- a. Impact of COVID-19 is likely to prevail for some more time. Therefore, bringing chain normal. Creating awareness among them, creating leadership, providing consultation

and guidance to them, facilitating initial operations etc. are some of the measures to bring them on board.

- b. Diversifying the activities of the FPOs would help them to bounce back in crisis and increase resilience. Rather than totally depend upon one of the activities like export, FPOs should diversify their activities with value addition, direct marketing etc. Losses arising from failure in one type of activity would be absorbed by functional activities.
- c. Proper infrastructure at FPOs is the need of the hour. Organisations like Mahagrapes in Maharashtra had shown how necessary infrastructure like pre-cooling unit, cooling unit, cold storage can be built at society level, where products of members can be aggregated and stored till the next cycle of demand arrives or for further processing. This has helped them to export their produce to meet demand in the European market. During the present crisis, the need for infrastructure like pack-houses, cold storage etc. are being felt by many FPOs. Therefore, more funds can be allocated to FPOs to establish basic marketing infrastructure in the future. Different donor organisations, NGOs, trusts can support performing FPOs to overcome such bottlenecks during crisis.
- d. The problem of transport was reported as many FPOs do not own vehicles. Owning a vehicle would help in continuous direct marketing. Therefore, along with the other market infrastructure, funds may also be allocated to purchase vehicles and make FPOs less reliant on the transport sector. For new FPOs, the government is going to provide Rs 15 lakh. Most of these funds would be used for infrastructure development and vehicle purchase.
- e. Market linkages are still weak and FPOs are disconnected from urban consumers. Innovative models using ICT platforms (as used by Abhinav Farmers Club), artificial intelligence and machine learning should be used to gather inputs about demand. This must be backstopped by required facilities to supply produce to urban clusters. Market linkages in cities to operate farmer-to-consumer models may be developed by allocating societies in a specific area to a particular FPO for marketing and sale of produce.
- f. Online market platform e-NAM offers great scope for FPOs to trade their produce. Therefore, more FPOs should be registered on e-NAM to harness the benefits of online trading for their members.
- g. During this crisis, FPOs need to have links with the Public Distribution System (PDS) for the supply of semi-perishable commodities like onion, garlic, potato, etc. to meet the need of consumers dependent on PDS. Governments can take necessary steps in this direction.
- h. FPOs should be an integral part of coordination and convergence of extension services along with ATMA and KVK in the district. A mechanism is needed at district level to share with FPOs the advisories that go to ATMA and KVKs. During times of disaster, this will help in fast dissemination of reliable information.
- i. Employing students of BSc (Agri), MSc (Agri) in Social Sciences, ABM, MBA, MSW during their industrial training, RAWE programme or research project to work with FPOs. They could be tasked with developing business models for FPOs and improve their performance to bring them on par with private start-ups in the supply chain. Support can be taken from established enterprises such as Big basket, Ninja-cart etc.
- j. To increase professionalism in FPOs, capacity building of members or board of directors in supply chain management and other procedural aspects related should be undertaken. State-level SAMETI or national level MANAGE can do such training.

To empower FPOs and prepare them for a future with unforeseen disasters and crises, we need to learn lessons from the current situation.

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## COLLECTIVE ACTION IN MAHARASHTRA TO DEAL WITH COVID-19 AND ITS IMPACT ON AGRICULTURE

Collective action by the agencies of the Maharashtra State Government, with support from producer collectives, have to some extent reduced the impact of Covid-19 on farmers and consumers. However, a lot more needs to be done argues **Sagar K Wadkar** in this blog.

The first case of COVID-19 was confirmed in Maharashtra State on 9 March 2020. Day-by-day the cases kept increasing and exactly after one month, i.e., on 9 April 2020, the State had 1364 positive cases against an all-India figure of 6761. Out of Maharashtra's 36 districts, 28 districts are suffering from corona positive cases, of which eight districts are in the 'Red Zone'. More than two-thirds of the cases in the State have emerged from the Mumbai Metropolitan Region. Unfortunately, Mumbai and Pune are among the 10 coronavirus hotspots in the country as declared by the Government of India. The State Government and its enabling agencies (including district administrations, municipal corporations, Health, Public Transport, and Law & Order Departments, civil society organisations, non-governmental organisations, etc.); different forms of producers collectives<sup>1</sup> (farmers' groups, clubs, self-help groups, [dairy] cooperatives, and more importantly Farmer Producer Organisations [FPOs]<sup>2</sup>); agritech start-ups; and farmers' federations and their supporting organisations, are collectively addressing the menace of the Covid-19 pandemic.

### CONTAINING COVID-19

On 13 March 2020, as a precautionary measure, the State declared the outbreak of this epidemic in the metropolitan cities and invoked provisions of the Epidemic Diseases Act, 1897. Following this all commercial places were shut across the State and a ban on public gatherings and events was put in place on the next day. On 23 March, the government announced curfew and border seal-off in all districts of the State, and since 25 March, a nationwide 21-day lockdown is being followed, which has now been extended by the State Government up to 30 April 2020. Unfortunately, the number of COVID-19 cases are increasing day-by-day in the State and the worst hit is the Western and Konkan region as compared to the



other three regions (Khandesh, Marathwada and Vidarbha) of the State.

After enforcement of lockdown, migrant workers<sup>3</sup> began to leave for their respective districts and/or States. The government has set up 262 Relief Camps and allocated INR 45 crore for shelter and food, especially for deeply affected poor people, landless, and migrant workers. These camps are being managed and monitored by the district administration along with support from Labour and Irrigation Departments. Many of the cooperatives, SHGs (see Box 1) and Gram Panchayats are providing food services to these migrant workers. However, since the last few days, it is challenging for the district administration to maintain these people's psychological balance arising from their lack of work and separation from their hometowns. Many other such negative effects are likely to come up in the lives of these poor, landless and migrant workers, may be across the country and the whole world as well.

### Box 1: Story of Women Farmers of Marathwada Region

The Swayam Shikshan Prayog, a social service organisation working for women's empowerment, have formed the 'Sakhis Task Force' (women volunteers) in 300 villages across the Marathwada region to educate villagers on how to contain the pandemic. This task force is also extending essential services through their respective Gram Panchayats with support from the district administration. These women have collected food grains and other essential daily use articles from big farmers and villagers/volunteers and are distributing it to needy women, particularly the widowed, divorced, and separated (WDS) women.

Source: Business Line, 6 April 2020

### Managing Essential Services

In order to put an early brake on the spread of novel coronavirus, the Hon'ble Prime Minister announced Janata Curfew on 22 March 2020, followed by 21 days lockdown up to 14 April 2020, and this has now been extended up to 3 May 2020. But there is no guarantee that by that time the situation will be under control; a strong people's response is of the utmost need, with strong maintenance of lockdown rules and regulations, along with of steadfast social distancing.

An appeal that strategized Social Distancing as the only solution to contain the pandemic was spread across the whole country. In view of this, during the initial few days there were kiosks in all parts of the country including Maharashtra State, where people could buy articles of daily use in general, and more particularly fruits and vegetables. Further, it was also observed that in most of places, even in rural villages, most of the middlemen/vendors/stockers sold essential commodities at higher rates which led to establishing kiosk on consumers' front as well.



FPOs Stall in Navi Mumbai

## COVID-19 AND AGRICULTURE

On the farmers' front, all farming operations – including procurement and marketing – abruptly stopped because of the lockdown. However, on 27 March, the government exempted all agricultural operations, agro produce marketing and its movements, harvesting activities, and procurement agencies, from the lockdown rules. In addition to this, input and fertiliser shops, and input manufacturers were also exempted, but due to fear of infection from COVID-19, the shops selling these inputs remained closed in most places. In fact, most of the wholesalers and retailers involved in these activities are also not functioning.

### APMCs Markets

Initially, through the 'Agricultural Produce Marketing Committee' (APMC), the State Government tried to manage marketing of agro-produce to some extent. But these agencies failed miserably to put checks on people's movement and on taking seriously the precautions of 'social distancing' and use of 'mask'. Nonetheless in the few districts of

Vidarbha, Marathwada & Khandesh region, where there are fewer cases of Covid-19, the APMC markets are partially open and that too for only 2-3 hours in the morning and evening, whereas in the Western & Konkan region, it was partially open during the initial 10 days of the lockdown. But with increase in positive cases, APMCs decided to completely close the market from 10 April 2020.

### Collective Action

Keeping the pandemic in mind, the State Agriculture Department, Agriculture Technology Management Agency (ATMA)-Pune, Maharashtra State Agricultural Marketing Board (MSAMB), and Maharashtra Cooperative Development Corporation (MCDC), jointly initiated steps to tackle this problem through convergence of their respective roles and responsibilities.

#### Sahyadri Farmer Producer Company (FPCs), Nashik

India's leading FPC is coming up professionally with different 'Basket Grades' of fruits and vegetables and have established city wise dedicated teams. (Vegetables: Grade 'A' – 10 kg @ Rs. 550; Grade 'B' – 5.5 kg @ Rs. 400; and Fruits: Grade 'A' – 11 kg @ Rs. 850; Grade 'B' – 7 kg @ Rs. 400). Approximately, a total of 25 tonnes per day is being sold to Mumbai and Pune.

To converge producers with buyers, MCDC acted as a bridging agent to bring Housing Cooperative Societies (mainly in Pune and Mumbai) and Producers Cooperative & Producers Company onto one platform for direct marketing through social media, especially WhatsApp.

In this effort Shri. Vijay Gofane, the State Coordinator of MCDC, took the lead, shared the contact details of interested FPCs with housing societies and approached the presidents/secretaries of these housing societies to discuss with their respective members – to work out the weekly quantities required of agro-produce and then got it fulfilled through any of the FPCs.

In addition to these collective efforts, individual FPOs are also marketing their produce by using social media, and a few of them have developed their own mobile apps for marketing. During

On 20 March itself, ATMA-Pune and MSAMB approached all FPOs that are supported by their respective organisations and also those supported by SFAC<sup>4</sup> (Small Farmers' Agribusiness Consortium) and NABARD across the State. As on March 2020, over 1600 FPOs are registered across the State by these supporting organisations. They were asked to share their readiness to extend services during this lockdown, with regard to commodity wise quantity available with its per kg price, expected volume of order to deliver doorstep services for providing food grains, fruits, vegetables, etc. As a result, more than 100 FPCs came forward and calculated the numbers for daily food packages, as well as the orders expected to come from people/consumers.

FPOs Marketing through Social Media Messages - Fruits and Vegetables Basket - combo packages are being sold across the State.

#### Kashatkari Raja Farmer Producer Company

Vegetables basket: All fresh vegetables basket for a week @ Rs. 500/basket.

#### Kisan Shakti FPC, Aurangabad

Supplying vegetable basket of 15 kg @ Rs. 450 to Pune market.

this lockdown it is very convenient for them to extend Company services to consumers and thereby create a database of consumers for future use (this is highlighted in detail in AESA Blog 110).

Further, to support these essential services provider's movement in the State, the Public Transport Department has developed a system for issuing a vehicle e-Pass through the link: covid19.mhpolice.in. In addition to this, MSAMB set up the 'Inter-State Fruits and Vegetables Control Room' with a toll-free number – 1800-233-0244 – to manage smooth movement and dispute settlement, if any.

As a result, 222 tonnes of fruits and vegetables have been sold during the last 15 days of lockdown by 5,030 farmers, farmers' groups, and FPOs from 2,657 places across Pune city.<sup>5</sup>

## State Level Producers Company and Pune Municipal Corporation

In addition to this, **MAHA-FPC, a State Level Producers Company** (SLPC)<sup>6</sup> also initiated a movement in collaboration with district administration and municipal corporations. They have developed a core team comprising of Nodal Officer, Sale Planner and Manager, Department of Agriculture, Municipal Corporation and Regional Transportation Office Coordinator, and FPCs Coordinator under the leadership of Shri. Yogesh Thorat, the Managing Director of MAHA-FPC, supported by a Chief Executive Officer (CEO), and they have successfully facilitated the smooth delivery of daily stuff to consumers across the State. As informed by Shri. Thorat, 20-25 MT agro-produce is being delivered daily to Pune and Navi-Mumbai Market with the help of Member FPOs from Ahmednagar and Pune districts.

Prior to the lockdown, on the directives of NAFED, MAHA-FPC as a State Level Procurement Agency along with the Maharashtra State Marketing Cooperative Marketing Federations (MSCMF) and Vidarbha Cooperative Marketing Federation (VSCMF), had begun the process of farmers' registration for the procurement of tur and chana dal at MSP rate. Initially, during the first few days of the lockdown, the procurement process got hampered, but soon after with the government granting exemptions for agri activities, MAHA-FPC decided to re-start its procurement operations partially (from their 50-55 collection centres particularly in Marathwada region out of 129 across the State) in order to give relief to member and non-member FPOs as well.

The Pune Municipal Corporation started 'ward wise' vegetable outlets managed by identified 'Farmer Conveners', (a member of any producers' collective and/or vendor in the vicinity of Pune city) at 68 locations across 15 ward offices (3-4 outlets per ward) to provide fresh fruits and vegetables at reasonable prices. Urban consumers are also raising their individual and collective demand for food to these farmer conveners in order to get doorstep service as well.

## AgriTech Start-ups

AgriTech start-ups in India are changing the landscape of Indian agriculture. These

start-ups are coming up with technology-integrated platforms to address supply-demand asymmetry issues. In the backdrop of the lockdown one such start-up – AgSource: Global Agri Trade Pvt. Ltd., a joint initiative of AgSource Group<sup>7</sup> and Vegetable Growers Association of India (VGAI), – began working as 'farmers marketing and customers' procurement arms' to provide the best quality veggies and fruits to customers at their doorsteps. This is especially true during this lockdown period as the group is more active and vibrant and meeting the requirements of the people of the State.

As informed by **Shri. Vikas Bhalerao, Founder & Chairman, AgSource**, daily 200 'fruits and vegetables baskets' (standard package for a week of 10-15 kg each, and customised package as well) are being delivered to housing societies in Pune and Mumbai. This WhatsApp group is not only meeting the needs of people but also creating awareness by sharing precautionary messages and images. In addition to this, there may be many more such start-ups, who come forward to create their market on one side and provide food to the needy on the other.

## EMERGING CHALLENGES



**Jogeshwar FPC marketing through Nature's Agribasket app**

The challenges faced by essential services providers, particularly FPOs (like permission for transportation, vehicle passes, availability of driver and appropriate vehicles, clearance from all checks, particularly on district boundaries and inside cities due to lockdown despite e-passes, etc.), are already highlighted in 'AESA Blog 110' (thus not discussed in detail here). However, the Director, Jogeshwar FPC, Akola said "The FPOs are not happy with the consumers' treatment and response while

*delivering grocery, especially in high-class societies, which is not expected”.*

Farmers growing fruit crops (particularly grapes, pomegranate, banana, sweet lemon, mango, etc.) in the State, and those practicing floriculture are the worst affected in this crisis. As discussed with an FPO representative in Aurangabad and Jalna districts, 30-40 per cent of harvested sweet lemon and grapes marketing are being managed at the district level. The remaining 70 per cent of produce of both these fruit crops is yet to be harvested due to non-availability of labour. Similar problems are being faced by grape growers in the western region of the State. Further, in Konkan region, 'Hapus Mango' growers and exporters are worried about harvesting and marketing. The condition of vegetable growers across the State is also not very different, lakhs of tonnes of produce is waiting to be harvested.

In procurement activities, (though started from 50-55 centres as discussed), MAHA-FPC is facing labour and packaging material (particularly gunny bags) shortage. Despite instructions and exemption by the Government, the input industry is shut across all regions of the State, which is causing problems in getting inputs required for harvesting and post-harvest management of agro-produce. If this lockdown continues, it will create further severe problems for farmers during the up-coming kharif season.

Due to disruptions during the rabi season, farmers are likely to face cash crunch for purchasing inputs required for kharif season sowing, whereas it is likely possible that the input companies/dealers may charge high price for inputs due to the present state of affairs.

Over and above this, despite all sorts of constraints, producers' collectives and their supporting organisations are somehow managing the delivery of essential veggies and fruits. At the village level people are scared of the coronavirus, so the Gram Panchayats' representatives are restricting the farmers' movement outside the village. They are not even allowing nearby villagers to enter the village, mentions a few FPO representatives. This is creating undue social pressure, apart from natural psychological stress on all essential service providers.

## WAY FORWARD

During the lockdown, for effective service delivery to farmers and consumers, a Single Window System may be developed at the District/State level for giving all permissions, license to provide essential services, and for registering available stock with producers for marketing through APMC and/or directly, so that farmers and consumers movement can be managed effectively.

FPOs working in the input business,<sup>8</sup> especially in seed production, and equipment and implement banks, should be approached by respective district ATMA offices and Agriculture Department for extending input service delivery to farmers of the State.

### **Win-win situation by Integrating FPOs**

**& AgriTech Start-ups:** On one side, FPOs are demanding appropriate and advanced technology for improving efficiency of their business operations, besides technology for improving farm productivity, and on the other side, many agritech start-ups are ready with their prototypes but find no end users.

### **Strengthening forward & backward linkages:**

Agriculture is in the phase of transformation. Second generation farmers have different needs. They are more worried about 'how to increase (their) share in the consumer's rupee' and 'how to minimise cost of cultivation'. The special provisions/schemes for infrastructure development and value addition can help farmers and FPOs.<sup>9</sup> Financing FPOs has always been a challenge. The sensitisation of financial institutions on financing FPOs is seriously needed.

**E-NAM and FPOs:** In view of this pandemic, on 2 April 2020, the Ministry of Agriculture and Farmer Welfare allowed FPOs to do marketing through e-NAM portal from farmgate in order to avoid overcrowding in APMC markets.<sup>10</sup>

Since agricultural marketing is a State subject, as on date, all FPOs are waiting for the State Government's green signal to do marketing on e-NAM portal through the respective FPOs' collection centres. This is a major issue, thus there should be coherency between policy provisions of Central and State governments.

**'Decentralised Marketing'** is the need of the hour - to develop a resilient food value-chain system, and in practice to achieve the concept of a 'farm to fork' and 'fork to farm' approach, where producers' collectives especially FPOs can reap benefits of the agri value chain directly. The Government of India and the respective State agricultural marketing boards – the agency responsible for issuing direct marketing license – should pay attention to this and devise a criteria for issuing direct marketing license for all FPOs across the country.

#### **Capacity Building of Producers Collectives:**

Across India FPOs lack the capability to do agribusiness activities professionally. They need to be trained on the Governance, Financial Management, Business Development Plan, and Leadership aspects to run and manage FPOs effectively and efficiently, and thereby make them competitive and sustainable.<sup>11</sup> The Vaikunth Mehta National Institute of Cooperative Management, an apex training institute for producers' collectives, have been undertaking such trainings for cooperatives, SHGs and FPOs.

#### **CONCLUSION**

Covid-19 and the resultant lockdown has created disruption in the global food supply system. Its impact varies considerably among different sectors and different sections of society. In agriculture, depending on the nature

of the commodity and resource availability at the farm level, its impact will certainly vary. In any case, the most affected are the poorest, marginalised and disadvantaged sections of society. Apart from the agricultural sector, the labour intensive, informal sector and MSME enterprises will also get severely affected. Extension and Advisory Services in the State need to review its current organisational and management systems and capacities at different levels so that they can support farmers in addressing the challenges emerging from COVID-19, and thus contribute to the development of a resilient food system.

EAS providers need to be properly equipped so as to address changes in the development scenario, as well as to meet the emerging demands and needs of farmers and FPOs, especially on agribusiness, value addition, and marketing. In addition to this, they need to get oriented to formation and nurturing of producers' collectives.

EAS providers need to engage with producers' collectives in building sustainable livelihoods, including technology integration at all levels of livelihood systems. A consortium-based approach – realised by converging the front-line and first-line extension systems along with national institutes, such as VAMNICOM, Pune; MANAGE, Hyderabad; NIAM, Jaipur; and BIRD, Lucknow – can undertake such efforts along with capacity building of producers' collectives.

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## ENDNOTES

<sup>1</sup>A combination of producers/farmers, registered/unregistered are being used by EAS providers, development practitioners, and academia to solve common economic, social, cultural and aspirational needs of member farmers.

<sup>2</sup>FPOs are an informal aggregation of producers/farmers. It can be registered as 'for-profit' legal entity under the respective State Cooperative Societies Act and Producer Company under Section 581(c) of Indian Companies Act 1956 amended in 2002; and as 'not-for-profit' under Section 8 of the Indian Companies Act 1956 amended in 2013.

<sup>3</sup>The State has approximately 23 lakh migrants, mainly from Bihar, Gujarat, Madhya Pradesh, Rajasthan, and Uttar Pradesh States.

<sup>4</sup>SFAC is entrusted by the Ministry of Agriculture and Farmers Welfare to support FPO promotion across the country. NABARD is also supporting this mission of promoting FPOs. These organisations have empanelled agencies including KVKs, NGOs, CSOs and other such legal entities to promote and nurture FPOs in India. As on date, more than 7000 FPOs have been registered by these organisations, including respective State Governments and its enabling agencies, and the self-promoted ones. In view of this pandemic, it is being observed that these FPOs across the country are playing a very crucial role in delivering agro-produce at the doorsteps of consumers.

<sup>5</sup>Reported by the 'Agricultural Director', Pune, in the local newspaper - Lokmat, Pune, 13 April 2020, p. 2.

<sup>6</sup>SLPCs is a second-tier of FPOs Model across the country. It is an institutional arrangement to create an enabling environment for FPOs of respective States. As on date, eight such SLPCs are working across India. MAHA-FPC is first amongst them, and developed a 'commodity wise value chain approach' as their business strategy.

<sup>7</sup>AgSource Group is a pool of professionals including farmers, FPOs' representatives, subject matter specialist and govt. officials in the field of agriculture and rural development. This strong support system established a pan-India network and is incubating agri-tech and social start-ups. The group works through WhatsApp Group named, 'AgSource India' (functional since 5 November, 2017), and connecting dots by helping FPOs to enhance and expand their forward linkages and connecting with buyers & sellers across the country.

<sup>8</sup>Devnadi Valley FPC, Sinner, Nashik; Jay Sardar FPC, Malkapur; and Shri Supo Krushi Vikas FPC, Nandura, Buldhana; and many more across the State.

<sup>9</sup>As of now, SFAC is providing 'Matching Equity Grant' @ INR 15 lakhs to eligible FPOs to increase their member farmers' equity and credit worthiness. However, the scheme for 'Credit Guarantee Support' (maximum of 85%) to financial institutions is not yielding significant results because of various operational constraints.

<sup>10</sup>As per the State marketing provisions, the FPOs have to take their stocks to their respective APMC market and have to pay an APMC mandi fee, which varies from State to State (0.5 per cent to 2 per cent of the value of the traded produce). In Maharashtra it is 1.05 per cent of the value of the traded produce.

<sup>11</sup>Tripathy KK, Deshpande DV, Wadkar SK and Lokhande J. 2020. Catalysing development through collectives: Status and issues of Cooperatives, Self-Help Groups and Farmer Producers Organisations in India. Pune: WPS (VAMNICOM)-03/2020, VAMNICOM Working Paper Series.

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## EVERYTHING CAN WAIT, BUT NOT AGRICULTURE IN THE TIME OF COVID-19

In this blog, **R M Prasad** argues for taking urgent steps in India to support agriculture as the lockdown imposed to combat the COVID-19 pandemic disrupts agricultural value chains.

The full impact of the coronavirus on food security and agricultural food systems globally is not yet known, which will unravel as the spread of the virus continues to evolve differently in different countries. But, it is evident that the impact of movement restrictions and disease containment efforts are negatively affecting all in the food supply chain, from producers to processors, marketers, transporters and consumers

### **Impact on production and marketing**

In India, the impact is felt at both the supply and demand sides. On the supply side, though there is no supply shock felt in terms of availability, restrictions on the movement of food has already slowed arrival of agricultural commodities in major markets. The transport restrictions and quarantine measures impede farmers' access to input and output markets, curb productive capacities and increase risks of post-harvest losses. Increased levels of food loss and wastage are being witnessed in the supply of perishable commodities like fruits and vegetables.

At the consumer end, the food market is witnessing increased demand in both staple and ready-to-eat food that can be stored with a similar trend seen on e-commerce platforms. These trends make it difficult to sell fresh produce and increase loss of perishable produce, particularly vegetables and fish leading to income loss. Media reports indicate that the closure of hotels and restaurants during the lockdown has already reduced sale of milk and milk products. Fishers are badly affected due to lack of refrigeration, marketing and logistic support. Poultry farmers are also badly hit due to misinformation, particularly on social media, about chicken being carriers of coronavirus.

## Impact on farm labour

The lockdown has come at a hard time as India's peak farm activity occurs between April and June. This is when winter crops are harvested and sold, and is also the peak season for fruits. It is when farmers start sowing the rain-fed crops. The shortages of labour disrupts production and processing of food, mainly that of labour-intensive crops.

The migrant seasonal workers constitute 27% of the agricultural working force. Their services in farming in Punjab, Haryana, Telangana, Maharashtra and other states is significant. The workforce mainly hails from eastern Uttar Pradesh, Bihar and parts of Madhya Pradesh. In the present situation, this workforce cannot move through villages to reach the states where they work. Entry points are blocked to stop movement for fear of COVID-19. Media reports indicate that many labourers are either staying home or leaving for their hometown, fearing

police action. In West Bengal, it is reported that most of the labourers hailing from Bihar and Jharkhand have returned to their hometowns fearing coronavirus.

## EVERYTHING CAN WAIT, BUT NOT AGRICULTURE

The general feeling is that the Centre should have created conditions for farmers to continue farm activities and should have calibrated the lockdown in such a way that the supply chain, from the farmer to the market, was cared for. Unfortunately, this did not happen. The government could have allowed flow of goods and the supply chain to continue taking safety measures in rural areas. The government only granted exemptions and relaxations for agriculture and allied sectors after a lapse of time (Box 1) by when some losses had already occurred.

### Box 1: Government Notifications providing relaxations during the lockdown

The notification by the Ministry of Home Affairs dated 24-03-20 exempted the following farming operations from lock down.

- i) Procurement of agricultural products including MSP operations
- ii) Mandis run by the agriculture marketing committees or as notified by the state government
- iii) Farming operations by farmers and farm workers in the field
- iv) Custom hiring centres related to farm machines
- v) Manufacturing and packaging units of fertilizers, pesticides and seeds
- vi) Intra and inter-state movement of harvesting and sowing related machines.

The recent notification of Ministry of Home Affairs dated 15-04-20 lists out other activities related to agriculture that will be permitted after April 20. They include:

- i) Movement of cargo
- ii) Fisheries: Operations of the fishing (marine and inland)/ aquaculture industry, including feeding and maintenance, harvesting, processing, packaging, cold chain, sale and marketing; hatcheries, feed plants, commercial aquaria; movement of fish/shrimp and fish products, fish seed/ feed and workers for all these activities.
- iii) Plantations: Operations of tea, coffee and rubber plantations, with maximum of 50% of workers; processing, packaging, sale and marketing of tea, coffee, rubber and cashew, with maximum 50% workers.
- iv) Animal Husbandry: Collection, processing, distribution and sale of milk and milk products by milk processing plants, including transport and supply chain; operation of animal husbandry farms including poultry farms and hatcheries.
- v) Cold storage and warehousing services at ports, airports, railway stations, container depots, individual units and other links in logistics chain.
- vi) Industries operating in rural areas, including food processing industries; construction of roads, irrigation projects, buildings and industrial projects in rural areas; works under MNREGA. These activities will create job opportunities for rural labour, including the migrant labour force.



ICAR has also issued an agro-advisory to maintain hygiene and social distancing by instructing farmers to take general precautions and safety measures during harvesting, post-harvest operations, storage and marketing of rabi crops. KVKs have translated these advisories in local languages and are disseminating them through ICTs.

APEDA has now resolved various issues related to transport, curfew passes and packaging units. Indian Railways introduced 67 routes for

running 236 parcel specials to facilitate farmers, FPOs and traders for continuity of supply chain across the country.

### **Addressing the problem of marketing**

The main problem with farmers is that they are unable to sell their produce, which is a distribution nightmare on a national scale. However, some state governments have adopted certain measures for marketing of farm produce (Box 2).

#### **Box 2. State level initiatives to address the problems faced by farmer in marketing**

- Meghalaya has adopted a business model that is partly subsidized by the government to help farmers in marketing using iTEAMS, which has a fleet of 17 Agri Response Vehicles to provide logistic support and provide market linkage, besides providing advisories to farmers.
- Kerala has successfully roped in the Department of Agriculture and associated agencies such as the Vegetable and Fruit Promotion Council and Horticultural Development Corporation to make extensive arrangements to procure vegetables and fruits from village level eco-shops and existing cluster markets. Innovative measures such as Pineapple Challenge promoted by the Agricultural Officers' Association have successfully mitigated the market glut of pineapple through online trading and door-to-door delivery. KVK, Ernakulam, has done commendable service in the marketing of fish and meat, and is also arranging door delivery of ready-to-cook cut vegetables in packs to urban consumers.
- In Telangana, Sahaja Aharam Producer Company, a federation of farmers' co-operatives promoted by Centre for Sustainable Agriculture, Hyderabad, has helped farmers in marketing of organic produce, particularly vegetables, during the crisis period.
- Ahead of the mango harvest in the coming days, the Tamil Nadu government waived off cold storage fee for fruits and vegetables.
- Farmers' groups in Maharashtra have started selling fruits and vegetables directly to homes, doing away with middleman. To connect producers with buyers, Maharashtra Cooperative Development Corporation acted as a bridging agent to bring Housing Cooperative Societies and Producer Cooperatives and Producer companies onto a single platform for direct marketing through social media, mainly WhatsApp.
- The Karnataka government permitted farmers to market their farm produces directly at apartment complexes, Nandini milk booths and Hopcoms stores across Bengaluru. The Karnataka State Mango Development and Marketing Corporation has made arrangements to supply mangoes to consumers through post offices. The consumers can order mangoes on <http://karsirimangoes.karnataka.gov.in> directly from farmers.



## Public procurement and social distancing

April-May is the period when wheat procurement starts in India. With COVID-19, the need to streamline and manage the flow of arrivals into mandis and procurement centres in line with protocols for social distancing is a

big challenge. The mandis usually witness large crowds of farmers, which can undo all efforts at social distancing. Various governments have suggested measures to minimise crowding and contact (Box 3).

### Box 3. Crowd Management in Agricultural Markets

Madhya Pradesh had used SMS-based pre-registration systems fairly successfully in the past to regulate arrivals and manage logistics. These systems will be deployed and further strengthened.

The Punjab Government intends to arrange 5000 mandis with shelters and other service units. Each mandi is to be allocated around three villages to organize the crowd and decrease the risk of infection during weighing and selling of wheat. The government plans to allot farmers specific days with a token system with official hologram to avoid misuse and to ensure social distancing to procure harvest in a staggered manner. Providing incentives to farmers who delay harvest to avoid crowding is another plan.

Telangana government intends to procure all non-perishable crops at the village level itself, freeing farmers of the responsibility of arranging storage or transport to the mandis.

The Gujarat government suggested dividing market yards in the state into separate segments for different commodities, assigning specific date and time in advance for trading produce. Direct purchase by traders and commission agents from farmers at the farm level is also planned.

## WAY FORWARD

**Strengthen local food systems:** The period of social distancing and border closures may be an opportune time to strengthen local food systems, reducing the distance between production and consumption, wherever feasible. This will also help in reducing food miles. Food security policy and research should focus on a resilient society in which the population is able to fend for itself. Community-oriented activities like community gardens, community markets, community kitchen, etc. need to be promoted as a part of strengthening local food production system. Urban and peri-urban farming can be promoted. PRIs may plan for local governance of food systems in the country.

**Linking producers with consumers:** Securing good quality food in sufficient quantities starts with an integrated food system--from production, distribution and processing to consumers. Such a food system can function effectively only with sufficient knowledge about all the stages and inter-system linkages. Traditionally, the focus on food security is on linking production with distribution and processing industries, and less on retailers and consumers, which needs to change. In this respect, there is a need to strengthen village markets. In place of malls in urban areas, malls in rural areas may be set up to sell fresh and processed produce of farmers.

**Strengthen decentralized procurement:** It is time to devise policy measures about how we can support and protect our vast, interconnected agricultural production with a marketing system that is fair and safe, particularly during crisis situations. There is a need for establishing more collection and procurement centres at village level in place of centralized procurement. FPOs have to be strengthened and policy guidelines for retail marketing of farm produce have to be developed. Small poultry and dairy farmers, and fishers, need more targeted support as their pandemic-related input supply and market access problems warrant attention.

**Strengthen public and private transport of agricultural produce:** There is a need for focus on both public and private food distribution systems to ensure that they work as equitably as possible. Transportation networks should be enabled for timely and safe movement of food. A significant proportion of agricultural produce, especially fresh produce, moves locally and regionally every day through public transport. If these systems remain closed for long (as is the case due to COVID-19), alternative transport has to be made available. The scope and potential of private transport services for movement of farm produce have to be explored.

**Promote future markets:** Without appropriate market linkage, farmers fear losses due to poor market access. Futures markets need to be developed to serve as an alternative marketing channel for farmers, linking them to exchanges through FPOs. With an online marketing platform, the agricultural produce can also be traded at a location or with a buyer of choice. Electronic Warehouse Receipts (eNWRs) can break barriers and promote a national market in agricultural goods for the benefit of farmers. Farmers may be encouraged to use e-NAM facilities and hedge through futures and increased use of warehouse receipts.

**Safety nets and support for intermediaries in the agricultural value chain:** The governments of Minnesota and Vermont in the United States have classified grocery clerks as “emergency workers”, entitling them to state-funded childcare services and other benefits so that they can continue to serve in stores. It is time to think about our own vast, largely informal networks of traders, wholesalers and retailers, and take concrete steps to support them as they keep working during shutdowns. Safety nets and support mechanisms for them have to be formulated.

**Strengthen direct cash transfer:** Existing policy measures to ensure income and credit flows such as direct procurement, direct cash transfers to farmers as well as landless labourers and interest subvention through cash transfers may be strengthened. The direct income support under the Prime Minister Kisan Nidhi scheme

may be given to farmers in toto at the earliest, instead of three instalments.

**Promote mechanisation in farming:** This is important as labour supply is an important impediment in production. Harvesting is almost 80 percent mechanised in Punjab and Haryana. These states have fairly succeeded while other states face problems due to labour shortage during the crisis situation. There is a need to encourage adoption of small farm machineries by our farmers for which a well-defined strategy has to be developed.

**Strengthen MGNREGA:** Labourers returning to villages due to lockdown can cause a sudden rise in rural unemployment levels. As a safety net, MGNREGA guidelines have to be modified and permission given to use the programme’s labour in farm related marketing activities. The huge number of migrants that have returned home due to lockdown (resulting in reverse migration) should also be provided opportunities to work as labourers under MGNREGA.

**Strengthen capacities of Extension and Advisory Services (EAS):** Though the extension system has taken many pro-active measures to help farmers, there is a need for more involvement and formulation of innovative practices to enable them to address marketing challenges. Organizing capacity development programmes for extension personnel and farmers to empower them to overcome challenges can be taken up.

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## WAYS TO OVERCOME THE EFFECTS OF COVID-19 ON BANGLADESH AGRICULTURE

Extension and Advisory Services (EAS) of Bangladesh should come together to respond to the immediate threats to Bangladesh agriculture from COVID-19, opines **Mohammed Sekender Ali**.

Incidence of COVID-19 was first confirmed in Bangladesh on 8 March 2020. Since then the number of confirmed cases has been increasing. On 18 April 2020, the number of confirmed cases was 2144 and the virus had claimed 84 lives. Of the 64 districts of Bangladesh, more than half are affected by COVID-19. After detecting a few confirmed COVID-19 cases, the Government of Bangladesh closed educational institutions and encouraged all non-essential business to move their activities online. It initially declared a nationwide public holiday until 4 April 2020, which has been subsequently extended to 25 April 2020.

### EFFECTS OF COVID-19 ON BANGLADESH AGRICULTURE

Due to this lockdown, all sectors of agriculture (crop, livestock and fisheries) in Bangladesh are facing serious problems. The challenges faced by farmers include:

- Inadequate supply of agricultural inputs like seeds, fertilizers, pesticides, days-old chicks, poultry and fish feed, veterinary medicine and vaccine, etc. due to restricted transport and quarantine measures;
- Inadequate pest control in fields due to shortage of pesticides and labour for cultural operations and preventive measures
- Inadequate irrigation facilities due to lack of spare parts of irrigation equipment, technical persons and labour
- Very severe shortage of labour for crop harvesting, sorting, grading, packaging, handling, loading, transporting, unloading, storing, trading, etc. The harvesting of main food grain crop of Bangladesh is going to start in the last week of April and shortage of labour is going to affect Boro rice harvesting.
- Huge wastage and low price of vegetables and fruits due to

disconnect with the customer, absence of traders (middle men as collectors, transporters wholesalers, etc.) and vehicles for transport

- Low price of egg, milk and fish in local markets due to reduced customer footfall, traders and vehicles
- Huge wastage of flowers in farmers' field as there are no customers, traders, collectors, transporters and vehicles
- Huge losses of export quality vegetables, crab and shrimp due to closure of borders and airports
- Reduced income to farmers owing to decreased sale of their products
- Food shortage in agricultural labour households due to lack of work and staying at home
- Shortage of food grain, vegetables, fruits,

fish, etc. in big cities due to short supply of agricultural products from fields and local markets.

With disruptions in the agricultural supply chain, farmers are getting very low prices for their produce. At the same time, consumers in the big cities are not getting fresh food, vegetables, milk and eggs, etc. and they are paying higher prices for these commodities.

Roy (2020) noted that COVID-19 could affect food demand in various ways. For instance, when reduced income and uncertainty make people spend less, it results in shrinking demand and the sales decline. In the period of lockdown, people visit food markets less often, change their food choices (buying more cereal crops) and consumption, i.e., a rise in eating at home. As food demand is also linked to income, loss of earnings for the poor could impact consumption.



Image credit-Rabiul HM

## GOVERNMENT INITIATIVES TO OVERCOME THE EFFECTS OF COVID-19 ON AGRICULTURE

Bangladesh government has unveiled some initiatives to overcome the effects of COVID-19 on agricultural sector. Honourable Prime

Minister of Bangladesh, Sheikh Hasina, has announced a stimulus package of BDT. 5,000 crore for the farmers to boost agricultural production in the backdrop of the COVID-19 fallout. Government announced that the money from the fund will be disbursed among small and medium farmers of crop, livestock and fisheries sectors at five percent

interest. Bangladesh Bank would formulate the refinancing scheme of the amount to be disbursed as working capital in the agriculture sector. Small and medium farmers in rural areas will get loans from the fund. The farmers can use the money to produce vegetables, food grains, flowers, fruits, fish, poultry, dairy, etc. She said there will be an additional allocation of BDT. 9,000 crore as fertilizer subsidy in the next budget and the existing disbursement of loans at four percent interest for producing spices like onions, garlic, ginger and chili, etc. will be continued.

The Government of Bangladesh has allocated another BDT.100 crore to the Ministry of Agriculture to mechanize harvesting of crops. This money will be used as subsidy by farmers to purchase machinery (especially rice harvesters). The government also allocated an amount of BDT. 150 crore for distributing seeds among affected farmers to help in continuing agricultural production.

The Prime Minister has said that agricultural activities will have to be continued to ensure food security. She directed the administration and law enforcement agencies to allow movement of people engaged in crop harvesting and facilitating food and agricultural input supply chain. She has ordered authorities to arrange a weekly haat (makeshift market) in an open field in every area to help farmers sell their produce while maintaining social distancing. During the upcoming Boro (rice) season, the government will procure an extra two lakh tons of paddy compared to the last season to ensure a fair price for farmers.

Prime Minister Sheikh Hasina has been directing authorities to provide food aid to daily wage earners. The Ministry of Disaster Management and Relief reports that food support is being provided to farm labourers and other beneficiaries.

### Box 1. Response to COVID-19 by Extension and Advisory Services in Bangladesh

#### Department of Agricultural Extension

- Ensuring Uninterrupted irrigation facilities for ongoing Boro Season
- Ensuring 24x7 presence of DAE staff in respective work areas
- Upazilla-wise distribution and allocation of Combined Harvester, Reaper and Rice Trans planter with subsidy
- Motivating farmers to cultivate papaya, citrus, vegetables, ginger and turmeric in their homestead
- Executing necessary steps to enhance Kharif-1 production - Local administration has been instructed to ensure hassle-free movement of farm workers travelling from one district to another
- Motivating farmers to harvest wheat timely and preserve seeds of the BARI wheat 33
- Necessary directives issued to keep vehicles loaded with fertilisers, pesticides, diesel and other agricultural produce out of the purview of the transport ban
- Ensure seed distribution for the Kharif-1 crops.
- Department of Livestock Services
- Setting up control room for farmer suggestions

#### Department of Fisheries

- Distribution of 24103.04 MT VGF Rice to 301,288 families of 20 districts as Humanity Assistance Program
- Telecasting nutrition related audio clips to create awareness
- Initiating control room for farmer suggestions

#### Bangladesh Agricultural Development Corporation (BADC)

Initiating monitoring cell for any emergency situation: Have planned to preserve 60,000 to 62,000 tonnes of Boro seed this season; distributed 3080 tonnes of Aus seeds across the country

#### Bangladesh Institute of Nuclear Agriculture (BINA)

Distributing seed of BINA-19 rice variety for kharif season and providing suggestions for its cultivation

#### BRAC

Conducted a rapid perception survey to capture the level of awareness among low income households and the economic impact on livelihoods.

## WAYS FORWARD: ROLE OF EXTENSION AND ADVISORY SERVICE (EAS)

With agriculture in serious crisis, EAS providers have to step up their efforts in addressing the impact of COVID-19. Some ways to do this are:

1. Extension and Advisory Services (EAS) of Bangladesh should come together to respond to the immediate threats to Bangladesh agriculture caused due to COVID-19
2. Organise an online survey among EAS providers to seek specific information on:
  - the challenges farmers face in their areas of operation
  - the roles they are playing to support farmers in the areas they work
  - what additional support farmers need in these areas and
  - what additional support EAS needs to respond to these challenges effectively

The Society for Bangladesh Agricultural Extension Network (BAEN) or other EAS providers should take this responsibility.

3. Organise a participatory impact assessments exercise to map effects of COVID-19 on people's food security and livelihoods, derive proactive measures and determine what assistance Bangladesh government requires from development partners such as FAO, IFAD, other donors and development banks
4. Strengthen digital advisory services and provide information on output prices, availability of inputs, etc.

5. Advocate exemptions for supply of agricultural inputs like fertilizers, pesticides, seeds, poultry and fish feed, days-old chicks, medicine, vaccines, etc. from the shutdown
6. Providing low interest credit to farmers' groups (common interest groups formed by DAE, farmer groups of NGOs) to buy rice harvesters with matching government subsidy so that small and marginal farmers will be able to harvest their Boro rice. They can also earn money by cutting other farmers' Boro rice as there is scarcity of labour for harvest. Actual prize of a rice harvester is BDT. 29 lakh. A farmer with BDT. 14.5 lakh can purchase the machine if BDT. 14.5 lakh can be provided by the government as subsidy through the Department of Agricultural Extension (DAE). In the current situation, small and medium farmers are not able to purchase the machines.
7. Ensure migration of agricultural labour from parts of north Bengal (where there is surplus labour) to Sylhet region during Boro rice harvesting while following lockdown guidelines.
8. Organise proper transporting system to (a) transport agricultural input from manufacturing and distribution centres to the farmers through private companies and (b) transport farm produce like food grain, vegetables, fruits, milk, meat, eggs, etc. from farm gate or local market to big cities
9. Educate farmers about biosecurity measures such as handwashing, wearing masks, staying home if sick and maintaining social distancing.





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## EXTENSION AND ADVISORY SERVICES AMID COVID-19: EFFORTS OF KVKs IN RAJASTHAN, HARYANA AND DELHI

To counter impacts of COVID-19 on agriculture, KVKs in Rajasthan, Haryana and Delhi are playing a proactive role. In this blog, **M S Meena and S K Singh** discuss this and suggest what more could be done to address the challenges.

India's ongoing lockdown to control the spread of coronavirus is threatening its agriculture sector. As it overlapped with the time of crop harvesting, the lockdown derailed threshing, harvesting and marketing operations. Lack of agricultural labour to help in harvesting and transportation of agricultural produce has worsened the situation. Meanwhile, poultry farmers in some states have been badly hit due to misinformation, particularly on social media, that chicken are carriers of COVID-19. India has taken early action to limit the spread of COVID-19, ordering a 21-day nationwide lock down for its population of 1.3 billion people starting 25 March 2020. Central and state governments have recognized the challenge and responded aggressively. Till 18 April, 11,906 cases of corona were active, 1991 cured, 480 deaths had occurred and one migrated. The nationwide lockdown has now been extended till 3 May. The lockdown period has been of great stress to farmers and farm families. The ICAR-Krishi Vigyan Kendras (KVKs) of Rajasthan, Haryana and Delhi states are proactively engaged with the Government of India, state governments and other local institutions to combat COVID-19.

### INITIATIVES OF KVKs TO COMBAT COVID-19

KVKs of Rajasthan, Haryana and Delhi are proactively engaged in issuing location specific advisories on crop, livestock, fisheries and other associated issues using information & communication technologies (ICTs). KVKs' are sharing information on markets, availability of critical inputs, maintaining social distance, facilitating the installation of Aarogya Setu app, immunity enhancing protocol, etc. Apart from these, a few KVKs are also engaged in specific activities to respond to COVID-19. These are discussed below:

#### Providing advisories

In accordance with directives issued by the Government of India, ICAR-ATARI,

Jodhpur provided advisories in English and Hindi to KVKs of Rajasthan, Haryana and Delhi. Advisories are uploaded on websites of ICAR-ATARI, Jodhpur and KVKs. Advisories issued by Govt. of India and state government

were delivered through various means of communications like WhatsApp, mKisan, print media, radio talk, phone calls and other ICT platforms (Box 1). Advisory services issued by KVKs is evident from table 1.

**Table 1: Extension and advisory services issued by KVKs of ICAR-ATARI, Zone-II, Jodhpur (10th April 2020)**

States/ KVKs	WhatsApp		mKisan	Print	Radio talks	Other ICT platforms	Call centres/ toll free number contact
	Total groups	Total farmers	Total farmers	Total news papers	Number	Total farmers	Total farmers covered
<b>Rajasthan (44)</b>	110	22120	299	249	5	4600	540
<b>Haryana (19)</b>	45	8750	5000	42	-	1890	223
<b>Delhi (1)</b>	5	340	0	5	-	134	34
<b>Total (64)</b>	160	31210	5299	296	5	6624	797

Source: Primary data

### Box 1: Some advisories issued for states of Rajasthan, Haryana and Delhi

1. ICAR advisory to farmers for Rabi crops (Ministry of Agriculture & Farmers Welfare) <https://pib.gov.in/PressReleaseDetail.aspx?PRID=1609604>
2. Guidelines applicable for farmers and farming sector during lockdown period due to COVID-19 <https://icar.org.in/content/guidelines-applicable-farmers-and-farming-sector-during-lockdown-period-due-covid-19>
3. State Advisory for Farmers during COVID-19 lockdown <https://kvk.icar.gov.in/download/StateAdvisoryforfarmers.pdf>
4. Lockdown support: farmers dial in to agri-experts for help <https://www.mssrf.org/content/lockdown-support-farmers-dial-agri-experts-help>
5. Instructions regarding prevention of spread of infection of COVID-19 during festivals in near future- '06/04/2020' [http://csharyana.gov.in/WriteReadData/Instructions/COVID-19/e\\_10939.pdf](http://csharyana.gov.in/WriteReadData/Instructions/COVID-19/e_10939.pdf)
6. Orders of officers deputed as District Incharge for Planning, Coordination and Monitoring the activities for prevention/control of COVID-19 - '03/04/2020' <http://csharyana.gov.in/WriteReadData/Transfers%20and%20Promotions/Services-II/10932.pdf>
7. Addendum to guidelines on the measures to be taken by Ministries/Departments of Government of India, State/Union Territory Governments and State/Union Territory Authorities for containment of COVID-19 epidemic in the country - '26/03/2020' [http://csharyana.gov.in/WriteReadData/Instructions/COVID-19/e\\_10906.pdf](http://csharyana.gov.in/WriteReadData/Instructions/COVID-19/e_10906.pdf)
8. CCSHAU to distribute free masks for families residing in the university campus <https://www.apnnews.com/ccshau-to-distribute-free-masks-for-families-residing-in-the-university-campus/>
9. COVID-19: Health Ministry issues advisory for aged people [https://economictimes.indiatimes.com/news/politics-and-nation/covid-19-health-ministry-issues-advisory-for-aged-people/articleshow/74884370.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/news/politics-and-nation/covid-19-health-ministry-issues-advisory-for-aged-people/articleshow/74884370.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)
10. Indian govt exempts agriculture-farming, allied activities from Covid-19 lockdown <https://www.thestar.com.my/news/regional/2020/03/29/indian-govt-exempts-agriculture-farming-allied-activities-from-covid-19-lockdown>

## काश्तकार फसल कटाई के दौरान बरतेंगे सावधानी, तो दूर रहेगा खतरा



रबी फसल कटाई का चल रहा है दौर

पत्रिका न्यूज़ नेटवर्क  
rajasthanpatrika.com

दुर्गपुर. कोरोना संक्रमण के दौर में खेतों में रबी की फसल काटने योग्य हो गई है और बड़ी संख्या में किसानों पर परिश्रम सहित इन दिनों अपनी खेती का फसल कटाई करने में जुटे हैं। इस दौरान खेती करने वाली विधियों एवं सावधानी को लेकर कृषि विज्ञान केन्द्र के वैज्ञानिक एवं प्रभारी डा. योगेश बलराज ने विशेष एडवाइजरी काश्तकारों के लिए जारी की है। काश्तकार इन सुझावों के अनुसार फसल कटाई कर कार्य करेंगे, तब यह कोरोना संक्रमण से काफी हद तक बच सकते हैं।

### तुरंत चिकित्सक से करें संपर्क

कटाई में बचका कि यदि किसी काश्तकार या अपने आसपास के खेत वाले लोगों को खासी, निरलस, कान बह, सर्दी और बुखार के लक्षण नजर आए, तो तुरन्त नजदीकी सरकारी अस्पताल से संपर्क करें। स्वस्थ रहने के लिए देरी फसल काटने से बचना चाहिए।



दुर्गपुर. सोशल डिस्टेंस की पालना के साथ फसल कटाई का काम कृषि विज्ञान केन्द्र के वैज्ञानिकों ने सुझाया है।

### ये बरतें सावधानियां

- फसल की कटाई यथा संभव मशीनों और जतों से करें।
- फसलों की कटाई देरी और जतों से करने की आवश्यकता है, ताकि कटाई से पूर्व एवं बाद में उपकरणों को सेनेटाइजर से धोएं। यह उपलब्ध नहीं हो, तो घर में उपलब्ध कपड़े धोने के डिटरजेंट के घोल में अच्छी तरह धो लें।
- फसल कटाई के दौरान घने गूँठ कपड़ों की बशिंग पहनाएं ताकि धूल में सूख जायें।
- फसल कटाई के दौरान मुँह को अपने मोटे टुकड़े आदि से अच्छी तरह बंद लें।
- खेतों से घर लौटने पर जित भी बदन से आ रहे हैं उनमें सभी एक दूसरे से अलग दिशा में मुँह कर लें।
- बदन की स्टेयरिंग, कलम, गिरस आदि की बशिंग पहनाएं ताकि धूल को बंद ही इस्तेमाल करें।
- अधिक से अधिक गर्म पानी का ही इस्तेमाल करें तथा नमकीन पानी के गुरारे करें।
- दोपहर को तेज धूप के दौरान किसी पेड़ या छांव में बैठने से बचें।
- कटाई के दौरान बंधी जाने वाली पूंजी का मुँह को कम खोजें।
- इससे एक ही व्यक्ति उसे साफ करने से उतावले न हों।
- खेतों में काम में आने वाली औजारों का परस्पर स्वयं-संक्रमण नहीं करें।
- पशुओं को नियंत्रित रखने के लिए बंधी गई बैन या रस्ती को भी बशिंग पहनाएं से धो लें।

## कृषि कार्य के दौरान रखें सोशल डिस्टेंस और सुरक्षा

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प्रतापगढ़. इस समय कोरोना के संक्रमण को रोकने के लिए देश भर में लॉक डाउन घोषित किया गया है। जिसके चलते लोगों को घरों पर रहने की सलाह दी गई है। लेकिन रबी फसलों की कटाई व श्रेश्रिंग का समय भी है। इसे ध्यान में रखते हुए खेती संबंधी कार्यों के लिए किसानों को कई रूप से छूट दी गई है। कृषि विज्ञान केन्द्र के वैज्ञानिक एवं प्रभारी डॉ. योगेश कनेजिया ने बताया कि कुछ सावधानियों को अपनाते हुए खेती के कार्य को पूरा कर सकते हैं। सरकार द्वारा दिए दिशा-निर्देशों, व्यक्तिगत स्वच्छता, मास्क का उपयोग, साबुन से उचित अन्तराल

पर हाथ धोना तथा एक दूसरे से सामाजिक दूरी बनाए रखने पर विशेष ध्यान दें। जिससे उन्हें खेती का नुकसान भी न हो और वायरस के संक्रमण से भी सुरक्षित रह सकें। फसल काटने एवं खाना खाते समय एक व्यक्ति से दूसरे के बीच कम से कम 1 मीटर की दूरी रखें। अलग-अलग पट्टियों में काम करें। खाने के बर्तन अलग-अलग रखें तथा प्रयोग के बाद साबुन के पानी से अच्छी तरह साफ करें। पानी की बोतल रखें और मुँह पर मास्क का प्रयोग करें। खेत में पर्याप्त मात्रा में पानी एवं साबुन या सेनीटाइजर की व्यवस्था रखें। उपयोग में आने वाले कृषि यंत्रों को भी साफ करें। समय समय पर उपकरणों साफ करते रहें।

पत्रिका Fri, 10 April 2020  
epaper.patrika.com/c/5081536

### Inspiring SHGs to help common people

Capacity building of farmers, farm women, youth and other stakeholders is one of the main tasks of all KVKs. KVKs are also involved in promotion of self-help groups (SHGs) and farmers producer organisations (FPOs). As face masks and sanitisers were not available in most of the markets, KVK, Kota took timely initiatives

to inspire SHG members and ex-trainee for the preparation of face mask and sanitisers.

Dr. Mahendra Choudhary, in-charge of the KVK stated, "We are inspiring our ex-trainees and 100 SHGs in the district to prepare face masks and sanitisers. The KVK is involved in knowledge management through application of ICT tools to cover more area." (Box 2).

### Box 2: Efforts of KVK, Kota

Bhoomi SHG at Nayagao have prepared 3000 face masks of which 500 were distributed among farm women, sweepers and others in need while 2500 were given at hospitals, grain markets, staff of jail and medical workers at a minimum cost @Rs.10 per piece. Another SHG, Albeli group at Thegada, made 8500 face masks. They distributed 500 masks among farm women, vegetable distributors and other needy persons of the area. About 8000 masks were supplied @Rs.12 per piece to other local institutions like Bharat Vikas Parishad hospital, Kota Heart hospital, Sudha hospital, Anta krishi upaj madi, etc.

Dr. Gunjan Sanadhya—Subject Matter Specialist (Home Science), stated that the KVK is supporting these women in preparing homemade sanitisers, educating them on nutritional and other aspects. KVK is delivering advisory to 100 SHGs through WhatsApp groups, she stated.



Bhoomi SHG member preparing face mask: Kota district, Rajasthan

An ex-trainee of KVK, Jhalwar, is preparing sanitising rooms to protect common people from COVID- 19 infection (Box 3).

### Box 3: Efforts of KVK, Jhalawar

Mr Ravinder Goswami, a trainee of KVK, Jhalawar, who is also an innovator and progressive farmer of Jhalawar district, has been inspired by the KVK to prepare a sanitising room costing Rs.10,000 -15,000. He adopted polyhouse technology from KVK and is now utilising the agriculture equipment for this purpose. Many items like fogging systems, sprayers, pipe and tank are available with him. He prepared six sanitising rooms and installed at the gate of city and other important places sanitise at entry. Now the demand of his sanitiser room is increasing and other organisations like Nagar Parishad also asked him to develop 15 sanitising rooms. One sanitising room was established at Jhalarapatan Police Station where the police staff get sanitised.



Sanitiser rooms at Jhalawar district

KVK, Hanumangarh-I, inspired Sangaria-based Gurunanak Kisan Club to engage in preparation and distribution of face masks. Dr. Anoop Kumar, in-charge of the KVK, said, "Club members are very eager to help common people by providing face masks and the KVK is providing technical help."

### Box 4: Efforts KVK Hanumangarh-I

KVK, Hanumangarh-I, and Gurunanak Kisan Club, Bhakarawali, are making a joint initiative to combat COVID-19. KVK, Hanumangarh motivated Ms Urmila Vishnoi from Sangaria to engage in preparation and distribution of face masks from 24 March 2020. She distributed more than 1500 face masks among local people.



Smt Urmila Vishnoi— Making face masks / Kisan Club at Hanumangarh district

## Box 5: Efforts of KVK Bundi

Dr. Kamla Mahajani—Subject Matter Specialist (Home Science) working at KVK, Bundi, noted, “We are promoting our ex-trainees and master trainers through WhatsApp and other ICT means to fight COVID-19.” We trained women trainees in preparation of hand sanitisers at home through video calling. Mrs Rinku Meena from Kesorai Patan is one of the trainees involved in preparation of hand sanitisers.

Mrs Anita Paliwal, a resident of Mayza village also prepared and distributed 1000 face masks during lockdown period.



Master trainer promoted by KVK, Bundi, to fight COVID-19

## KVK collaboration with All India Radio

KVKs, Chittorgarh, and KVK, Pratapgarh, are collaborating with All India Radio (AIR) Chittorgarh for delivering agro-advisory services to the farming community (Box 6).

## Box 6: KVKs and AIR, Chittorgarh, to combat COVID-19

Through Kisanwani programme of All India Radio, Chittorgarh, Subject Matter Specialists of KVKs have provided the following advisories:

- How to store agriculture produce (Dr. S.K. Agarwal)
- Weather forecasting and preservation of fruits and vegetables (Dr. Priyanka Swami)
- Health safety and agricultural operations (Dr. R.L. Solanki)
- Fruits and vegetables preservation (Mrs. Deepa Indoriya)

The reach of AIR, Chittorgarh, is 80 to 100 km, where the advisory was delivered to a population of nearly 20 lakh in the area.

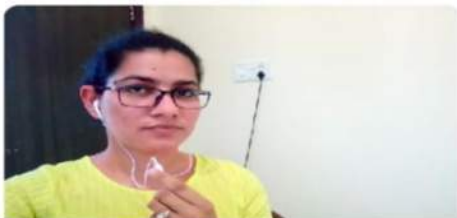
← Tweet



All India Radio Chittorgarh  
@Airchittorgarh1

दिनांक 15 अप्रैल 2020 को सायं 7 बजे से 7.30 के मध्य, किसानवाणी कार्यक्रम में आप सुन सकते हैं, भेंटवार्ता, मौसम पूर्व अनुमान और आगामी मॉनसून के बारे में जानकारी देंगी डॉ प्रियंका स्वामी, मौसम वैज्ञानिक, कृषि विज्ञान केन्द्र, चित्तौड़गढ़, और आपसे बातचीत कर रहे हैं, तेजराम मीना।

Translate Tweet



All India Radio Chittorgarh @Ai... · 1d

दिनांक 9 अप्रैल 2020 को 7.00 बजे से 7.30 से किसानवाणी कार्यक्रम में आप सुन सकते हैं, लॉक डाउन की स्थिति में अनाज को कैसे सुरक्षित रखें, जानकारी दे रहे हैं, डॉ एस. के अग्रवाल, कृषि विशेषज्ञ, कृषि विज्ञान केन्द्र चित्तौड़गढ़ और आपसे बातचीत कर रहे हैं, तेजराम मीना।



### Measures to avoid infections on KVK premises, public places and in stray animals

KVKs are committed to providing realistic, up-to-date information and resources to support essential work during the pandemic. KVKs are involved in spraying chemicals to avoid any contamination on their premises, equipment and other public places. However, there is a great need to make farmers aware in disposing off the used materials (infected items like mask, gloves etc.) to prevent from contamination with livestock or other animals. An advisory issued by KVKs asked the farmers to: *“Wash hands properly with soap or use sanitizer before and after carrying out field operations. Maintain at least one metre distance between workers. Prevent unknown persons from entering fields. Don’t spit, shake hands or hug each other during field operations.”*

### Maintaining social distancing at KVKs’ farms and farmers’ fields

Social distancing helps to minimize contact with those having COVID-19 infection. KVKs have persuaded their employees and farmers to practice social distancing while doing farm operations. This message was also conveyed to other stakeholders.

**Table 2: Efforts of KVKs in downloading Aarogya Setu app in Rajasthan, Haryana & Delhi states (on 10 April, 2020)**

State (s)	Total KVKs	Total KVK Staff	Staff downloaded App and registered	Farmers to whom message diffused	Total farmers downloaded app and registered
Rajasthan	44	419	380	4500	1860
Haryana	19	183	165	3640	1520
Delhi	1	16	14	257	89
<b>Total</b>	64	618	559	8397	3469

Source: Primary data

### MORE WORK TO BE DONE BY KVKs AMID COVID-19

All KVKs of Rajasthan, Haryana and Delhi are actively engaged in collaborating with many other organisation. However, KVKs should do more to address this challenge.

- Most states have introduced measures to market agricultural goods. KVKs should assist farmers with registration in online portals to help them market their farm produce.

### Installing Arogya Setu App and protocol for immunity boosting

Aarogya Setu app launched by the Union Health Ministry on April 2 helps users identify whether they are at a risk of COVID-19 infection. KVKs have informed farmers and other stakeholders in the respective districts to use the app. Till 14 April, 2020, a message for downloading the Aarogya Setu app was sent to 26,290 farmers of which 5815 have downloaded it.

Ministry of AYUSH has developed a protocol for immunity boosting measures for self-care. All 64 KVKs of Zone-II are making efforts to popularize these efforts among farming community.

### Other location specific initiatives of KVKs

KVKs are taking initiatives based on the situation and needs of each district. KVK, Udaipur-I, for instance, has already taken the steps to make a farm machinery bank with various agricultural machinery (cultivator, seed drill, multi crop threshers tractor, mould board plough, etc.) to help farmers. KVK, Sikar, is engaged in distribution of fodder to stray animals. Similarly, other KVKs are also involved in implementing location specific interventions to deal with COVID-19.

- KVKs should encourage more SHGs, FPOs, kisan clubs to help their members in downloading Aarogya setu app.
- ICAR has a large network of 64 KVKs across Rajasthan, Haryana and Delhi that can be used as quarantine centres, if need be.
- Specific advisories (crop, animal, fishery-based, etc.) must be issued in local languages to farmers, farm women, youth and other stakeholders through ICTs.

- KVKs and other departments must ensure timely availability of agricultural equipment and inputs for minimum cost. For this purpose, other ICT platforms must be used in addition to print media, forums, WhatsApp groups, mKISAN web and FM radios.
- KVKs must train other organisations to produce face masks and sanitisers.
- KVKs are providing quality seeds of green gram, small millets and other crops to partner farmers for conducting cluster front line demonstrations. However, seed produced in farmers' fields in participatory mode will also have to be promoted through farmer-to-farmer extension.

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## COVID-19: How EAS can support Livestock and Poultry Farmers during Lockdown

COVID-19 pandemic has adversely impacted Indian farmers rearing livestock and poultry. In this blog, **Mahesh Chander, M S Kannadhasan and Raj Kumar Patel** discuss these new challenges, the interventions being made to address them and more that can be done to support farmers during and after the crisis.

Lockdown has caused disruptions in livestock and poultry value chains in India, leading to a fall in procurement and sale of animal sourced food. Animals are suffering due to lack of adequate feed and veterinary care. Farmers' problems are further aggravated by rumours and fake news linking animal products and COVID-19. All these are adversely affecting farmers' income and economy at the state/national level (Box 1). Besides farmers, pet lovers are also in need of advice for saving their animals.

### Box 1: Hardship reports on livestock and poultry farming

#### Livestock industry and value chain

- Milk is selling at about half price. From Kashmir to Kanyakumari suffering is widespread
- Coronavirus impact: Dairy industry faces 30% dip in demand
- Dairy firms witness fall in milk demand due to lockdown
- Coronavirus: Gallons of milk go down the drain amid lockdown
- Are Mother Dairy milk supplies on track? Check what problems the company faces in lockdown

#### Poultry sector

- Crisis cuts to the bone
- COVID-19 scare hits poultry industry, birds culled in Karnataka
- COVID-19 impact: Buyers chicken out; demand drops 60%
- COVID-19: With projected losses of Rs 22,500 crore, Indian poultry sector seeks Centre's intervention
- Lockdown hits poultry farmers hard

#### Problems faced by pets and butcheries

- COVID-19: Animal rights advocates want illegal pet, meat marts shut

#### Problems due to rumours

- COVID-19 rumours hurt India's poultry industry

Due to movement restrictions imposed during lockdown, farmers are unable to collect feed and fodder for their animals. Restricted inter- and intra-state movement of supplies adversely affected feed manufacturing and distribution. Police officers in most



places are stopping farmers from taking their animals to veterinary institutions. Transporting and selling animal products is yet another problem. Though veterinary hospitals and dispensaries are exempted during lockdown, veterinarians and the field staff of Animal Husbandry departments are finding it difficult to reach their workplaces due to lack of public transport and restrictions on use of personal vehicles.

Besides these, both farmers and consumers of Animal sourced food (ASF) are fearful and insecure about animals and use of ASF during this period. They often ask:

- Do animals have any role in COVID-19 pandemic?
- How to protect animals, including companion animals, from humans infected or suspected to be infected with

COVID-19?

- Is it safe to eat animal sourced food during COVID-19 pandemic?
- What are the precautions to be taken with animals and animal products?

These questions need to be answered for safeguarding animal and human welfare. Early action is needed to invalidate fake news and educate people to take precautions. Livestock and poultry farmers need information about several such aspects during lockdown (Box 2).

Livestock extension and advisory services (EAS) are expected to support farmers to overcome these challenges during this difficult period. How successful has EAS been in promoting production and health care practices, alongside provision of marketing information? This blog will attempt to answer.

### Box 2: Farmers' needs on knowledge and skills/practices during lockdown

- Health emergencies: Homestead remedies and first-aid
- Feeding: Inclusion level of feed from alternative feed resources (AFR) and practices to overcome adverse effects of overfeeding
- Breeding: Management practices to deal with estrous, pregnancy, repeat breeders, anestrous and pre-, peri- and post-partum management
- Housing: Animal house disinfection and precautions while using disinfectant
- Marketing: Sale at farm gate and sale directly to consumers
- Schemes: Government schemes to avail eligible benefits
- Credit and insurance: Availing/renewing credit and insurance facilities
- Weather related information: Advisories such as summer management practices



### EXTENSION INTERVENTION AND INITIATIVES DURING LOCKDOWN

#### Initiatives by Government of India

The Government of India exempted veterinary services from lockdown restrictions. Addendum to guidelines, annexed to the Ministry of Home Affairs' Order No 40-3/2020-DM-I (A) dated 24 March, released 25 March, 2020, permitted veterinary hospitals under Clause 3 and directed

authorities to implement.

The Government of India, Ministry of Home affairs, issued consolidated revised guidelines on the measures to be taken during lockdown 2.0 across the country except in containment zones from 20 April to 3 May, 2020, vide its order No. 40-3/2020- DM-I(A) dated 15 April, 2020. This makes several animal husbandry activities permissible (Box 3).

### Box 3: Lockdown 2.0 guidelines for animal husbandry activities from 20 April, 2020

#### Under 5. All health services (including AYUSH) to remain functional, such as:

- Veterinary hospitals, dispensaries, clinics, pathology labs, sale and supply of vaccine and medicine
- Movement (inter and intra state including by air) of all medical and veterinary personnel, scientists, nurses, paramedical staff, lab technicians, midwives and other hospital support services, including ambulances.

#### Under 6. Agricultural and related activities and (D). Animal husbandry

- Collection, processing, distribution and sale of milk and milk products by milk processing plants, including transport and supply chain
- Operations of animal husbandry farms including poultry farms, hatcheries and livestock farming activity
- Animal feed manufacturing and feed plants including supply of raw material such as maize and soya
- Operation of animal shelter homes including Gaushalas.

#### Under 13. Supply of essential goods is allowed, as under:

- Shops and carts dealing with dairy and milk booths, poultry, meat and fish, animal feed and fodder etc. should be allowed to operate while observing strict social distancing, without time restrictions of operation.

#### Under 17. Movement of persons is allowed

- Private vehicles for emergency services including medical and veterinary care.

In many places, livestock farmers are not yet aware of the exemptions and activities permitted during lockdown.

#### State level initiatives

Comparison of state level notes on advisories to farmers on livestock and poultry farming is presented below:

**Table 1: A comparison of advisories to farmers during lockdown**

Permission / advice	GJ <sup>5</sup>	MN	MZ	NL	RJ	SK	TN	TR	WB
<b>Feed/fodder</b>	√	-	-	-	-	√	√	-	-
<b>Medicine and treatment</b>	√	-	-	-	-	√	√	-	-
<b>Movement of animal &amp; products</b>	-	-	√	-	-	-	√	-	√
<b>Animal products' shops and establishments</b>	-	√	-	-	-	-	-	-	-
<b>Shelter hygiene</b>	-	√	√ <sup>1</sup>	-	√	√	-	-	-
<b>Drinking water</b>	-	-	-	-	√	-	-	-	-
<b>Advice on feeding</b>	-	√ <sup>2</sup>	-	√ <sup>3</sup>	√	√ <sup>4</sup>	-	-	-
<b>Feed collection from forest</b>	-	-	√	-	-	-	-	-	-
<b>Social distance by staff</b>	-	-	-	-	-	-	-	√	-

<sup>1</sup> Changing litter material in poultry shed

<sup>2</sup> Feeding advice on pig

<sup>3</sup> FVWs to animals and tapioca to pig

<sup>4</sup> Mineral mixture and tree fodder

<sup>5</sup> GJ-Gujarat, MN-Manipur, MN-Mizoram, RJ-Rajasthan, SK-Sikkim, TN-Tamil Nadu, TR-Tripura & WB-West Bengal

Though it is a nation-wide lockdown, inter-state variations aggravate problems and constraints on farmers. Some state governments have taken specific measures to support livestock and poultry farming (Box 4).

**Box 4: State level initiatives to support livestock and poultry farmers**

- In Uttar Pradesh: Corona Virus Spread Has No Relation to Consumption of Poultry: Animal Husbandry Department
- Haryana to revive the distressed poultry industry, becomes a model to educate residents of the state on consumption of eggs and chicken
- Government of Tamil Nadu plans to sharpen abattoir norms for safer meat
- Fodder for cattle soon: Minister Talasani, Telangana
- Maharashtra govt to organise 'chicken parties' to dissipate fear of coronavirus
- COVID19: SOP prepared for Nagaland farmers
- Amid coronavirus scare, Meghalaya govt says poultry products safe

**Guidelines shared by National Dairy Development Board (NDDB)**

NDDB has disseminated essential advisory material to dairy federations across the country. It has developed and shared guidance documents including Measures to contain the spread of the COVID- 19 virus, Guidelines for prevention of COVID-19 and Ethno-veterinary

**Table 2. KVK interventions amid COVID-19 lockdown**

S No.	Institute	Extension intervention
1	KVK, Ernakulam, under ICAR-Central Marine Fisheries Research Institute (CMFRI)	Door delivery facility for the fish lovers of Kochi
2	The Sahbhagita, a self-help group formed by the ICAR-Central Institute for Subtropical Horticulture(CISH), Lucknow, Uttar Pradesh (Box 5)	Promotes egg and chicken production in the mango belt of Malihabad
3	ICAR-Indian Veterinary Research Institute including KVK of ICAR-IVRI, Izatnagar, Uttar Pradesh	Timely information to livestock farmers via WhatsApp , YouTube, Facebook, mobile apps, KVK portal, All India Radio including presentation via Zoom

**Box 5: Shri Mohammad Shafiq's experience**

Sharing his experience of poultry production, Shri Mohammad Shafiq stated that during the lockdown he is earning Rs 300 per tray or Rs 30 per egg in the case of eggs from Kadaknath breed. Trained farmers and Senior Research Fellow (SRF) of CISH, Lucknow, who are posted in the village proved to be very helpful in educating farmers about social distancing and hygiene.

**Strength and limitations of livestock extension system in India**

The scope of social media in offering EAS is tremendous during COVID-19 lockdown. Social media such as WhatsApp, Telegram, Facebook and YouTube are successfully used

medicine (EVM). It issued an advisory and directed dairy cooperatives to make suitable arrangements for ensuring uninterrupted functioning and fodder availability in villages.

**Advisories from ICAR – Indian Veterinary Research Institute (IVRI)**

ICAR-IVRI has released advisory for livestock owners during COVID-19 Lockdown in English and Hindi in public interest. These advisories are on do's and don'ts, homestead health care, preventive and protective measures to be taken across the value chain and by consumers, value addition and FAQs, myths and facts about COVID-19 etc.

**Krishi Vigyan Kendras (KVKs)**

KVKs are issuing location specific advisories on crop, livestock, fisheries and related matters using information and communication technologies (ICTs). Also, they are sharing information on markets, availability of critical inputs, maintaining social distance, facilitating the installation of Aarogya Setu app, immunity enhancing protocol, etc. Also, a few KVKs are engaged in specific activities to respond to COVID-19 (Table 2). However, KVKs may not have subject matter specialists in Animal Sciences, Extension and Fisheries, which can restrict their advisories to crops.

by extensionists to offer EAS. Also, social media can be used to disseminate truthful and factual information to counter fake news (Box 6). While disseminating information including input dealers is beneficial.

### Box 6: Myth busters from authentic sources

- Myth busting by Government of India
- Questions and answers on the 2019 Coronavirus Disease (COVID-19) by World Organization for Animal Health (OIE)
- Coronavirus disease (COVID-19) advice for the public: Myth busters by World Health Organization (WHO)
- No evidence that animals can transmit the coronavirus to humans by Food and Agriculture Organization (FAO)

### Box 7: Strength of livestock extension system in India

- Multiple agencies involved brings pluralism
- Potential and boon of using ICT tools
- Gaining attention of policymakers
- State departments started establishing exclusive extension wing/department
- Fit for Public-Private-Partnership (PPP) model of convergence and sharing of resources
- Potential of farmer-to-farmer extension

### Box 8: Limitations of livestock extension system in India

- Grossly neglected: State Departments of Animal Husbandry (SDAH) focus on animal health with negligible extension
- Lack of exclusive livestock extension policy, system and regulatory network
- Not fit for agriculture extension model
- Poor and inadequate infrastructure
- Lack of investment in livestock extension activities
- Shortage of technical manpower in extension (Only 34,500 veterinarians against the requirement of 67,000)
- Lack of demarcated role and responsibilities of extensionists
- Lack of nutrition-centric approach
- Very little flexibility to modify extension programmes
- Poor linkage between veterinary university and SDAH
- Lack of extension research

This in turn reflects in poor performance at the field levels. Despite the large number of livestock in India, livestock extension remains grossly neglected. The outnumbering of strengths (Box 7) by limitations (Box 8) reflects poor EAS at field level. Hence, mission mode approach is needed to deliver EAS amid COVID-19 lockdown.

### WHAT MORE NEEDS TO BE DONE?

Various stakeholders in the livestock and poultry sector need to stay connected through social media, follow etiquette and collaborate their efforts in EAS by playing their roles as mentioned in Table 3.

**Table 3: Role of varied stakeholders**

SNo.	Stakeholder	Roles during COVID-19 lockdown
<b>I</b>	<b>Policymaking (National and State level)</b>	
1	Ministries and departments	<ul style="list-style-type: none"> <li>• Formulating and circulating guidelines on EAS which should also be nutrition-centric and consumer-centric</li> <li>• Knowledge management/guidelines to frontline EAS institutions</li> <li>• Updating guidelines based on problems addressed through call history of Kisan Call Centre (KCC) and browsing history on search engines</li> </ul>
2	National Institute of Agricultural Extension Management (MANAGE)	
3	ICAR	
4	Centre for Research on Innovation and Science Policy (CRISP)	

<b>II</b>	<b>Planning (District level)</b>	
1	District administration	<ul style="list-style-type: none"> <li>• Planning and implementing district EAS action plan involving stakeholder departments, private, voluntary and farmers' organizations</li> <li>• Circulating orders and guidelines to implementing departments</li> <li>• Addressing problems and needs through mass and social media and EAS</li> <li>• Representing farmers' problems with proposed solutions</li> <li>• Communicating marketing information</li> <li>• Using digital opportunities to offer EAS</li> </ul>
2	Department of Animal Husbandry (DAH) and allied departments	
3	Extensionists/SMSs/faculties from ICAR /SAU/SVU/CAU	
4	Supporting actors such as FPOs, CIGs, co-operatives, input dealers and NGOs	
5	District level National Information Centre (NIC)	
<b>III</b>	<b>Implementation (District to village level)</b>	
1	Local panchayats and Municipalities	<ul style="list-style-type: none"> <li>• Implementing action plan</li> <li>• Using government machineries for EAS</li> <li>• Following action plan and guidelines</li> <li>• Offering EAS including marketing information at work place, field and through social media</li> <li>• Using supporting para-EAS providers</li> <li>• Motivating farmer-to-farmer extension (F2FE)</li> <li>• Acting as para-EAS providers</li> <li>• Providing market information</li> <li>• Keeping information link with extensionists</li> </ul>
2	Extensionists and veterinarians	
3	Input dealers, NGOs, volunteers, FPOs, CIGs and co-operatives	
<b>IV</b>	<b>End-users/beneficiaries (Grass-roots level)</b>	
1	Farmers, farm women and youth	<ul style="list-style-type: none"> <li>• Communicating needs and problems</li> <li>• Following/practicing EAS</li> <li>• Self-awareness on fake news</li> <li>• Educating others against fake news</li> <li>• Performing F2FE</li> </ul>
2	Other core actors of value chain such as aggregators, middlemen, traders and butchers	
<b>V</b>	<b>Active supporters</b>	
1	Press and media	<ul style="list-style-type: none"> <li>• Reporting actuals and needs of farmers directly from farmers' field</li> <li>• Disseminating information on EAS</li> <li>• Trusting authentic information</li> <li>• Reporting doubtful news to authority</li> <li>• Educating others against fake news</li> </ul>
2	Non-farmers including consumers	

There is no real livestock extension in the country as the emphasis has been mostly on treatment and vaccination. The roles of stakeholders mentioned in Table 3 are, predominantly, irrespective of lockdown. However, these would be useful for future interventions.



### Specific roles for Livestock EAS

#### Enhancing EAS delivery through online and social media

- Webpages of official websites of EAS offering institutes, containing advisory information on animal keeping and management during lockdown, should be made directly accessible without sign up at free of cost
- Options for online feedback
- Periodical short brief on extension talks should be circulated in social media.

#### Potential of FPOs and cooperatives

The potential of FPOs and cooperatives needs to be effectively utilized by EAS to help farmers sell their products and share information and updates on farming. But FPOs, despite efforts made, are not in good numbers, particularly in livestock and poultry sector. Cooperatives carryout EAS as one of their mandates. Similarly, cooperatives in livestock and poultry sector, except dairy cooperatives, are also few in number.

#### Strategies for using traditional mass media

- Information broadcast on radio and television to harness the flexibility and ubiquity of mass- media technologies effectively

- Volunteerism by newspapers in allotting exclusive page or column for information on livestock and poultry farming written by SMSs/extensionists/faculties of EAS offering institutes is desirable
- Community radio is a good means to connect with farmers because of their strengths in local dialects, local issues and solutions with community participation. But, only a few institutions are effectively running these.

#### EAS to pet animal owners

The fear of COVID-19 has been reflected by pet lovers too. Extensionists should alleviate their fear and depression by giving advisory services and counselling as per 'One health' concept that explains human health and animal health are interdependent and bound to the health of the ecosystems in which they exist.

### LESSONS FOR THE FUTURE

#### Extensionists' competency development:

Extensionists need to be trained on next generation extension tools and New Extensionist Learning Kit (NELK) for providing EAS during crisis. The Module 13: Risk Mitigation and Adaptation in Extension could be particularly useful to handle crisis situation.

**Alternative Feed Resources (AFR) origin:**

Extensionists should disseminate information on level of feeds of AFR origin such as commonly available fruits and vegetable wastes (FVWs). EAS providers in livestock sector can become acquainted with the utility of various FVWs to guide farmers in making good use in animal feeding. Policymakers need to consider AFR while formulating livestock and poultry extension policies and programmes.

**Need for technology:** Problems which need new technology to confront crisis have to be addressed and communicated as feedback to researchers. Such feedback in general is often missing.

**Inclusive social network:** Developing a social network involving all the stakeholders of EAS for timely information dissemination to all agricultural subsectors.

**Farmer Producer Organization (FPO):**

Livestock and poultry farmers have to be supported to form FPOs by Small Farmers' Agribusiness Consortium (SFAC) and National Bank for Agriculture and Rural Development (NABARD). FPOs need to be trained to play their role in EAS.

**Marketing intelligence:** Training in marketing intelligence needs to be imparted to face new customers and new markets.

**Farm tours:** Animal products from commercial farms are susceptible to fake news. To overcome this, commercial farmers should organize farm tours showing their farm hygiene.

**Awareness exercise:** Awareness through social media on related law and regulations for all the stakeholders of EAS needs to be conducted with more emphasis on farmers.

**Data mining perspective for social media:** To curb rumours, data mining perspective needs to be inculcated.

**Extension and education never end:**

Stakeholder meetings need to be conducted to document their experience and feedback. The reason, factors and resources responsible for EAS delivery need to be discussed for better EAS during future crisis.

We know ASF is crucial for healthy human life. In India, difficulties faced by farmers in availing timely EAS is more severe during COVID-19 lockdown. Therefore, it is important to collaborate and coordinate with stakeholders to disseminate timely EAS to farmers and consumers.

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## PREPARING FOR THE 'NEW NORMAL' – AGRICULTURE AMIDST THE COVID-19 PANDEMIC

COVID-19 continues to claim lives and disrupt livelihoods around the world. While strengthening immediate relief activities **Arun Balamatti** recommends a few priorities for the future to the government of Karnataka, specifically for irrigated and dry land areas. He outlines a three-pronged strategy for dry land areas – reducing migration of small and marginal farmers to urban areas, keeping them productively engaged in their villages, and strengthening the seed system in favour of food and nutrition security.

## CORONA VIRUS ALTERS THE WORLD

Just four months ago, in December 2019 to be precise, no one imagined that a trivial virus would shake the morale of almost every country in the world and that economies would take a beating. The speed with which the Corona virus is spreading and the pace at which the key sectors of the economy is tumbling is very disconcerting. Industries have shut down leading to loss of employment in the millions; surface, air and sea transport have come to a standstill severely jolting service sectors such as tourism and hospitality. The impact is global and phenomenal.

## IMPACT ON AGRICULTURE WILL BE FAR-RANGING

Predictably, COVID-19 hasn't spared agriculture. Make no mistake, the impact on agriculture is likely to be much worse than on the other sectors. While losses in the secondary and tertiary sectors are being keenly debated in Europe and the USA, we in India are even more concerned about the implications on the primary sector. Since a vaccine to combat COVID-19 remains elusive, the discussions and debates at the moment, are centred around how long? what next? what should governments do? how should industries be responding? how many lives will be affected? and how hard will livelihoods be affected? and so on. Serious efforts on rebuilding are yet to commence. Those of us who have learnt one important lesson in the last two months – that our health depends on what we eat and not on doctors' prescriptions – have every reason to believe that there is going to be a significant shift in agriculture, globally.

## Farming can neither halt nor wait

The immediate concern, however, is that once the measures of rebuilding are initiated the revival of industry and service sectors is likely to be much faster



than of the agricultural sector for the simple reason that agriculture largely plays out at the mercy of the weather. On the other hand, although current losses in other sectors are enormous, the impact on agriculture is quite likely to be both in the near future as well as in the long run. The analogy in agriculture is not to a train, which stops when there is no driver or fuel and begins moving the moment you have both, but rather to time, which just must keep on moving. Lockdown or otherwise, everyone needs food at least twice a day, every day. More importantly, for farming to sustain, one needs to keep nurturing precious natural resources - soil, water and biodiversity. Farmers and farming have no choice but to keep going. Should COVID-19 continue to play havoc beyond June 2020 the impact is unlikely to remain limited to the economy alone. Our social and cultural foundations will also experience the tremors. Social media is already abuzz with messages announcing that the human race is not really indispensable to Nature.

Currently, farming is facing two challenges on account of the national lockdown. One, the farmers are struggling to harvest their Rabi crop due to shortage of labour and the uncertainty of marketing. The panic is especially among those farmers who have grown highly perishable fruits and vegetables. Two, for the government, if this has to do with the challenge of 'aggregation' the other challenge is about 'distribution'. Despite the existing supply and demand the restrictions on traders and the movement of vehicles have become hurdles affecting smooth distribution. The government, of course, has recognized these challenges and has swiftly moved into action on a war footing by listing farm produce as essential goods. The concern and proactive measures taken by the government are laudable.

### **The Present must not Eat into the Future**

Just as it happens during every calamity – whether it be an earthquake or a flood – the commotion and shock following the calamity demand full attention and drain out resources. The immediate 'relief' works jeopardise the government's ability to deal with post-calamity challenges viz., 'rehabilitation' and 'reconstruction'. Therefore, to be able to effectively deal with both the short-term and

the long- term impacts, the government should focus on planning and preparing for both these situations.

### **The Immediate Priorities**

In the short run, the government should aim at strengthening its efforts of aggregation and distribution by roping in traders, transporters, Farmer Producer Companies (FPCs), software experts and start-ups. The government should address the immediate relief work through its 'facilitation' role by bringing together the various players ensuring maximum attention and minimum use of resources. The next priority should be on simultaneously initiating preparations for the coming Kharif and Rabi seasons.

### **What Lies Ahead**

COVID-19 has come as a total surprise. The effects are expected to be widespread and unimaginable at this stage. In the middle of national lockdown 3.0, it is hard to predict the precise nature and scale of impact on agriculture. Two episodes in the recent past nevertheless offer some clues as to what could possibly be in store. One is the heart-wrenching image of migrant labourers walking from many cities back to their villages, and two, the anguish with which many farmers are either letting their crop rot in the fields or throwing it away on the streets. Both these incidents are bound to influence agriculture in different ways.

### **Agriculture is Multi-dimensional**

The long-term implications of these two incidents are multiple. If our future plans are to be relevant and if those plans are to succeed, we must avoid one cardinal mistake, that of considering agriculture as uni-dimensional. A 'one-size-fits-all' approach to planning just doesn't work in agriculture.

Agriculture has two major dimensions: irrigated and dry land. They are two different forms that demand different sensitivities, strategies and plans.

Under irrigated agriculture a farmer is certain of one of the most critical resources - water. This very fact enables the farmer to look for technologies, urges him to invest, compels him to take regular care of the crop, and often

assures him of a decent return. Therefore, there is scope for use of high yielding varieties and hybrids, mineral fertilizers and plant protection chemicals (PPC) in irrigated agriculture. 'Wealth creation' through high investment and returns are but natural expectations.

On the contrary, the often uncertain and ill-distributed rains are the only source for meeting the moisture requirement of the crops in dry land farming. Since rainfall is uncertain the

farmer is always hesitant to accept technologies and invest in high-cost inputs. Under these circumstances farmers tend to look for crops and varieties that can be grown with minimum investment and care. Wealth creation, hence, is a distant possibility here. However, it is wrong to consider farming and farmers in dry lands as a drag on the economy. After all, it is the dry land farmers who generate their own employment and produce their own food.



### **PRIORITIES FOR THE PRESENT AND PLANS FOR THE IMMEDIATE FUTURE: PROSPECTS FOR KARNATAKA**

In the context of the impact of dreadful COVID-19 here is an indication of how agriculture might unfold in two different situations based on which the Karnataka government could begin preparations to meet the challenges arising in the seasons ahead.

#### **Irrigated agriculture**

Karnataka has about 13 million hectares of arable land of which a mere 30 per cent is irrigated. Yet, the state has made a mark for itself nationally and internationally in coconut, banana, dairy, poultry, sericulture and vegetable production. The financial and the resulting psychological setback suffered by farmers on account of the national lockdown is bound to shrink the area and production of seasonal fruits and vegetables, especially the crops requiring

expensive inputs. The possible reduction in area and production of fruits and vegetables, major sources of protein and vitamins, could affect nutrition security, more so among the poor; this is apart from the serious setback to the incomes of both the farmers and the State. The government should therefore plan a special package for farmers – providing critical inputs like seeds/seedlings, fertilizers and Plant Protection Chemicals (PPCs) on subsidy – and also announce encouraging procurement prices ahead of the season.

This is the most opportune time for the government to revisit the Horticultural Producers Cooperative Marketing and Processing Society (HOPCOMS). While the cooperative needs to be strengthened and geared up to play a major role in aggregation and distribution, the State appears to be reluctant to visualise such an opportunity. Being a typical cooperative, HOPCOMS is bogged down by issues such as lack of

entrepreneurship, political interference and favouritism. Its infrastructure, such as ripening chambers, cold storages and the network of retail outlets, is selectively active and often underutilized. Waiting for the farmers to bring their produce to the designated procurement centres and procuring only part of the farmers' produce has been a deterrent; the disconnect between the agency and farmers is only growing. It is an irony that the same Department of Horticulture, which is promoting FPCs throughout the State, is also running the HOPCOMS. The simplest way to turn the problem into an opportunity is to let some of the FPCs run the HOPCOMS in a few districts as pilots, and also experiment with outsourcing district units to start-ups. The worst thing to allow at this point is letting the production in irrigated areas decline – not on account of the challenges being faced by the farmers – but because of poor support systems. The situation calls for innovations in crop choices, production technologies, linking producers to consumers, and value addition.

The government, at the moment, although appearing concerned and showing the inclination to walk the extra mile, is doing little. Except for allowing the farmers to sell their produce directly to consumers (which is not really possible and feasible for all farmers, and there shouldn't really be a prohibition on such a practice in the first place) and pressing municipal corporations into door-to-door delivery of fruits and vegetables, there aren't any impact-making policy shifts on the cards.

### **Dry land agriculture**

As always, the enormity of challenges under any crisis is most severe in dry land areas. Harsh agro climatic conditions, lack of access to resources, and poverty are but a few reasons. The challenges in dry land areas will be more demanding due to its sheer magnitude. Of the 60 million total population in Karnataka 40 percent are farmers and farm labourers (24 m). About 70 percent of these are dependent on dry farming (nearly 17 m). The State has about 7.2 million landholdings of which 92 percent are below 4 ha (small and marginal holdings). Majority of the food crops such as coarse cereals, minor millets and pulses are grown in dry lands.

There should be a three-pronged strategy for dryland areas:

**Reducing Migration:** Cash-starved small and marginal farmers would prefer migrating to urban areas in search of wage employment at the immediately available opportunity leaving their farms fallow. But, since the construction, travel, tourism and hospitality industries in urban areas have been severely affected by COVID-19 and are unlikely to resume and reach 'normal' in the near future, most of the farmers exiting agriculture are unlikely to get gainful employment. There is a serious threat to income and food security in dry land areas.

**Productively engaging farmers in the villages:** The only means of easing this impending crisis is for the government to find ways of ensuring that farmers remain in their villages. This could be done by intensifying soil and water conservation activities in the next three months under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) and encouraging farmers to grow hardy crops as the Kharif season commences. The government has earnestly initiated works under MGNREGS.

**Strengthening seed systems:** The next step is ensuring availability of adequate quantity of seeds of those crops that thrive in dry lands, such as sorghum, pearl millet, finger millet, minor millets, and many pulses. Although the government claims there is enough seed in stock, it was in anticipation of a normal season. There is now a 'new normal' where more area and most of the farmers need to be engaged in farming.



## FINAL WORDS

Crises not only create problems but also throw up many opportunities. There are opportunities that could be turned into solutions. Thanks to research in dry land agriculture, there are resilient crops and varieties that promise both food as well as nutrition security. What is more, there are varieties that grow in 2-3 months. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, in partnership with state agricultural universities (SAUs), has developed super short-

duration varieties of pearl millet, chickpea and pigeonpea. The government could encourage these institutions to pool the available seed material and immediately initiate large scale seed multiplication programme by SAUs, KVKs and farmers, so that the actual seed availability by July 2020 is a lot more than what it is now. The MGNREGS works for the immediate three months and the seeds made available for the following 3-6 months should ensure that farmers stay in villages where they belong, and do what they are best at – farming.

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## GEARING UP SRI LANKAN TEA INDUSTRY TO MINIMIZE ADVERSE IMPACT FROM COVID-19

In this blog, **Lalith Amarathunga** discusses how varied stakeholders in Sri Lankan tea industry are revising their strategies to protect the tea sector from the adverse fallout of COVID-19 and suggest what more could be done to address the challenges.

Tea industry plays a significant role in the economy of Sri Lanka. Total tea production of the country in 2017 was 307.08 million kg of which 288.98 million kg (94% of production) was exported, earning Sri Lanka LKR (Sri Lankan Rupee) 233.3 billion (Central Bank, 2017). The sector provides direct or indirect employment to about two million people both in smallholding and plantation sectors in Sri Lanka, which is 9.8 % of the total population (Box 1).

### Box 1: Employment pattern in tea sector

The tea industry is composed of two main subsectors; the corporate subsector or the large plantation companies, and tea smallholdings. Smallholders contribute over 70% of the country's tea production, while the remaining production comes from plantations. Over two million people in plantation and smallholding sector are directly or indirectly dependent on the tea industry. The vast majority of tea pluckers and wage workers, both on plantations and smallholdings, are female. The collection of tea green leaves for factories takes place through factory agents, smallholder societies, licensed collectors or direct supply by smallholders. The producer and the consumers are linked with many intermediaries such as the exporters, brokers, blenders and packers. The Sri Lankan tea supply chain comprises of both state-owned and non-governmental organizations, all of which play valuable part in the Sri Lankan tea supply chain. This supply chain of tea involves a large no of individuals with different social status and different segments that are interconnected with each other. Any change in each category/segment due to natural consequences, drought, flood, pandemic or market fluctuation can seriously affect the overall tea industry and finally, health of the Sri Lankan economy.

### COVID-19 IN SRI LANKA

Since the origin of the COVID-19 in December 2019 in Wuhan, China, the Sri Lankan authorities stepped up vigilance to control the virus. The national health system, military forces and the national

intelligence service were put on high alert. The government created specialized aviation and border control expert teams to track the movement of all inbound tourists. Since the first case of COVID-19 reported on 27th January in

Sri Lanka, the total cases confirmed up to 27 April 2020 was 584 of which 126 recovered in the country. Seven deaths were reported. The government has taken several measures to contain the spread of COVID-19 (Box 2).

### Box 2: Sri Lankan Government Intervention to contain the spread of COVID-19

The Sri Lankan Government has taken several steps to control the spreading of corona virus in the country. Accordingly, the government has requested the general public to practice social distancing, hygiene and self- quarantine methods to prevent infection. With increasing incidence of new cases, the government authorities declared few days as national public holidays except for health, banking, food supply and transportation to control the spread of coronavirus in the country. They also imposed island-wide curfew to cease all public gatherings and movement. The large number of cases reported main urban districts such as Colombo, Gampaha, Kalutara, Puttalam, Kandy and Jaffna were totally locked down whilst curfew has been imposed with intermittent relief in other districts including major tea growing districts such Ratnapura, Galle, Matara, Kegalle, Nuwara Eliya, Badulla etc. Although, plantation workers and smallholders are mostly vulnerable to pandemics no significant cases were reported so far in the above tea growing districts with the preventive arrangements taken by government authorities.



### GOVERNMENT INITIATIVES TO SUPPORT THE AGRICULTURAL SECTOR DURING COVID-19

Keeping in view the importance of continuing main farming operations such as planting, harvesting, processing etc., government

authorities allowed continuation of activities in all regions while keeping social distance and practicing hygiene measures introduced by health authorities. On the directives of the President of Sri Lanka, the Minister of Plantation Industries and the Police have extended assurances to the industry that it

will be granted all necessary authorizations to conduct its operations and movements without hindrance. As a critical export orientated industry, the tea sector has been granted special status, which would warrant complete cooperation of relevant State agencies to conduct its legitimate activities uninterrupted. In addition, the President of Sri Lanka ordered the banking sector not to overburden the coronavirus-hit segments of tea sector by extending the payback period of bank loans by another six months. This would ensure that the smallholders, a vital component of the tea industry, contributing towards most of the country's tea production are safeguarded and would be able to harvest their crop.

## **SPECIFIC INITIATIVES FOR THE TEA SECTOR**

### **a) Tea Smallholding Development Authority**

The Presidential Task Force on Corona Disaster Relief Promotion has decided to make following arrangement in a special discussion conducted by the Prime Minister on 04.04.2020.

1. Every step will be taken to safeguard and maintain the supply chain of tea from the tea land to auction.
2. Advised factory owners to hand over the green leaf payment of March at the tea smallholder's doorstep.
3. Issuing Police curfew license for small/ medium land owners for transporting labour to land. Tea officials to officially visit tea land or office.
4. The special allowance of LKR 5000 paid to those who lost their work due to COVID-19 was extended to deserving tea smallholders.
5. To make tea smallholders aware about the loan of LKR 50,000.00 to be granted through the Bank of Ceylon with a grace period of 18 months.
6. Instructing tea Extension Officers to look into payment for green leaves in March and facilitate the provision of essential food items in each Tea Inspector's region.
7. It was decided to consider releasing replanting subsidy payments immediately to eligible smallholders for 2020.

8. Releasing allowance for drought casualties that occurred during February-March 2020 and continue granting of water pump, sprayers, field equipment etc. to selected farmers.
9. A special nursery project was proposed to establish 500 input nurseries among selected small holding nursery holders aiming to raise quality nursery plants with recommended standards for fulfilling 2020 replanting program requirement. TSHDA will provide required nursery inputs to nursery holders whilst loan facilities will be granted through BOC bank under rewarding funds loan scheme.

### **b) Regional Plantation Companies**

Following government declaration of the plantations sector as an essential service, RPC (Regional Plantation Company) operations immediately gathered momentum amidst stringent new measures to protect workers and the wider estate community against the COVID-19 pandemic. Although the plantation sector is operating at 60 percent production capacity due to unprecedented drought for the past 3 months, they were able to pay salaries to workers in April since tea is being plucked and prices have also risen at auctions. All possible precautions are taken by managements of RPCs to prevent spread of COVID-19 among workers and the estate community in compliance with guidelines issued by health authorities. Additionally, the employees and workers of RPCs were provided with food parcels and advances for food and other essentials, as well as special measures taken in partnership with government authorities.

For instance, complying with the guidelines set by health officials to combat the pandemic, the Hayleys Plantations sector initiated following measures to ensure that the daily needs of all its employees were met, while rolling out a set of strict health and safety regulations to be followed in the field, factories and estate premises. The company provided its entire plantation workforce community and their families - a population of 140,000 people, with dry rations and food packs through estate worker housing cooperative societies during the ongoing curfew.

### c) Colombo Tea Traders Association

*Paradigm shift in Ceylon traditional tea auction with digital platform:* As a much needed change to the industry's age old traditions, the Colombo Tea Traders Association in Sri Lanka conducted its first e-platform auction in collaboration of all stakeholders' associations in the tea trade and under supervision of Tea Board of Sri Lanka. This was prompted by COVID 19 restrictions on social distancing and other stringent health precautions recommended. The highly successful first three e-auctions held between April 4th and 15th, 16.5 million kg of tea was sold via the online platform. This will have a trickle-down effect spanning the entire tea supply chain. The e-trade has created hope, especially for tea growers who depend on daily wages. This has let exporters to commence shipments with available resources and work flat-out to meet the increasing demand for Ceylon Tea. The tea industry has shown its ability to deal with challenges during periods of global crises.

*A review of Sri Lankan tea industry's resilience and leadership:* A review of Sri Lankan tea industry's resilience and leadership organized

by Colombo Tea Trader Association that also initiated Ceylon Tea road map 2030 was held via a webinar on 4th May 2020 with participation of leading tea experts in a panel representing different segment of tea sectors. The session focused on updating knowledge about current market forces with particular reference to Sri Lanka's main importing countries, managing a workforce under the threat of COVID-19, learning from best practices, the role of the industry in taking Ceylon Tea to the world, the challenges and the opportunities.

### d) Sri Lanka Tea Board

The strategy was formulated by Sri Lanka Tea Board (SLTB) in order to boost the popularity of Ceylon tea in international markets (Box 3) and bring in foreign exchange which is desperately needed for Sri Lanka's corona virus-hit economy. Chairman, SLTB, stated that they planned to go for a campaign that promoted tea as a wellness range, while looking at Germany, one of Sri Lanka's biggest black tea markets, for the campaign. He went on to state that the SLTB is planning to export black tea to Egypt, Pakistan and the UK at the moment with other products.

#### Box 3: Sri Lanka Tea export profile

Tea is one of Sri Lanka's main exports, with 99% of the country's production being geared towards black tea and the remainder towards green tea (2018). Mr. Hasitha De Alwis, Sri Lanka Tea Board (SLTB) Global Campaign Consultant stated that Sri Lanka produces about 300-310 million kilograms of black tea each year, out of which the country exports 280-290 million kilograms. He explained that major portion the country's tea export markets involve black tea; these markets include countries in Western Asia, parts of North Africa, parts of the Middle East, and more recently China. He went on to state that even the US is a good market for black tea where 85% of the market deals with black tea while 15% deals with green tea.



**Ceylon Tea auction conducted on first e-platform**



## e) Tea Research Institute (TRI) of Sri Lanka

The TRI has highlighted that several studies undertaken in different countries have demonstrated the potential benefits of Black & Green Tea consumption in boosting immune system to fight influenza and common cold generally caused by viral infections (Box 4).

### Box 4: Benefits of Tea consumption on enhancing immunity

The Tea Research Institute of Sri Lanka (TRI) together with the Sri Lanka Tea Board recently released a scientific paper Antiviral properties of tea - black tea may become the unique brew of choice with no side effects, to fight against COVID-19? Tea Catechins can bind onto the surface of the influenza virus and inhibit the spread. An alkaloid found in tea is Theaflavins, a chemical shown to alleviate respiratory diseases such as asthma, chronic bronchitis and other lung diseases. It relaxes and opens air passages in the lungs making it easier to breathe. Inhaling boiling water mixed with Black Tea can facilitate the clearing of the passages towards the lungs. It could be assumed in respect of the circumstantial evidence available that daily consumption of Black Tea (3 to 4 cups without sugar or milk) is very useful and linked to boosting of the immune system of normal human beings and helps fight respiratory diseases.

### Power of Ceylon Black Tea as a potential booster

Several studies are ongoing globally in search of therapeutic options to recognize 'anti-viral' agents which could treat patients affected by COVID 19. However, "prevention is better than cure". TRI has made a genuine effort to investigate the "Power of Ceylon Black Tea" as a potential booster to aid one's immune system to fight against the virus when confronted.

Several studies undertaken in different countries have demonstrated the potential benefits of Black & Green Tea consumption in controlling influenza and common cold generally caused by viral infections. Tea Catechins have the ability to bind onto the surface of the influenza virus and inhibit the spread. TRI has quoted a recently conducted research study from Taiwan where the chemical structure of 64 compounds had been bioinformatically modelled against SARS-CoV-2.



### Low Incidence of Infected Patients

Sri Lankans habitually consume 03 to 04 cups of Ceylon Black Tea. Therefore, in addition to epidemic control measures and social distancing and hot local temperatures (between 26°C-32°C), the practice of drinking tea may also contribute to the low incidence of infected patients with coronavirus. The infected case and the cases per million people in Sri Lanka are comparatively low. It could be due to a combination of multiple reasons, which certainly requires in-depth investigation.

#### Extension strategies:

**Helpdesk:** The staff of Tea Research Institute's Head Office and its Regional Centers have been made available in the special Helpdesk to assist stakeholders engaged in tea cultivation and processing, including partners in the industry, supply and value chain. They provide necessary information and technology during the period of COVID-19 pandemic. The clientele have been advised to contact relevant officers through telephone, email, WhatsApp or Viber communication technologies.

**New research:** According to the corporate research plan (2019-23) of TRI, scientists have initiated new research on screening and

developing new varieties containing beneficial broad stratum antiviral activity of compounds. Modifications in process technology, research for developing beneficial compounds, developing quality index for improving overall quality aspect of made tea and also replacement of the labour incentive field practices with the introduction of appropriate mechanization techniques are other parts of the plan. Although, the above forward research plan was developed prior to COVID-19 pandemic, necessary modification/development in the relevant research disciplines will be taking place to address socio-economic issues, health and hygienic precautionary measures introduced by health authorities for post-pandemic situation.

## **f) Other Extension and Advisory Services**

*Bought leaf factory based extension team initiatives in smallholding sector:* Bought leaf factory based extension team (Amarathunga, 2019) are committed to measures for avoiding the spread of infection in their factory premises and all steps of smallholder tea supply change by motivating their staff and workforce to follow proper health and hygiene practices as per guidelines given by health authorities.

- Tea factory extension staff are involved in spraying chemicals to prevent contamination on their working premises, worker resting rooms/dormitories, equipment and other common public places including smallholders leaf collecting centers, roads etc.
- Motivate their factory workers to maintain safe distance of 3-4 feet during rest, taking of meals, transfer of produce at collection points, loading/unloading and other factory operations.
- Bought leaf factory management has provided PPEs (mask, gloves etc.) for staff members and workers. Workers are also made aware of regular use of PPEs during work and disposing off the used materials (mask, gloves etc.) to prevent contamination.
- Adequate soap or hand sanitizer, foot cleaning bath, digital thermometers (to test body temperature) and displays related to guidelines are made available at the tea factory entrance point.
- In addition, most of the tea factory management has made arrangements for collecting information from staff and workers about their family and social life, keeping in view the pandemic and risk of infection, prior to reporting to work and also prevent entering of unknown persons to fields/factory.
- Extension team has persuaded smallholders and their workers to practice one meter social distancing while doing tea field operations and leaf transportation.
- Make smallholders aware to stagger the field and operations on roster basis wherever possible and avoid crowding.
- Tea factory Extension teams deliver messages via leaflets, posters on good health and hygiene practices to be adopted to avoid spreading of pandemic to smallholder/factory workers.

*Para-Extension team initiatives in plantation sector:* Plantation management personal with the assistance of para-extension team (Field Officers/Asst Field Officers/Welfare Officers/EMAs of estates) are taking all possible precautions to prevent spread of COVID-19 among workers and the estate community, in compliance with guidelines issued by health authorities.

- Steps are being taken to clean and disinfect estate premises and staff quarters with the support of regional Public Health Inspectors (PHIs), police officers and regional government officers with motorized spraying machines.
- All employees have been equipped with hand sanitiser and face masks, with some estates going so far as to manufacture their own protective gear.
- Daily awareness programmes are also being held to highlight the importance of social distancing to contain the spread of the virus with support of health officials.
- Furthermore, posters and advisory notices with safety instructions have been distributed among the staff and displayed at all prominent locations across estates in all three languages. Working together with the Plantation Human Development Trust (PHDT) and Save the Children, Hayleys Plantations has taken special care to safeguard the crèches and child development centers to ensure the safety of all children in the community from pandemic.

*Agro-input supply Private Extension teams:* Some of the private companies i.e. A Baur & Co. (Pvt.) Ltd, CIC Agri-businesses involved in agro-input supply chain in tea plantation sector are proactively providing effective advisory services to both smallholding and plantation sectors, delivering effective extension messages to tea growers who are struggling from consequences of pandemic. For instance, extension team of A Baur & Co. (Pvt.) Ltd. is playing a key role in delivering a unique message emphasizing importance of adopting good agricultural practices, ensuring safety and hygiene of work personnel, good handling and sanitation of the packing house, pest control and sanitation of containers etc. (Tharaka, 2020).



**Extension team of Tea Smallholder Factory Plc. conducting awareness program on hygienic practices for factory workers**



**Testing body temperature prior entrance at a tea factory / Tea plucker well-equipped with PPEs**



**Maintain one meter social distance between workers / Maintaining distance during working time at field and leaf collecting centers**

## WHAT MORE NEEDS TO BE DONE BY EAS?

### Initiation of new research on effect of pandemic on plantation and smallholding sector

National Institute of Plantation Management has developed a research proposal to undertake social research on Potential adoption of health promotion interventions into practice among plantation workers in the pandemic situations. The study aims to analyze prevailing behavioral patterns of plantation workers with respect to health practices and controlling measures introduced to minimize spreading of COVID-19, besides determining trends and potentiality of adopting new health interventions.

EAS providers in public and private extension networks should organize a research study Tea smallholder's perception towards health and hygienic promotion introduced by health authorities against pandemic, and their limitations and potentials in adopting such practices in their work place and social life. The findings of this study will elaborate effectiveness, limitations and weakness in applying such practices under smallholding conditions and also propose new measures that could be effectively implemented.

*Development of new guidelines:* Extensionists and economists should develop guidelines on how best to practice recommendations aimed at keeping social distance and following health and hygienic practices while minimizing cost and addressing socio-economic issues.

*Delivering a unique message on correct harvesting to improve product quality:* As research findings have proven that most beneficial chemical components are concentrated in the apical part of immature flush leaf, it is worthwhile to initiate special Extension campaign to make aware tea growers, workers, leaf collectors, transport agents and factory staff to follow correct harvest techniques emphasizing leaf standard, closer harvesting interval and also to minimize post-harvest damages from field to factory, ensuring supplement of quality green leaf for manufacturing of quality tea. This will enhance demand for Ceylon tea and also open up new market opportunities as world market demand

remains for natural beverages having health benefits. Hence, maintaining quality of made tea will ensure a stable market and sustain the brand name of Ceylon Tea. Therefore, EAS in both public and private sectors have to deliver above message effectively using all possible extension channels to maintain quality of made tea.

### Use Social Media Platforms

- Various stakeholders in the tea plantation and smallholding sectors need to stay linked through social media, follow health and hygienic protocol and collaborate their efforts in EAS by playing their roles.
- Enhancing EAS delivery through online and social media by exploring all potentials of public and private extension channels to keep social distance under pandemic and post pandemic situation.
- Webpages of official websites of EAS offering institutes, containing tea advisory information for on-field and manufacturing practices, agri-inputs such as fertilizer, availability of nursery plants, weather and natural disasters forecast, value addition, updated marketing information and management practices should be made directly accessible free of charge.

### Use traditional mass media

Tea smallholder focused radio and TV programs are good means to connect with smallholders and EAS offering institutes to address field issues and solutions with community participation. Options for online feedback to be provided through mobile phone and social media.



Potential Areas in Tea sector – PPP concept can be applied and way forward

Availability of tea information - through PPP tea related channels

Market price information  
Service inquiries  
Tea Board/  
• Tea brokers/factories  
• Via SMS  
• 'sltb-rp-mfno' send 1919  
• Tea Infor- Website  
[www.pureceylontea.com](http://www.pureceylontea.com)  
[www.tri.lk](http://www.tri.lk)  
[www.tshda.lk](http://www.tshda.lk)

## END NOTE

The effects of COVID-19 have been very apparent as people, politics and economics of the world have been brought down to a grinding halt. Sri Lanka has been identified as one of the most vulnerable middle-income countries as its economy could shrink this year due to impacts of COVID-19. Increasing the export earnings from tea is definitely one way

Sri Lanka could overcome the crisis. Therefore, all stakeholders in the tea sector should take this challenge as an opportunity to strengthen the country's economy and have to collectively play a proactive role for strengthening the tea industry. Already, the stakeholders in the tea sector have come together to address this challenge. But, there is a lot to learn from every sector and I hope this blog will encourage others to share their experiences.

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## EDUCATIONAL LANDSCAPE DURING AND AFTER THE COVID-19 PANDEMIC: STRATEGIES AND ADAPTATIONS TO ENCOURAGE QUALITY TEACHING AND LEARNING

The COVID-19 pandemic has resulted in the use of more online teaching methods. In this blog **Aditya Sinha and Debabrata Basu** suggest suitable strategies to ensure a smooth and successful transition of learning from a face-to-face environment to a digital environment in agricultural sciences education, especially in agricultural extension.

The last five decades saw a phenomenal rise in the reach of education at all levels worldwide. Several models of teaching – through distance education, online learning, and traditional learning with blended environments – were tried and tested with mixed results. The COVID-19 pandemic has brought an unprecedented crisis to the educational landscape of the world. Many universities across the globe have decided to shut their traditional classrooms where learning was done face-to-face till 2021, or until the situation normalizes. In these tough times, the world needs to make decisions rapidly and change at lightning speed to ensure that the digital divide between students are minimized, and the goals on imparting quality education are not compromised. This blog post deals with the emerging situations which pose constant challenges to higher educational institutions, especially agricultural universities, and recommends the use of well-known strategies and adaptations to cope with this situation for the betterment of the teaching and learning community at large.

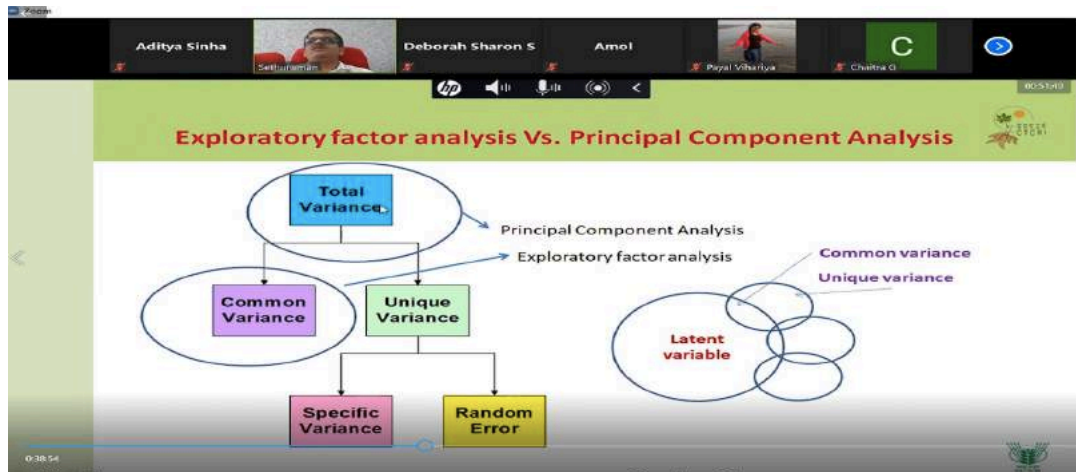
### ENABLING REMOTE LEARNING AND ASSESSMENT STRATEGIES

I have personally implemented the flipped learning instructional strategy as well as collaborative learning approaches (Box 1) while imparting learning experiences to my postgraduate students for over four years. The number of postgraduate students in MSc and PhD courses in Extension Education at Bihar Agricultural University (BAU), Sabour, ranges mostly from two to eight. The use of internet and technology-based interventions in these approaches has proven to be a blessing for me in teaching various topics on statistics, e-extension and human resource development.

## Box 1: Flipped Learning and Collaborative Learning

Flipped learning instructional strategy (also known as “flipping or inverting” a classroom) is a teaching approach in which the in-class time is re-purposed for inquiry, application, and assessment in order to better meet the needs of individual learners while course materials are left for the learners to study at home. The course materials might comprise of readings, pre-recorded video lectures, or different sorts of assignments. In-class activities are designed for students to gain practice in applying the knowledge gained prior to class.

Collaborative learning is an educational approach in which the strength of working in groups or a team is utilized to solve problems, complete different tasks, or learn new concepts together. This approach is an engaging process leading to synthesis and processing of concepts rather than just rote memorization. The students work with each other on collaborative projects and understand the concepts by critically discussing and analyzing these concepts.



These strategies could be quite helpful in teaching students the subjects requiring no field work or laboratory experiments. Similar study on collaborative learning for teaching English and statistics to school students in small groups were reported very recently by instructors from other Asian countries, which suggested that the collaborative learning method led to enhanced learning – leading to better collaboration and communication with fellow students.

The present COVID-19 scenario has provided lot of space to the flipped learning and collaborative learning approaches in which the education imparted in classrooms could be substantiated with offline assignments on digital platforms in the months to come, along with peer assessment techniques.<sup>1</sup> Universities are relying more on remote teaching environments with the promotion of asynchronous (Box 2) learning environments.

## Box 2: Synchronous and Asynchronous learning

Synchronous learning requires simultaneous attendance at scheduled lectures. This could be either in the traditional classrooms or in the online classroom environments. The latter might involve scheduled video conferences, live streaming of lectures, scheduled quizzes and assignments, etc.

Asynchronous learning provides freedom to students to learn at their own pace allowing access to course materials, ask queries, and practice their skills at any time based on their liking. This is mostly possible through the online courses offered through various modes.

As such, the current situation demands teachers to be equally technology savvy and innovative in using teaching methods to fulfill the purposes of education. Google has permitted access to a bunch of teaching applications, educational resources in various domains, and customizable tools for the educators to enhance their teaching experience during this time of crisis (available on <https://edu.google.com/>

products/classroom/apps/?modal\_active=None). Teachers should devote time to learning these tools which could prove to be instrumental in providing an enhanced experience to students and break the monotony associated with online classes. Some of the Google tools worth using by the teachers of agriculture faculty is discussed in Box 3.

### Box 3: Google tools for teachers

**Google docs:** Google Docs is an online Word processing software where all the documents and files can be saved on the Google Drive linked to the Gmail account for free. It is an efficient tool for collaborative writing as well as collaborative brainstorming. Collaborative writing could be harnessed by the teachers to separate the class into groups and ask them to work together in contributing towards some assignment or project. The main benefit associated with collaborative brainstorming is that any changes/edits made in the documents by any member of the group can be immediately observed by the other members of the group. It also offers collaborative brainstorming through which teachers can ask for ideas on a project to the students of the group. The ideas could be expressed with the use of flowcharts, concept maps, or by using different visuals.

**Google Slides:** It empowers teachers to build presentations right in the web browser without the need to download any special software. Multiple people can work on slides at the same time, and all can see whatever people change right when they make them, and every change is automatically saved providing a collaborative atmosphere. It is also helpful for teachers in making short duration videos by adding their own audio in the slides.

**Google Classroom:** Classroom is a free web-based platform that integrates all Google Suite services for education, including Google Docs, Gmail, Google form, Google slides and Google Calendar. It is a great tool to help teachers in creating specific classes for different subjects, distribute assignments, communicate, and stay organized. Teachers can quickly see the status of assignments, and provide direct, real-time feedback and grades right in Classroom.

**Google Forms:** Google Forms is a web-based app used to create forms for data collection purposes. Teachers can use Google forms to prepare surveys, quizzes, or event registration sheets. The form is web-based and can be shared with respondents by sending a link, emailing a message, or embedding it into a web page or blog post. Data gathered using the form is typically stored in a spreadsheet and can be downloaded in several formats, like Excel spreadsheet or a pdf document. It allows teachers to ask both open-ended and close-ended questions such as multiple-choice, checkboxes, paragraph, scale and grid-based questions.

**Google Sites:** Google Sites allows one to easily develop a website by adding pages and elements within the page. Teachers can choose from custom layouts that have different elements laid out in a nice view. It is useful for the teachers – particularly extension professionals – to showcase their digital portfolio highlighting their best work. It could also be used to showcase the courses taught, research conducted, and publications of the teacher. It could be easily connected to a domain name (internet address like .com, .org, .tech, .edu) to provide a more professional outlook.

The application of such tools, fostering collaborative learning, can help in the creation of asynchronous learning environments which would enable students to learn at their own pace from their home, and engage with a variety of content like wikis, blogs, video, quizzes, peer assessment. etc., to suit their schedules and decrease monotony.

Several teachers across India might face difficulty in shifting to the online mode all of a sudden. This requires teachers to test and try techniques from scratch, such as short video creation on a specific topic (of 5-8 minutes' duration), learning online assessment techniques such as Google Forms, creating online brainstorming environment, etc. The role of institutions granted the status of Centre for Advanced Faculty Training (CAFT) under Indian Council of Agricultural Research (ICAR)

in Agricultural Extension and Information and Communication Technology<sup>2</sup> becomes imperative at this stage for imparting quality learning to the teaching community on the integration of technologies through remote learning. BAU with CAFT status on ICTs since 2017, has been conducting several training programmes regularly on inculcating ICT skills among teachers and enhancing their technical skills.

### SUPPORT FOR CURRICULUM DEVELOPMENT

Most of the universities in India closed in the month of March 2020, mid-semester. This forced teachers to change their strategy all of a sudden so as to enable online teaching; and this was particularly hard to do mid-stream since



planning for the semester had been made well in advance last year.

The process of curriculum design by policymakers and the classroom teaching strategies to be implemented by teachers require a lot of planning before implementation. Many universities across India directed teachers to upload course material along with exercises and practical activities onto the website of the university for easy student access. This has put undue pressure on teachers as they had to create content in haste leading to compromise in quality standards, which mostly remain unchecked during these times of crisis. The current scenario demands that universities foster trust among the teaching community and encourage them to teach courses on different learning management platforms (LMS).<sup>3</sup> This will enable teachers to have greater autonomy over the subject and offerings could be provided in several ways, such as videos,

interactive exercises, peer assignments, self-assessment, etc., rather than just relying upon printed resources with less appeal and feel. As stated earlier, learning management systems could also offer peer assessment which would help the teachers to focus more on providing quality content rather than on just grading all the assignments themselves. The presentation of courses on LMS would enable the teachers to explore their creativity in offering the best possible teaching and learning solutions to the student community. Some open access learning management platforms which could be easily learned and utilized for offering courses are: Google Classroom, Moodle and Open edx platform. I have personally tried offering courses through all of these platforms and have experienced that each of them has some major advantage over others while still lacking in one way or the other. I have provided a comparative analysis of the three LMS according to my use and application in Table 1 below:

**Table 1: Comparative analysis of LMS used in education**

LMS	Google Classroom	Moodle	Open Edx
Classroom size	Effective for classroom sizes between 35-60	Small classroom sizes typically ranging between 5-30 students	Large audience size with no limit
Coding skills	Not required	Might be helpful in designing quizzes	Required in changing content on pages and quizzes
Ease of use	User friendly	A bit outdated in several contexts	Easy to integrate and use
Mobile friendliness	Good	Poor	Average
User interface	Average	Average	Good
Website	<a href="https://classroom.google.com/">https://classroom.google.com/</a>	<a href="https://moodle.org/">https://moodle.org/</a>	<a href="https://open.edx.org/">https://open.edx.org/</a>

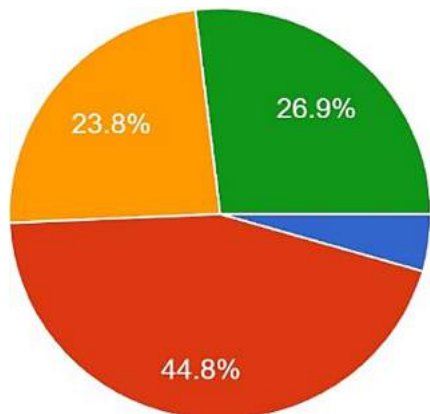
A major intervention by BAU –asking teachers to conduct and record online classes on Webex meeting app which would be further processed by the media processing center of the university – is quite impressive during these difficult times. The processed videos of the student-teacher interaction would hence lead to classes that work much better with the use of LMS, and moreover help teachers to utilize their time for creating better resources and content.

In addition to it, the teachers should make use of high quality Open Educational Resources (OERs)<sup>4</sup> and learning materials available with

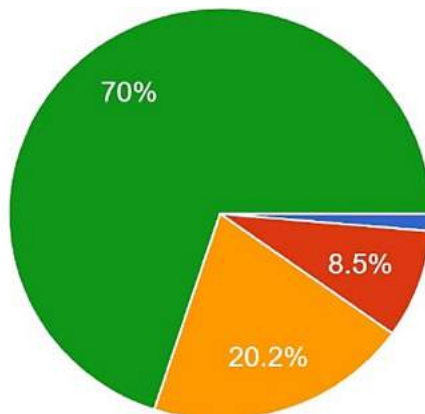
Creative Commons (CC) license<sup>5</sup> to strengthen their course content on various disciplines. It is always better to rely on the content already developed by experts and shared on open access platforms so as to save time that could be used for implementing other activities for the benefit of learners. Some of the examples of noteworthy OERs in different disciplines are: MIT Open Courseware from Massachusetts Institute of Technology and Open Learn from the Open University. A comprehensive list of institutions offering OERs is available on OER World Map.

Coming to the student part, peer learning activities can also provide an ample learning ground for students to understand the grading rubrics and prepare them to become future educators; this will help in improving their skills and abilities in the long run. A survey to assess the impact of lockdown – with 223 students participating from agriculture universities –

conducted among the students of agricultural universities by Bidhan Chandra Krishi Viswavidyalaya (BCKV) has a few interesting insights to report (Das and Basu 2020). When asked whether online classrooms could replace traditional classrooms in teaching different subjects of agriculture, the student community seemed to be divided in their perception.



**Online teaching could substitute traditional teaching agriculture**



**Online teaching could substitute fieldwork in agriculture**

- Strongly agree
- Moderately agree
- Moderately disagree
- Strongly disagree

Also, when the follow-up question was asked on whether fieldwork could also be substituted through online classes or not, majority of the students (70%) strongly disagreed with the statement.

The feedback from the students of BCKV on their experiences with online classrooms show that it has led to more participation in the discussion and chat forums, and they feel more comfortable in expressing themselves online as

compared to traditional classroom situations. As against this, students not having proper internet/broadband connectivity along with smartphones/laptops with good processing and storage capacity are frustrated with online learning since they could not get appropriate bandwidth to understand and comprehend the live classes. The use of technology per se in teaching was generally welcomed by the students, and they felt comfortable in adopting this transition.

## INTERACTIONS THROUGH WEBINAR AND REMOTE CONFERENCES

All universities and learning institutions across India are not equally fortunate to have the same infrastructural support and competency in their teaching fraternity. As such, these times are apt

### Box 4: Popular video conferencing platforms

**Google Meet:** This video conferencing solution is offered to any Google user – to connect through an online meeting with up to 100 participants for up to 60 minutes per meeting. The educational institutions and organizations with a subscription to Google suite services can conduct meetings with up to 250 internal or external participants, and live stream to up to 100,000 viewers within a domain. Some of the unique features of Google Meet are live captioning during meetings, and compatibility across different browsers. URL: <https://apps.google.com/meet/>

**Zoom Meetings:** It offers built-in tools for screen sharing, HD video and audio calls along with features to conduct polls and create separate small breakout groups. The free version allows the user to host up to 100 participants and have unlimited 1:1 meeting for 40 minutes duration. The interface is quite easy to navigate and operate with various scheduling options. URL: <https://zoom.us/meetings>

**Cisco Webex Meetings:** It allows a maximum of 200 people to join from a video device or the Webex meetings app without any paid subscription. It can host online meetings with HD video, audio and screen sharing capacity. The user experience is sometimes quite challenging. It takes about one minute to get into a meeting and does not offer the most intuitive interface. But the scheduling and joining of meetings are quite easy. URL: <https://www.webex.co.in/>

for conducting short webinars and conferences on various topics that are particularly suited to the expertise of teachers and educational institutions in a videoconferencing mode without charging the participants. A few of the mobile applications which offer free conferencing along with real-time chat facilities for a considerable number of participants are Google Meet, Cisco Webex, and Zoom, etc.

Various agricultural universities in the country have recently conducted online national conferences or are in the process of conducting them. This would certainly provide a platform for the students and teachers to showcase their research and thoughts with a wider audience. I recently presented a paper on 'Improving logistical support in agriculture through the application of Internet of Things (IoT)' in an online national conference organized by Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, which was an enriching experience. The conference was very well-moderated and had the same feel and appeal of a conference conducted within the four walls of an institution.

Teachers and students of the discipline should also make use of online trainings conducted by experts in the discipline. An online workshop conducted recently by Dr P Sethuraman Sivakumar from ICAR - Central Tuber Crops Research Institute on scale construction using structural equation modelling was quite popular among extension professionals, which provided them with the necessary skills to conduct the exercise along with a practical demonstration. Students and teachers from the discipline

should regularly watch for notifications on Facebook groups, such as Agricultural Extension in India, and Agricultural Extension in South Asia for more such opportunities. The Agricultural Extension in South Asia portal is also of immense importance to gain new perspectives and insights on the discipline. It regularly offers interesting blogs in several domains (research in extension, extension approaches, ICTs in extension, livestock extension, etc.) from the practitioners along with a wide collection of resources on various facets of the discipline. Extension professionals should also explore the webinars conducted by different agricultural commodity organizations across the country during these times, and keep abreast of the latest resources in their subject areas. A series of webinars on different facets of the millets value chain is currently being conducted by the Millet Foundation, Bengaluru, India, with the title 'Know Millets Webinars 2020' to understand the importance and ecological value of millets in the food value chain.

An opportunity also exists for extension professionals to enroll in various high-quality courses to improve their skills and understanding on research and various emerging areas. The platforms offering top notch Massive Open Online Courses (MOOC) like Coursera and Edx is a must try as it offers several audit courses requiring no enrolment fees. A few of the online courses that I have successfully completed, which are worth exploring by extension professionals to enrich their knowledge and understanding on these platforms are given in Table 2.

**Table 2: Important courses for extension professionals available on Coursera and Edx**

MOOC platform	Title of the MOOC	Course content	URL of the course
Coursera	Understanding Research Methods	Understanding research and formulating good research questions, conducting literature review, and management of research	<a href="https://www.coursera.org/learn/research-methods#about">https://www.coursera.org/learn/research-methods#about</a>
Coursera	Introduction to Research for Essay Writing	Research and planning the paper, language for research writing, citing and formatting	<a href="https://www.coursera.org/learn/introduction-to-research-for-essay-writing">https://www.coursera.org/learn/introduction-to-research-for-essay-writing</a>
Coursera	Advanced Writing	Writing advanced argument and synthesis essays, avoiding plagiarism, better documentation skills	<a href="https://www.coursera.org/learn/advanced-writing#syllabus">https://www.coursera.org/learn/advanced-writing#syllabus</a>
Edx	Design and Development of Educational Technology	Educational theories and approaches regarding teaching and learning, assessment learning through technology	<a href="https://www.edx.org/course/design-and-development-of-educational-technology">https://www.edx.org/course/design-and-development-of-educational-technology</a>

## CONCLUDING THOUGHTS

These unprecedented times have become a promising ground for extraordinary possibilities. Teachers across the country should come forward to showcase their skills and capabilities so as to promote common good among both students and teachers alike. This is the perfect ground to prove the phrase, “Act locally and share globally”. The progress of universities and institutions in switching from a face-to-face learning approach to remote learning is indeed praiseworthy in the Indian context where severe infrastructural and technical challenges still pose a major threat to the delivery of education.

The training imparted to agricultural faculties could further be improved to include tutorials

on free to use learning management systems in order to promote online learning. Platforms such as Google Classroom, Moodle, Open EdX can help in retaining the interest and pedagogical skills of teachers. Moreover, as far as the students are concerned, students in the 21st century popularly known as ‘millennials’ and ‘digital natives’ having experienced digital technologies since their birth, might not find it difficult to make this transition from the face-to-face environment to the digital environment. The strategies and approaches discussed in this blog can certainly provide guidance to the teaching fraternity – to make best use of their potential and available resources so as to create a major difference in the educational configuration of this country during these times and thereafter.

Disclaimer: The views and opinions mentioned in this blog are those of the authors and in no way represent the views, positions, opinions – expressed or implied – of our employer or anyone else.

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## ENDNOTES

<sup>1</sup>Peer assessment is a collaborative learning technique in which the students evaluate the work of their fellow students, and also get themselves evaluated by them. Such assessment strategies lead to the personalization of learning experiences. The responsibility of the teacher is to provide clear guidelines, scoring criteria, and examples to all the students so that they can provide uniform and unbiased assessment.

<sup>2</sup>CAFT in Agril. Extension at Indian Agricultural Research Institute, (Pusa), New Delhi <sup>-110012</sup>; and CAFT in ICT at Bihar Agricultural University, Sabour, Bhagalpur, Bihar, (Bhagalpur), Bihar <sup>-813210</sup>. Source: <https://cbp.icar.gov.in/CaftCenterDetail.aspx>

<sup>3</sup>Learning Management System (LMS) is a software programme that helps to create, manage and deliver eLearning courses. It bears the term ‘Learning’ since it is used to deliver educational courses or training programmes. Management, because it helps to organize the courses (create, change, assign them to students, grade them, etc.), and System, since the word translates to ‘software’ making it a computer programme.

<sup>4</sup> Open educational resources are teaching or learning materials that are either in the public domain or have been released under a license that allows them to be freely used, changed, or shared with others.

<sup>5</sup> A Creative Commons (CC) license is a public copyright license that enable the free distribution of an otherwise copyrighted “work”. A CC license is used when an author wants to give other people the right to share, use, and build upon a work that they (the author) have created

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# 88

## POLICY RESPONSE TO COVID-19 IMPACT ON THE KERALA FARM SECTOR

In this blog, **Sreeram Vishnu** discusses the policy response of Kerala State to combating the COVID-19 crisis in the farm sector. Embattled with a range of challenges, the State has formulated its own policies around multi-institutional interventions along with the inclusion of more functional components. Above all the central focus of the State's policy is to achieve food self-reliance by augmenting domestic production.

The response of the Government of Kerala to COVID-19 has largely been a success so far because of the strict disease containment measures and social security programmes it put in place, such as distribution of food kits through public distribution systems, functioning of community kitchens and various welfare measures intended for migrant workers (AESAs Blog 109). However, the farm sector witnessed large scale disruptions due to the pandemic-induced lockdown in the agricultural supply chain – disturbing the harvesting, procurement and movement of various commodities. The state agricultural machinery tried to respond by beefing up the local procurement through various agencies, relaxing the lockdown norms for transport of commodities and agricultural operations in line with the directives of the Central Government, and by instituting novel initiatives such as 'The pineapple challenge' (AESAs Field Note 4). Beyond these short-term measures, the State Government is contemplating a number of policy measures to tackle the crisis. These measures are informed by three critical factors:

1. Consumerist status of the State and its pursuit of food self-reliance;
2. Reverse migration of a large number of non-resident Keralites (NRKs);
3. Revival of the farm sector derailed by the COVID-19 pandemic.

### GOVERNMENT INTERVENTIONS

#### **Jeevani Sanjeevani**

The Jeevani Sanjeevani project of the Agriculture Department is an ongoing initiative to boost vegetable cultivation (Box 1). Even though vegetable production in the State grew to 12.12 lakh tonnes in 2020 from 6.5 lakh tonnes in 2016, Kerala still depends on its neighbours for about 40 per cent of its total vegetable requirement (Kerala Karshakan 2020). Aggressive promotion of this project was the first response of the State towards combating the crisis in scaling up agricultural production. It envisaged a slew of measures to ramp up

the local food production by promoting vegetable cultivation and facilitating its local-level marketing to strengthen the supply chain. However, with the risk of this pandemic looming large over the supply of other food commodities in the long run, the State started mulling over ways to attain food self-sufficiency. This concern was largely driven by the consumerist status of the State, with its heavy reliance on other states for food grains, vegetables and pulses. At present Kerala produces only 15 per cent of its total food grain requirement, domestically (Economic Review 2017).

Meanwhile the State is facing a new set of challenges – the huge influx of non-resident Keralites (NRKs), mostly from Gulf countries back to the State, and scarcity of manpower and machinery due to disruptions in the supply chain. Finding alternate livelihood avenues for the NRKs has become a daunting challenge for the State. Above all, interruptions in farming operations due to labour shortage is also expected in the post-COVID phase as migrant labourers have returned to their native states.

In this backdrop, the State Agriculture Department, after having grasped the gravity of the crisis, has redefined its policy response.

**Box 1: Objectives envisaged under the Jeevani Sanjeevani Project**

- Increase the production of essential food crops for meeting the challenges in food security posed by the COVID-19 crisis.
- Bring maximum available fallow land under food crops for enhancing food production.
- Ensure local food security by strengthening the supply chain in case of a prolonged lockdown due to the COVID-19 crisis.
- Provide support to farmers for taking up farming and ensuring sustained incomes.
- Engage local productive and young manpower resources in farming for mitigating the impacts of COVID- 19.
- Focus and invest in agriculture as the primary economic revival activity.
- Improve the efficiency of the existing extension system.
- Ensure better income for farmers through post-harvest management (reduction in post-harvest losses) and value addition.
- Support livelihoods of farm labourers by providing immediate employment opportunities through an Integrated Farming system approach.
- Promote organic farming, Good Agricultural Practices (GAP) and supply of safe-to-eat agricultural produce to the public.



**Distribution of vegetable seedlings as a part of Jeevani at Ambalavayal**

## Subiksha Keralam

A special drive, Subiksha Keralam (food sufficient Kerala) was launched by the State, to enhance domestic food production and attain food self-reliance to the extent possible (Government of Kerala 2020). The drive is envisaged as an intensive effort with the active

involvement of different line departments, such as the Agriculture, Animal Husbandry, Industries, Fisheries, Water Resources, and Cooperative departments, Local Self-Government Institutions (LSGI) as well as agriculture, veterinary and fishery universities (Table 1).

**Table 1: Objectives and activities conceived under Subhiksha Keralam, a special drive by Kerala Agricultural University**

No.	Objective	Activity
1	Enhance production of seeds, seedlings, planting materials and bio inputs in all the centres of the Kerala Agricultural University (KAU)	<ul style="list-style-type: none"> <li>Enhancing production of seeds and planting materials</li> <li>Participatory production of planting materials of tubers and pulses</li> <li>Development of seed villages by KAU</li> </ul>
2	To assist local self-government institutions to formulate local level production plans and programmes	<ul style="list-style-type: none"> <li>Adoption of Grama Panchayats</li> <li>Fostering food security projects of local self-government institutions</li> </ul>
3	Provide consultancy services and handholding support to farmers, entrepreneurs, non-resident Keralites, youth clubs and farmer collectives	<ul style="list-style-type: none"> <li>Provide advisories on commercial agriculture</li> <li>Creating content for the Subhiksha Keralam campaign</li> </ul>
4	To train youth on mechanization and provide custom hiring services for mechanized farming	<ul style="list-style-type: none"> <li>Provide custom hiring facilities to farmers and farmer collectives</li> </ul>
5	To facilitate post-harvest handling, procurement, sales, minimal processing and value addition of produce by utilizing the infrastructural facilities of KAU centres	<ul style="list-style-type: none"> <li>Facilitate post-harvest handling by farmers</li> </ul>
6	To create public awareness on the importance of 'Food Self Reliance of Kerala' and produce e-content to be disseminated through social media and mass media	<ul style="list-style-type: none"> <li>Conduct social media content</li> <li>Conduct webinars and Facebook live streams to educate the public about this campaign</li> </ul>

In addition to the set of activities envisaged under the Jeevani Sanjeevani project, this initiative envisions a number of components, such as formulating local level production plans under the panchayat institution, strengthening farm mechanization and promotion of custom hiring services, facilitating procurement, minimal processing and value addition of produce by employing the infrastructural facilities of farm universities and training, consultancy services, and handholding support to small scale producers, NRKs, youth clubs and farmer collectives. A multi-mode awareness campaign was also planned under this special drive so as to create public awareness on the importance of 'food self-reliance of Kerala'. Moreover, the drive assumes significance as the food crops

accounted for a mere 10.12 per cent of the total cropped area in the State and an area of 1.09 lakh ha remaining as fallow (Department of Agriculture, Kerala 2020).

The State Agriculture Department have also set explicit objectives under this special initiative. These include campaign mode activities to promote farming in collaboration with the LSGIs, target-based expansion of area under fallow land cultivation, promotion of intercropping, distribution of seeds and planting materials of fruit crops, homestead cultivation, localized procurement of food crops, increasing the coverage of crops under irrigation, and strengthening agro service centers with the participation of multiple institutions and



people's cooperation. The scheme guidelines of the department are specific and target-based for each of the components. For instance, the additional area to be covered under fallow land cultivation of various food crops is fixed at 12,500 ha at the State level, with district specific area targets. It also mandates that at least 25 per cent of the beneficiary farmers should be youth.

Thus various institutions are supposed to complement other actors to achieve the objectives set under the Subiksha Keralam initiative. Coordination committees have also been formed at various levels to facilitate joint actions by different departments and institutions. Local level production plans are to be formulated to augment agricultural or allied sector production by the LSGIs by allocating additional funds meant for annual plan projects or by modifying the projects by integrating additional components to enhance farm production. In Kerala, about 25 per cent of the State's annual plan funding devolves to local governments as development funds on an average, with the mandatory allocation of 30 per cent of this fund for productive sector (Economic Review 2017). Therefore the proposal is to streamline a portion of this fund to be spent for the activities planned under this special drive.



Reorienting the MGNREGA workers for fallow land farming activities, adequate supply of quality farm inputs, provision of subsidies, enhancing coverage of crops under crop insurance, smooth disbursement of loans through agricultural cooperatives even to landless tenants are some of the measures recommended to support farming activities. A dedicated portal was set up ([www.aims.kerala.gov.in/subhikshakeralam](http://www.aims.kerala.gov.in/subhikshakeralam)) for gathering the details of various stakeholders interested in taking up farming activities under the special

drive, to offer technical information support, and efficient and timely disbursement of subsidies to beneficiaries. Further, a State wide e- platform has been conceived and piloted under the initiative, to create an efficient market linkage for local produce, by roping in innovative agri-tech startups.

## CONCLUSIONS

There is no denial that COVID-19 has led to massive and lasting disruptions in the farm sector. But response of the State to such a grave situation is crucial in tackling the crisis. Kerala State has redefined its policy measures to combat multiple challenges through dedicated interventions. Multi institutional collaborative action – to be led by the LSGIs – has been conceived with the launch of an intensive drive to achieve food self-reliance. However, realizing these partnerships and implementing planned activities at the ground level is going to be a real challenge.

The special drive presumes that KAU and KVKs will play a proactive role in reviving the agricultural supply chain of the State by adopting technology-led interventions. The extension machinery of these institutions may have to shoulder a variety of roles, such as vigorous campaigns to promote the special drive, facilitating partnerships, assisting the local self-government organizations in developing farm plans and production protocols, instituting market linkages, training youth in the areas of farm mechanization and agri-business ventures, and providing hand holding support for first time farmers in farming-related enterprises or for developing bankable projects.

However, capacitating the work force of the Agriculture Department and ATMA functionaries to take up additional responsibilities will be another challenge at this juncture. Ensuring meaningful engagement of various departments in plan formulation at the panchayat level, integration of new project components under Subhiksha Keralam with the existing plan projects, dealing with time constraints while executing the planned activities amidst the ongoing kharif cropping season and other regular schemes are some of the major challenges.

Moreover, interventions like fallow land farming or development of seed villages and community nurseries may require mobilization of farmer groups, youth clubs and women's collectives. The strong presence of community-based organizations like Kudumbashree at the grassroots level, may augur well for the State in realizing these action plans. Though the

policy response of the State was quick with a concrete plan of actions, its success can only be gauged against the attainment of goals, including enhanced farm production, area expansion under food crops, and generating more employment opportunities along the agricultural supply chain.

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# 89

## EXTENSION AND ADVISORY SERVICES (EAS) IN THE INDIAN RUBBER SECTOR: REFORMS NEEDED IN THE COVID-19 BACKDROP

Though conventional extension methods which make use of strong personal rapport between the extension agents and stakeholders have proved to be highly effective in bringing positive attitudinal changes among rubber farmers, situations like COVID-19 demand complementing this with more online services. As social isolation remains one of the most important recommendations in the fight against COVID-19, e- extension gains importance in delivering EAS, opines **C Sabu**.

Rubber Plantations play a vital role in the Indian economy, by way of income generation, rural employment, and poverty reduction. There are around 1.32 million rubber growers and 0.6 million workers in the Indian natural rubber (NR) plantation sector. The Indian rubber industry is characterized by the co-existence of a well-established rubber production sector and a fast-growing rubber products manufacturing and consuming sector. The Rubber Industry value chain begins from NR plantations and ends in a huge range of dry rubber- and latex-based products. India is currently the sixth largest producer of NR in the world (651,000 MT in 2018-19). The production capacity in India is around 900,000 MT. The total area under rubber is 822,000 ha, of which 655,000 ha is mature plantations.

The incidence of COVID-19 pandemic and the consequent lockdown have adversely impacted production, processing, plantation development, marketing of primary produce and employment of daily wage earners, such as rubber tappers. The continued lockdown is likely to further aggravate domestic NR availability unless we develop sustainable strategies for tackling such issues. Numerous agencies globally are trying to find solutions to these unprecedented problems. Extension and Advisory Services of the Rubber Board under the Ministry of Commerce and Industry (Government of India) facilitate the transfer of knowledge, information, improved technologies and practices to farmers, promote farmer organizations and support the various actors in the rubber value chain.

### EXTENSION AND ADVISORY SERVICES (EAS) OF RUBBER BOARD

The NR plantation sector in India is currently teetering under issues such as climate change, increasing labour/ input costs, and fluctuating output prices. Enhancing productivity, reducing

production costs, and enhancing value addition are critical in order to address some of these challenges, and EAS need to support farmers on these aspects. Extension and Advisory Services facilitate the transfer of knowledge, information, improved technologies and practices to farmers, promote farmer organizations and support the various actors in the rubber value chain. Extension and Advisory Services of the Rubber Board under the Ministry of Commerce and Industry (Government of India) facilitate the transfer of knowledge, information, improved technologies and practices to farmers, promote farmer organizations and support the various actors in the rubber value chain.

## Extension approaches

### Conventional extension approaches

In the NR plantation sector, extension personnel have been using a wide range of conventional

extension approaches, which mainly rely on face-to-face communication. These include: mobilizing farmers; provision of one-on-one advisory support at the field level; organizing demonstrations, on-farm trainings, workshops; and holding informal group discussions, seminars, campaigns using written material (leaflets, pamphlets, etc.). The conventional extension approaches are highly effective for awareness creation and scaling up the adoption level of Good Agricultural Practices (GAPs). However, despite its relatively long history and widespread adoption, significant challenges still exist in providing extension services, including insufficient funds for supporting extension, limited involvement of rural farmers and populations in extension processes, lack of extension research and advanced extension methods. This limits the coverage of extension services, particularly across rural regions and in adapting technological packages to community-specific contexts.

### Box 1: Conventional EAS tools/methods in practice

Extension is not just about communicating but also about bringing behavioral/attitudinal changes for adopting Good Agricultural Practices (GAPs) for sustainable agriculture. Hence, it is necessary that growers and other stakeholders are motivated and capacitated through the conventional approaches mentioned below. These primarily rely on personal contact, interactions and continuous follow up and are expected to bring in positive attitudinal changes for technology adoption as well as scaling up of the adoption level.

#### 1. Demonstrations/on-farm trainings

Demonstrations – one of the most common extension methods – involve showing a technique/skill, input, practice or technology, and its potential benefits to a target audience. This is a highly versatile method which can be used on a single occasion or over a period of time, depending on the objectives (e.g., tapping, processing and GAP demonstrations). Demonstrations are an integral part of other extension methods/approaches, such as Farmer Field Schools (FFS) and community workshops.

#### 2. Structured trainings

Agricultural extension activities rely on structured learning events, such as courses and workshops led by a facilitator or trainer (or a team of facilitators/trainers). Learning events for growers and other stakeholders typically use classroom, field sessions, or a combination of both. It relies on methods such as demonstrations and individual exercises. They may consist of a one-time event or could be multiple events held periodically, vary in length, and may be residential (e.g., Training programmes under Tappers Intensive Skill development Programme [TISP], Tapping Skill development School [TSS], District Development Centre [DDC], and Regional Research Training Centre).

#### 3. Seminars/Group discussions

Seminars and group discussions are a highly interactive form of learning where participants engage in discussions. Case studies, brainstorming, and discussion are tools frequently used to engage participants and facilitate learning. Group discussions are being conducted regularly for implementing development and extension schemes and also for taking policy decisions on Rubber Producer Societies' (RPS) activities.

#### 4. Annual campaign meetings

Campaign meetings, which are meant to benefit small groups, are organized in association with RPS simultaneously at various centers every day continuously for about a month. These campaigns help to create widespread awareness and motivation so as to adopt the technological innovation dealt with. Annual campaign meetings have been conducted regularly since 1985.

### **Participatory extension**

In addition to the conventional top-down extension approaches discussed above, other innovative extension approaches in the NR sector focus on multi-disciplinary, collaborative and participatory technology development involving assessment and refinement of new technologies; and the use of participatory rural appraisal techniques for identification of problems in the plantation, and development of appropriate action plans. The RPS together with the village-level cluster of small rubber growers, serve as an effective extension arm of the Rubber Board. The smallholder empowerment approach – adopting cluster-based and community-driven development through the formation and institutionalization of RPS – was a milestone in the progress and development of the natural rubber sector. Many of the extension schemes of the Rubber Board, being implemented through the RPS, are based on a participatory extension approach.

### **Farmer centered Extension**

Farmer-to-Farmer Extension (FFE) is a complementary approach and involves farmers sharing knowledge on agricultural innovations within their communities. Farmer Field Schools (FFS), Common Interest Group (CIG)/Farmer Club (FC)-based activities, and exposure visits based on the concepts and principles of farmer-centered learning, and provision of handholding support to help farmer clusters – is yet another shift in this line. Majority of the on-farm training programmes that focus on the capacity building of stakeholders in the

NR sector, are designed in line with the key principles of the FFS.

### **Market-led extension**

Market-led extension has got the potential for disseminating the most recent market information to the farming community and enabling farmers to get optimum returns out of their enterprises. The RPS emphasis is on activities which improve the processing and marketing facilities of small rubber growers. For members, training classes are conducted so that better grade rubber sheets can be produced. Facilities for processing good quality rubber are also provided on a group basis at Group Processing Centers (GPCs) under the auspices of RPS. It helps in producing sheets of uniform grade and export quality. The realization of higher prices for better grades has made the small growers 'grade-conscious', leading to improvement in the quality of the sheets. Arrangements for marketing of products, such as latex, sheets (grade-wise), field coagulum, etc., are also made through companies in the RPS sector.

### **ICT-enabled extension**

ICTs are very useful in EAS and in facilitating 'reach out' to rural farmers. The Rubber Board provides the updates of both national and international market rates of natural rubber through SMS throughout the country. Advisories and information are being provided to the growers through SMS, WhatsApp groups etc., by Extension Officers. Mobile apps, such as Rubber Kisan app, Rubber Soil Information System (RubSIS), etc., are the other innovations being used extensively.



**Practical training on Rubber nursery aspects/ Tappers training/Training on Rubber sheet processing**

## COVID-19 AND THE NR SECTOR

Small growers and labourers have been the most affected by COVID-19 as their household incomes are under threat. Growers are not always well-informed and need support to deal with the crisis; and they have restricted access to inputs and labour for plantation management, harvesting/processing and marketing. Rubber Board is an institution with trained technical staff that is trusted by communities and farmers, have local reach, and have good communication skills. Our EAS actors are in a unique position to assess the situation in the field, provide

tailored services, and inform governments, who need to take rapid and adequate measures in ensuring sustainability, both in the short as well as long terms. However, extension personal are currently forced to stay away from regular face-to-face contact, and awareness and capacity building programmes have slowed down as governments are now mandating social distancing to slow down the spread of this disease by minimizing close contact between individuals. Hence, to adapt to the present situation and also operate within the government regulations, EAS providers need to rapidly change their way of functioning (Box 2).

### Box 2: What needs to be done

#### EAS adaptations

- Coordinate actions among EAS actors, including public, private, non-Governmental Organization (NGOs), Producer Organizations (POs), etc.
- Explore simple, available, accessible, and easy-to-implement Information and Communication Technologies (ICT) solutions, such as short message service (SMS), Interactive Voice Response (IVR), radio, TV, online marketing, e-extension platforms, social media, etc., for enabling information flow in the face of physical distancing and mobility constraints.
- Take advantage of existing formal and informal contacts, mechanisms, and local networks, such as cooperatives, producer organizations, farmer leaders, self-help groups, etc. These are crucial to ensure dissemination of timely and widespread information and advice when measures limiting mobility are in place.
- Link with frontline emergency response actors at national and local level for providing regular updating to the government on the situation and challenges faced by farmers in the field, and implement responses through a participatory approach.

#### EAS service provisions

##### To reduce COVID-19 impact

- Carry out a timely assessment of COVID-19 impacts and identify the specific challenges and needs of farmers and rural communities and inform governments and enable other agencies to respond.
- Provide locally specific/appropriate advice and services on access to inputs, market information, easily implementable ways of processing, use of labour-saving practices and collective marketing.
- Create awareness through timely and accurate information about relevant government measures, social protection schemes, credits, and other preventive measures such as physical distancing and hygiene.
- Facilitate access to locally available agricultural inputs in collaboration with local input suppliers, as they are also struggling to keep their distribution lines open to farmers.
- Facilitate matchmaking between labour demand and supply, by providing labour banks as labour-intensive agricultural activities are at risk due to work force shortages.
- Facilitate conflict resolution as the crisis puts the population under huge stress while the fear of contagion may disrupt social relationships. EAS workers need to acquire soft skills to communicate with distressed populations.

##### To help increase resilience and rebuild livelihoods

- Facilitate linkages with social protection schemes and promote self-help groups to undertake alternate income-generating opportunities.
- Build capacity of youth and women on agribusiness.
- Enable access to credit and inputs, such as fertilizers and other inputs, by collaborating with companies functioning in the sector.

#### Empowering of EAS system

- Ensure funding for EAS activities: resources will become scarcer than before and funding sources may be at risk. Increase efficient use of available resources and look for alternatives through convergence.
- Strengthen infrastructure, institutional set-ups and individual capacity to make use of digital information and services.



**Training for rain guarding to Kudumbasree women labour group / Field training for women labour cluster**

## REFORMS IN EXTENSION APPROACHES

In this difficult time, the role of EAS is even more critical than before in bridging the realities of local communities with government actions, and helping growers to overcome new challenges. EAS providers need to rapidly adapt to the emerging situation and change their approach so as to better respond to this crisis.

### Undertake conventional extension with suitable changes

Conventional EAS activities that focus on motivating, mobilizing and capacity building of farmers through one-on-one advisories, demonstrations, on farm trainings/workshops, informal group discussions etc., at field level are to be conducted, keeping in mind social distancing norms. The number of participants may be reduced so as to ensure social/physical distancing. Use of PPE by officials and participants and other guidelines are also to be followed while conducting these awareness and capacity building programmes. The number of such events may be maximized for achieving more outreach.

### Harnessing ICT for complementing conventional extension

Digitally-enabled extension tools can also be utilized for complementing conventional extension services with cost-effective and enhanced farmer reach out. The Rubber Board may utilize the following digital tools for EAS against the COVID-19 backdrop:

**Mobile Phone (Mobile extension):** Mobile phones, both conventional and smart phones, can be used to provide extension and advisory

services. Extension Officers can call farmers to provide information, or the extension organizations can provide information through 'pushed' or 'pulled' SMS.

**Television (TV):** TV conveys a sense of importance and legitimacy, whether programmes are transmitted through national government stations, community stations or private stations. TV can be combined with other ICTs tools, such as mobile phones, to create a two-way communication flow (e.g., by asking questions during live TV shows). Varieties of programmes which include features, documentaries/success stories of farmers, research inputs, quizzes, crop seminars, and live phone-in programmes can be broadcast. Scrolling news/advice can also be transmitted through cable TV network.

**Radio:** Radio (including FM stations, community and rural radio) can be used as a one-way or two-way communication channel to broadcast EAS content using different formats, such as radio campaigns, radio talk, on-farm interviews, and live talk shows. Radio is often combined with other ICTs, such as mobile phones, which allow farmers to provide feedback and ask questions during call-in programmes. The Rubber Board may host such programmes for EAS.

**Use of social media:** For EAS, whose primary component is communication, social media can be a potential goldmine. In the COVID-19 scenario, face-to-face teaching cannot be carried out physically. Social media offer great potential to convey important content at a distance or to provide targeted suggestions and

ideas. Social media can help farmers to seek information on farm operations, clarify their doubts, and give immediate access to market-related information. However, this can be possible only when they are socially networked with extension agents, progressive farmers and other actors in the value chain – in virtual space. Two of the most popular social media tools prevalent in India – Facebook and WhatsApp – can be used very effectively.

#### *WhatsApp groups for peer learning*

This social media tool enables sharing information with multiple users in multiple forms – ranging from text-based messages to audios, visuals; audiovisual and even web links – making it an information-rich platform. This tool is simple and easy to use, has low internet data requirements, and is becoming increasingly popular in rural India. WhatsApp offers a communication approach that can be quite flexible, as ‘any time-any place’ interaction is possible in most of the Indian and foreign languages. Even diffident and shy farmers can participate through encouragement and support. User feedback is easier to receive, and it is also prompt. It is easier for farmers to communicate with peers, extension professionals and experts in real time through WhatsApp group networks. The opportunities for clarification and removal of post-training doubts among farmer participants remain poor. As a result, a sizeable proportion of knowledge and information gained by participants may be lost. Thus use of WhatsApp for continued interaction after the training programme is over can offer peer learning among farmers. This can also offer an opportunity for farmers to ask for support during implementation of knowledge and skills learnt during the training.

WhatsApp can be used to offer context-specific information by linking farmers on one side and resource persons of different disciplines on the other, interlinked through a common mediator. The role of the mediator would be to receive the queries from the farmers on one side and sending them individually to different experts. After receiving answers from different experts, the mediator can share the pooled advice in an easily understandable form to the farmer clients.

*Video chat via Facebook or the Messenger app*  
Facebook is found to be the most popular social

media platform used by EAS actors. Facebook’s new group video chat feature – Messenger Rooms – is now available, and is ready to compete with services like Zoom, Skype, Google Meet and Microsoft Teams, as more people turn to video chat during coronavirus lockdowns and quarantines. A video chat room via Facebook or the Messenger app can be created, and up to 50 people can join a video call, even if they don’t have a Facebook account. There are no time limits on calls. Facebook users will be able to share links enabling non-users to join Rooms via a web browser on both desktop and mobile, eliminating the need to download an app or create an account as in the case of other services.

#### *Farminars/Farm seminars*

A webinar is a seminar that is held online. The live transmission of this is similar to a normal lesson, but the participants can participate online regardless of their location. The interaction usually takes place via chat. By recording a webinar, the same content can also be watched repeatedly, and at different times. Farminars/Farm seminars are a special type of webinar, namely mobile webinars. They differ from webinars in that they are not transmitted from a classroom, but live from outside, directly on site, on a farm or in the field (virtual field inspection). This places special demands on technology and people.

Webinars and farm seminars offer many advantages – less time required due to no travel, only short absences from the office instead of whole days, better accessibility; no costs/appointments for seminar rooms, no printed documents, only simple recording needed. There are various tools/software platforms on which webinars can be conducted (Box 3). Some are more focused on one-way communication, while others offer more options for interaction.

The Rubber Board may host online training programmes, seminars, campaign programmes on suitable social media during COVID-19 as part of its EAS operations. Use of social media still has to face a few challenges (Box 4) and these need to be addressed too.



### Box 3: Examples of Webinar Apps

- **Zoom:** Users outside of China can still sign up for the free version of Zoom to host up to 100 participants, access free for 1-to-1 meetings, and create group meetings lasting up to 40 minutes.
- **Avaya Spaces:** Avaya was one of the conferencing and communication companies on the frontline of the Coronavirus outbreak. Avaya Spaces is available to all educational institutions and non-profit organizations across the globe. The free solution supports video conferencing for up to 200 participants, with access to video, voice, chat, content sharing, and online meetings.
- **Cisco Webex:** Cisco has expanded the capabilities on its free offer in all countries where the technology is available. The updated free version now includes support for up to 100 participants, as well as unlimited usage with no time restrictions.
- **PGi:** PGi, a global business communications and collaboration provider, offers GlobalMeet Collaboration for free unlimited meetings for up to 125 participants with HD multipoint video, Dolby voice audio, local dial-in access, recording, and many more features.
- **Sangoma:** Sangoma Meet is highly secure, fully encrypted password-protected video conferences to avoid unauthorized users from jumping into a video meeting. Sangoma has launched the new service completely free of charge to everyone during the COVID-19 period.
- **Facebook:** Gives Free Portal Video Chat Devices to any employee that requests one.

### Box 4: Social media in EAS – Challenges

- **Lack of skills and competency:** Social medium is a comparatively new medium of communication and even though more and more young people are using it, the online presence of the older generation is still low, especially in rural areas. Field-level extension personnel of these areas also fall into this group and because of their low levels of skill and competency in using social media, they prefer to altogether avoid using it.
- **Infrastructure:** Proper physical infrastructure needs to be in place for getting access to social media. Lack of mobile networks or poor connectivity, faulty internet connections, high data charges, low bandwidth, etc., limit access to social media to a large extent
- **Training needs:** Proper training of extension personnel, farmers, and other actors in using social media is important. But first, psychological barriers and concerns need to be sorted out before imparting the required skills..
- **Attitude towards social media:** Due to lack of understanding on the working of social media, privacy concerns, and control of digital footprint, many extension officers hold a feeling of negativity towards social media.
- **Engaging the rural community:** The most important part of using social media in EAS is engaging the farmer community continuously. Therefore, selection of social media platforms needs to consider client preferences as well as content.

## THE WAY FORWARD

### Exploit the potential of social media in EAS:

Since social media is fast becoming an integral part of EAS, especially in the changing scenario, faster actions are required for better utilization of social media. To overcome challenges, a multi-pronged approach is needed at different levels:

#### Individual level:

- Extension officers should take personal initiative to use social media as part of their job within the norms of institutional guidelines.
- Farmers and other stakeholders should be encouraged to connect with social media

platforms.

#### Organizational level:

- Formulate suitable social media policy and guidelines; coordinated strategies are required.
- Encourage use of social media to promote organizational goals, actions, and success.
- Train employees, not just at the bottom level, but also at higher levels of the hierarchy; this is needed to help them understand and use social media appropriately.
- Organize workshops and hands-on-training for clients to create awareness about utility of social media and also develop the skills to use it.

- Employ a social media officer or communication officers to manage social media accounts, create content with experts, and for gatekeeping.

**Infrastructural level:**

- Basic infrastructure – power supply and access to network services are necessary to access social media.
- Free Wi-Fi in offices would be helpful in accessing social media.

**Strengthen Rubber Producers Societies as Rural Resource Centres (RRC)**

Rural Resource Centres (RRC)/Farmer Facilitation Centers (FFC) offer a community-based approach for providing EAS. RRC is a physical location set up to improve farmers’ access to technologies, knowledge and training, and to promote farmer innovation, interactive learning and networking. RRC typically have

a training hall and other training facilities. They offer various services, including training, sale of inputs/farm produce, advice on new technologies and approaches through demonstrations, access to ICTs, and also link growers to markets. Rubber Producers Societies having such facilities may be designated as RRC/FFC for facilitating offline and online training programmes.

**END NOTE**

Conventional extension methods which make use of strong personal rapport between the extension agents and stakeholders have proved to be highly effective in strengthening the Indian NR sector. While use of these methods will continue to remain important, these need to be supplemented with ICT-based approaches in order to deal with the new challenges posed by the spread of COVID-19.



**Annual mass contact programme / Annual general body of a Rubber Producer Society**

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## ADAPTING TO NEW NORMAL: SOME REFLECTIONS ON ROLE OF EXTENSION IN THE CONTEXT OF COVID-19

India's extension systems, with cross-country presence and grass root level outreach, has multiple roles to play in supporting the farming community in their struggle against the pandemic COVID-19 and its ill effects on agricultural sector. **Shantanu Rakshit, Reshma Gills, Anshida Beevi, C. N, Sajesh V. K. and Ph. Romen Sharma** discuss some of the potential roles of extension in enabling the farming community to adapt to a new normal.

COVID-19 has affected all walks of life including agriculture. The scenario points to the possible dip in production and supply of agricultural commodities due to many factors like disruption in supply chain of inputs and outputs, reverse migration of migrant labourers, price fluctuation, etc. The general inelasticity of the food demand has had a limited effect on the overall food consumption pattern, though there is a leeway of a disproportionately larger dependency on the grains and vegetables rather than animal protein-based food products. Agriculture and allied sectors help us meet necessities, prevent famishment and support livelihoods. Hence, they need to be functional in these challenging times.



Agricultural extension, being the broadened arm to loop farmers with the research system and governance, has major role in empowering farmers in this difficult situation. This in turn requires a complete overhaul of the system from its conventional approaches to a 'new extensionist' perspective. The present scenario demands strong institutional support to agriculture and behavioural changes in not only hygiene, but also in the adoption of sustainable ways of living to thrive in the situation. Since the extension system helps with voluntary behavioural change among the communities it works with, effective communication is now more important than ever. Similarly, extension agencies in public, private and civil society need to take up a range of activities like disaster management, attracting

and retaining youth in agriculture to prevent distress migration, leveraging the potential of collectives, value chain development and integrating ICTs across the value chain in more dynamic and innovative ways.

## RISK COMMUNICATION AND DISASTER MANAGEMENT

During recent times, initiatives related to climate change and disaster management, adaptation and mitigation, were most discussed and implemented in agriculture. But, most of the climate change related efforts are focused on technological push rather than holistic disaster management approaches. For a more realistic impact, institutional innovations, coupled with knowledge integration and community mobilization, are more important than technological inputs. Facing challenges put forth by a pandemic is a herculean task for technology-led climate adaptive systems. The present situation, firstly, demands strengthening risk management abilities of extension system to enable farmers and rural producers face disasters of any sort. More efforts are required in this direction.

Developing the risk management capacity of extension personnel is the larger issue. EDEN (Extension Disaster Education Network) in the USA is an example. EDEN is a collaborative multi-state effort by extension services across the USA to reduce impact of disasters through research-based education. In addition to strengthening the capacity of extension personnel, the mission of EDEN involves enhancing disaster preparedness of communities and other stakeholders as well as serving as national source for research based disaster education. The cooperative extension service in the USA has community development, home economics and 4-H youth development as mandated areas in addition to agriculture. It necessitates community level interventions of extension systems. Agricultural extension system in India are mandated to work in agriculture and allied sectors, but can partner with broad range of actors to reduce vulnerability of farmers and fishers.

Disaster management is a collective effort of many actors like local institutions,

farmer collectives, media and civil society organizations, in addition to government agencies in public health, civil supplies and public administration. The extension system strengthened with adaptive risk management strategies has to work closely with these agencies in the interest of farming community for widespread dissemination of preventive and mitigating measures to minimize farming losses. The Indian Council of Agricultural Research (ICAR) has dispensed state-wise guidelines for farmers/fishermen while harvesting, post-harvest operations, storage and marketing of farm/fish produce during lockdown. The advisories were popularised with different electronic and print media including social media like WhatsApp, Facebook and twitter.

### Box 1: ICAR's state-wise guidelines for farmers/fishermen

1. <https://icar.org.in/sites/default/files/eBook-COVID-19-ICAR-Initiatives.pdf>
2. <https://icar.org.in/sites/default/files/Kharif%20agro-advisory%20for%20farmers.pdf>
3. <https://icar.org.in/content/cift-covid-19-advisory-fishermen>
4. <http://ivri.nic.in/circulars/advisory27042020.pdf>

Similarly, in the time of pandemic, the presence of extension and communication system need to be amplified to manage associated social stigma, if any. Being the most influential and credible information source for the rural farming community, extension agents have the social responsibility to communicate facts and figures, to correct misconceptions and misinformation which may contribute to social stigma and discrimination at community level.

Farmers in rural areas are vulnerable with less competitive and inefficient marketing systems and need facilitation in marketing of crop produce. This is another area where extension needs to build capabilities and developmental strategies. In the following sessions, we have discussed some of the marketing innovations and models emerged in-situ during the lockdown period. Capacity enabled extension systems could take valid lessons from these initiatives and develop many

adaptive and efficient models to navigate risks and uncertainties that may arise in agriculture marketing.

## **INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) AND BEYOND**

Farming community requires real-time information and advisories to address issues and problems. Amid lockdown, farmers were restricted from visiting formal institutional sources to get required support. Similarly, the movement and field visit of extension personnel, who play a key role in technology transfer and information dissemination, was also limited. In this context, going digital by exploring options (mobile phones, interactive video calls, television, community radio, digital marketing platforms, social media, etc.) of ICTs was considered the best way to connect with distantly located farmers and other actors. It is quite appreciable that many state and central extension agencies are increasingly involved in electronic mode of information dissemination. The Sikkim government has circulated district specific helpline numbers to support farmers during lockdown (Sikkim Chronicle, 8 April 2020). Private ventures like Aquaconnect have launched an emergency helpline to support Indian shrimp and fish farmers during the lockdown (BW Business World, 4 May 2020). Different educational and training institutions are also utilizing online platforms for providing advisory support to farmers.

The Haritha Keralam Mission of Kerala has utilised Facebook live for classes on vegetable farming to encourage an increasing number of people into farming. Kerala Agricultural University released online videos on vegetable cultivation in kitchen gardens along with round-the-clock helplines being operated through KVKs and research stations in all districts. Platforms like Meghdoot app developed by IMD and ICAR will be effective for transfer of advisories with its localized weather and agro-advisories services.

The Alumni Association of University of Agricultural Sciences, Bangalore, has started an initiative to help grape farmers to find markets by connecting them with Resident Welfare Associations / Bulk Consumers through

WhatsApp. They have also developed a Google form for associations and consumers to express their requirement of different fruit and vegetables that will be delivered to their doorstep without physical contact.

The Union Ministry in April launched the KisanRath mobile app to facilitate farmers and traders in searching for transport vehicles for movement of agriculture & horticulture produce (PIB, 17 April 2020). The Punjab Mandi Board (PMB) introduced ePMB, an e-Pass system. This system automatically generates appropriate number of passes based on historical data available with the Mandi Board. The passes for a given day are issued to the Arthiyas (commission agents) three days prior to avoid any kind of rush. This automated solution eliminates all unnecessary biases and favouritism, thereby bringing transparency to the process (Express Computer, 21 April 2020).

There are many ICT based initiatives as mentioned above, but the issue of digital divide may limit the reach to such initiatives by the farming community. The rural internet density was reported to be 27.57 i.e. number of internet subscribers per 100 people (TRAI, 2020). Connectivity and speed are other binding issues. Extension has to promote ICT use among farmers and improve their readiness to use technology. But at the same time, human intermediation should be made possible in areas where, access to ICTs is constrained. Farmers' organisation can play an intermediary role and facilitate access to ICTs for the unreachable.

Several novel initiatives have been taken in response to the emerging situation. But, few systematic studies have been conducted on the impact of ICT based initiatives. Information on the number of beneficiaries, their level of satisfaction, challenges they face in accessing these services, the way to improve effectiveness of these initiatives, etc. should be examined before replicating these initiatives on a larger scale.



## LEVERAGING THE POTENTIAL OF COLLECTIVES AND TRANSFORMATIVE SUPPLY CHAIN

Recently, collectives of various size and activities have emerged as major determinants of farmers' welfare in India. From neighbourhood groups to large producers companies, collectives are now revolutionising Indian agriculture. In addition to advantages like resource pooling, transaction cost reduction and increasing bargaining power of farmers, collectives have the potential to act as the point of convergence for various schemes and developmental agencies.

Farmer Producer Organisations (FPOs) are playing important roles in sustaining the supply chain of grains, fruits and vegetables while exploring direct marketing-based new supply chains. FPOs are continue to facilitate linkages between farmers, processors, traders and retailers to coordinate supply and demand. During lockdown, Small Farmers Agribusiness Consortium (SFAC) assisted FPOs by collating data on surplus produce available with FPOs and helping them establish direct market linkages with buyers. More than 1000 FPOs are now aboard the eNAM platform facilitated by SFAC. The eNAM introduced 'FPO trading module' to strengthen agriculture commodity

supply chain and to decongest the mandis. The FPOs can trade their produce from their collection centres without bringing the produce to the mandi through this module.

Disruptions in the supply chain of perishables – vegetable and fruits – were other major issues. Due to lockdown and non-compliance with social distancing norms, several APMC markets are either closed or partially functioning. Farmers could not send their produce to the market owing to transport problems. Farmers are not getting adequate price for their produce. Urban consumers are also experiencing shortage and high price of vegetables and fruits. In the present context, it is necessary to find out new supply chain for vegetables and fruits, which will benefit both farmers and consumers. AESA Covid19-field note-9 has detailed the alternate supply chain developed for mango farmers in Muthalamada Kerala by HORTICORP, an agency under department of agriculture and farmers welfare, Government of Kerala. Mangoes were procured directly from farmers through clusters under the supervision of agricultural officers. These were further transported to HORTICORP outlets and local markets (Sujith and Mary Vijaya, 2020).

Direct marketing needs to be promoted. While discussing strategies to tackle COVID-19 with

Chief Ministers in April, the Prime Minister of India, Narendra Modi, suggested states to incentivise farmers for direct marketing of farm produce to buyers' doorsteps, which would prevent crowding in 'mandis' and urged all states to reforms regulations in this line (The Times of India, 11 April 2020).

The vegetable Growers Association of India (VGAI) started connecting farmers with housing societies of Pune and Mumbai (Sakal Times, 30 April 2020). The farmers of Parbhani and Aurangabad in Maharashtra formed a chain to collect vegetables from fields and take it to housing societies. In many places, the district administration is facilitating linkages between farmers' groups and housing societies. This arrangement is a win-win situation for both cultivators and consumers. Farmers are getting better prices without losing to middlemen and wholesale dealers, while consumers are getting fresh produce at their doorstep at affordable better prices. (Business Line, 30 March 2020).

The marine fisheries sector in Kerala has undertaken a very innovative supply chain modification right from the harbour during lockdown. Fishermen have been allowed to sell their catch without going for open auction, as was the practise earlier in the harbour. However, the price of fish is decided by Harbour Management Societies headed by respective District Collectors. These societies ensure minimum fair price for primary producers based on quality. The Fisheries Department of Kerala has developed an IT application to enable hassle-free selling of fish through booking in advance. To promote social distancing, vehicles are allowed entry to the harbour for purchase of fish on the basis of their booking. For those engaged in small business, market points are worked out and Matsyafed (the Kerala State Co-operative Federation for Fisheries Development Ltd.) ensured fish availability at these points in quantities booked in advance. Work hours were also introduced in fish markets i.e. they function from 7 am to 11 am only (Business Line, 3 April 2020).

The Association of Agricultural Officers Kerala and the Kerala Pineapple Farmers' Association have joined hands to launch a 'pineapple challenge' to address the issue of

large quantities of unsold harvest in the wake of COVID-19 spread (Kanatt and Jos, 2020). Around 1,200 tonnes of pineapple reach the Vazhakkulam main market, near Muvattupuzha, every day. Considering the non-availability of drivers for transporting fruits to major markets, farmers and farm officials decided to deliver 'A' grade pineapple based on a minimum order of 100kg at a price of rs 20 per kg. This assured an attractive price, given the current market rate, and helped farmers. Farm officials have appealed to traders, voluntary bodies and residents' associations to place orders with a condition that the minimum order should be for 100kg (AESAs COVID19 Field note-4)). The pineapples were also sold through outlets opened by Kerala State Horticultural Products Development Corporation (Horticorp) and the Vegetable and Fruit Promotion Council, Keralam.

Extension systems should help farmers/ farmers' collectives to explore new supply chains, connect with buyers and develop sustainable direct marketing models. As most farmers are unorganised and not tech-savvy, organizing them into FPOs ICTs. FPOs can help in supporting the livelihood of farmers by ensuring the functioning of supply chain, as in the case of Mahagrapes (Kumar and Sharma, 2016). Livestock sector is likely to be constrained by unavailability of feed, poultry chicks, fish seeds, etc. FPOs, co-operatives and private stakeholders should coordinate with line departments for smooth movement and delivery of inputs.

## **ADDRESSING CHALLENGES OF REVERSE MIGRATION**

Migrants who returned to their hometowns are likely to find difficult to engage in meaningful employment. It will in turn affect their household expenditure and food security. Migration may lead to labour shortage for agriculture activities in labour intensive crops like paddy. Promotion of community resource centres like custom hiring centre and cooperatives can help in coping with labour shortage.

Extension agencies like KVK can play a major role in skilling (re-skilling or up skilling) reverse

migrant workforce for farm and non-farm rural employment opportunities based on local needs and labour market demands. Potential of agro processing needs to be explored for employment and income generation. ICAR has already instructed all KVKs to plan economic activities along with skill-based trainings for the migrant workforce. KVKs have shared their opinion about strategies for migrant labourers during this Covid-19. KVK-Kotwa organised a training programme on beekeeping for migrant workers for three days under the new government initiative, Prime Minister's Garib Kalyan Rojgar Abhiyan. About 35 migrant labours were trained and reskilled in scientific beekeeping and honey processing practices (Live Hindustan, 09 Jul 2020). KVKs in different districts can stand as custodian for re-skilled and up-skilled workforce if they map and keep a repository of the workforce. It will help farmers, entrepreneurs or potential job providers to get certified skilled workers from KVKs when they need skilled hands for their farm and related operations. Distress returned migrated labour can be accommodated in rural employment generation programmes like MGNREGA. The office of the principal scientific advisor (PSA) to the Indian government has come up with a 'Covid-19 agriculture track to support migrant workers with technologies and information for profitable farming'. It also proposed to train youngsters among migrant workers as change agents to facilitate technology dissemination in villages (Economic Times, 11 June 2020).

In the recent year, Agriculture Skill Council of India (ASCI) under the aegis of Ministry of Skill Development & Entrepreneurship has been working towards skill upgradation of farmers and wage workers in agriculture and allied sectors. ASCI developed 169 qualification packs for imparting training through 900 training partners. These facilities can also be utilised to upgrade skillsets of returned migrant workers for locally available employment avenues.

## **PROMOTION OF LOCALISED EXTENSION STRATEGIES**

Extension system has the onus of emphasizing local production and consumption. It requires local extension strategy, starting with developing database of all agencies involved in

technology dissemination and implementation of development programmes. Kumar (2018) in AESA blog 86 discussed the importance of having an extension census to identify the major actors in the extension and advisory landscape. It was noted that huge extension resource base is available, but belongs to diverse organisations and sectors. Synergising the efforts of these actors for the welfare of the farming community is the need of the hour. In addition, database of resources, farmers, labour availability, technologies and markets should be developed through a 'best fit approach for the locality'. The localised strategies must give prime importance to family farming/ home grown food production for sustainability of livelihoods. In this regard, cultivation of many unexploited, neglected and underutilised nutritious food crop varieties, vegetables and fruits need to be promoted through specialised advisories and quality input kit supply on demand basis.

The farming community needs to be strengthened and capacitated to develop localised markets and direct value chains to overcome unforeseen price fluctuations and disruptions in the market structure due to pandemics or destructive conditions. Dependence on informal credit sources may rise. Institutional arrangement for credit may be arranged for distressed households and agricultural activities. Grass root capacity building in a gender-neutral manner is needed to realize opportunities on-farm and off-farm activities. This may enable them to see farming as a business enterprise and prefer agriculture as a viable livelihood option. The issue has already gained policy attention. Agriculture Technology Management Agency (ATMA) stresses identifying local research and extension priorities in consultation with farmers during the preparation of the Strategic Research and Extension Plan (SREP). Other features of ATMA like mobilization of farmers' groups as well as promotion of agri- entrepreneurs, custom hire service providers and input dealers are intended to supplement the efforts of public extension functionaries (DAC 2014). The concept of farmers' friend is another key feature in ATMA to strengthen the linkage between agricultural extension system and farmers in the village.



Such localised and need specific extension efforts must also have a strategic dimension to handle the social stigma associated with the pandemic by facilitating social relationship rebuilding among the rural people and communities. It can be achieved through collaboration, coordination and convergence of different departments like health, agriculture, mental health and disaster management to explain various issues and its measures devised at local level. The stress and anxiety caused by the pandemic among rural people and farmers will have very adverse effects on existing structure of the society. Counselling and timely advice to distressed people is very essential to maintain strong social relationships and interconnectedness. Involvement of Panchayati Raj Institution (PRIs) will be the key determinants in the formulation and implementation of such localised strategies. They can converge the strength of various agencies and schemes and customise it to the local needs and priorities. Also, PRIs can facilitate involvement of local organizations and key stakeholders in the implementation of

localised extension strategies. Extension agents, who are the change agents, can mobilize farmers and rural people to synergise and garner the effect of convergence efforts.

## **WAY FORWARD**

Extension systems have to innovate potential methods for adapting to the new normal. In this article, we tried to highlight some of the aspects and related initiatives which merit the attention of extension system. Compartmentalised discussions or initiatives may not be sufficient to create strategic change in extension methods and its specific applications. Harmonious blending of research outputs and its implications on outcomes can to be ensured through convergence of experimental outputs, policy suggestions and insight on field implications and extension efforts of NARS, DoE-DAC, private extension agencies, community level organizations, etc. Assimilating the learning from field cases with the experience of professionals can add to developing appropriate extension strategies.

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## JOHAR FPCs AUGMENT AGRI-MARKETING SERVICES IN TRIBAL AREAS DURING COVID-19 LOCKDOWN

Streamlining production systems while connecting farmers with market-led initiatives through collectivization, institution building and investments in quality support services appears to be a succinct and pragmatic strategy to support resource poor farmers in tribal areas. In this blog, Pratyush **Ranjan Singh and Amit Kumar Burman** illustrate how Farmer Producer Companies in Jharkhand provided such support to farmers during COVID-19 lockdown and the lessons learnt from these initiatives.

Mithlesh Kotwar, local personnel from the farmer producer company (FPC) Rajrappa Kisan Producer Company Limited (RKPCL) remarks, "This is the only vegetable collection center that is operational and providing marketing support services to farmers of four nearby villages during COVID-19 lockdown when other major markets are closed," as he records the weight of a crate of graded tomatoes in one of the temporary collection centers (CCs) established at a remote location in Ramgarh district, Jharkhand. Mithlesh recounts, "RKPCL has procured 19 MT of vegetables from women producer groups during the lockdown. We, as an FPC, are trying to safeguard small and marginal farmers from indemnity and distress sale through this aggregation center."

### FARMER PRODUCER COMPANIES

FPC as a collectivization model is acknowledged for providing services with specialized and streamlined production systems to its members. Marketing support services through FPCs during the COVID-19 lockdown were overwhelming, especially in tribal and remote areas with derelict market facilities. There is a strong imperative now to invest in promoting FPCs as strong operational institutions that seek to address the multifaceted agricultural marketing challenges faced by farmers in resource constrained geographical settings.

Numerous women farmers in Jharkhand like Mamta Gorai of East Singhbhum district had accessed timely market support services through the FPCs during the COVID-19 lockdown. We met Mamta while she was returning crates to the producer group office in her village. She said, "In our village, we as a producer group cultivated watermelon and vegetables. We were tormented about losses during the lockdown, but our FPC helped us sell our harvest at market rates right on time".

So, could investments in collectivization models, more specifically, FPCs, hold the key to enhancing productivity and profitability for small and marginal farmers in tribal dominant areas and could FPCs, as an institution, better

handle crisis to benefit their large member base? We explore the Jharkhand Opportunities for Harnessing Rural Growth (JOHAR) model of FPC promotion and its performance during the COVID-19 pandemic lockdown in Jharkhand.

### Box 1: JOHAR and FPC

JOHAR – a World Bank financed project, implemented by the autonomous Jharkhand State Livelihoods Promotion Society (JSLPS), under the aegis of Department of Rural Development, Government of Jharkhand, has promoted FPC as a community institutional platform to support small and marginal farmers (mostly women) in tribal areas to transition towards intensification, diversification and enhancing market orientation of produce with the objective of augmenting and diversifying household incomes. JOHAR-promoted FPCs are unique because of their huge membership base (7,000–8,000 farmers per FPC), women shareholder base, collectivization of farmers in tribal dominant geographies, and trading in perishable products (vegetables, fruits and livestock) as their major business portfolio. JOHAR project has currently institutionalized 19 FPCs, servicing around one lakh women farmers in 17 districts of Jharkhand.

### JOHAR FPCs

The agribusiness operations model of JOHAR FPCs is based on a two-pronged strategy: streamlining the production systems and later, setting up agri-marketing systems operations.

**Streamlining Production Systems:** For streamlining production systems, individual producers are first collectivized into organized producer groups at the village level and later, federated to form FPCs at sub-district/district level. Synchronized farming of two or three high-value crops in a cluster, augmenting irrigation support and cluster development ensure continuous supply of marketable produce across different cropping seasons. Capacity building and skill development efforts are undertaken through transfer of scientific knowledge to enhance productivity and quality

with the help of technical support agencies such as the World Vegetable Center. Farmer-wise crop production data, with details of crops/varieties, acreage, land type and sowing/planting time are recorded in each cropping season through a robust digital management information system to support adaptive business management and real time decision making. Field community cadres, selected by the community members, undergo a series of training programs on different crops package of practices and marketing services. Later, these community cadres are certified by the Agriculture Skill Council of India as master trainers and trainers to provide technical support services at the farmer's doorstep. Community master trainers provide continuous backstopping support to trainers in providing trainings and services.



Farmers with their harvested produce / Weighing and record keeping of individual farmers at village level

### Setting up agri-marketing systems:

Development and implementation of agri-marketing operations are initiated concurrently with the planning of production systems. FPC agri-marketing activities involve demand and supply estimations, quality/ price verifications, localized demand aggregation, streamlining product (input/output) supply, logistics and human resource management, price discover and, payment systems. Synergy Technofin, experienced in setting up processes for agri-

marketing, was hired to set up processes for FPCs and train FPC staff to operate in a process driven environment. FPCs also partner with agri-start-ups like DeHaat and Weather Risk Management Services Private Limited for streamlining input-output support systems and building capacity of staff.

Several partners have contributed to this initiative and their roles are presented in Table 1.

**Table 1: Role of different partners**

SI No	Partners	Support
1	World Vegetable Centre <a href="https://avrdc.org/">https://avrdc.org/</a>	Transfer of scientific knowledge to enhance crop productivity and quality.
2	Synergy Technofin <a href="http://www.synergytechnofin.com/">http://www.synergytechnofin.com/</a>	Setting up processes for agri-marketing and market intelligence.
3	DeHaat <a href="https://agrevolution.in/">https://agrevolution.in/</a>	Streamlining input-output support systems and training of staff.
4	Weather Risk Management Services Private Limited <a href="https://www.weather-risk.com/index.html">https://www.weather-risk.com/index.html</a>	Streamlining input-output support systems and training of staff.
5	Agriculture Skill Council of India <a href="https://asci-india.com/">https://asci-india.com/</a>	Training and certification of field cadres as trainers and master trainers.

JOHAR FPCs provide inputs (seed, fertilizer, crop protection) as backend support in accordance with package of practices and crop planning exercises to create standardized products. FPC collection centers (CCs) situated at strategic locations in existing trade routes provide better access to farmers for inputs and output sales. Marketing plans entailing logistics and local cadre management are developed and executed to ascertain realistic business transactions. This helps producers and FPCs improve their understanding of timeliness, quality, packaging and payment requirements of various buyers and market channels. Nineteen FPCs until July 2020 transacted INR 120 million in input/output trading, benefiting thousands of women farmers in tribal dominated areas in the last one year of operations.

### FPCs DURING COVID-19 LOCKDOWN

JOHAR FPCs also made continuous and protracted efforts in agri-marketing to safeguard the interests of small and marginal farmers during the unprecedented lockdown period. Until July 2020, 13 FPCs sold 1410 MT of vegetables and fruits along with livestock

products and agri-inputs worth INR 35 million in two and half months by following process-driven aggregation and sales.

**Challenges:** FPCs faced multiple challenges in conducting their agri-marketing activities during the COVID-19 lockdown. These included exceptionally high transportation costs due to unavailability of transport facilities, restriction of FPC staff movement leading to poor coordination in field operations, low market demand due to fewer functional markets, difficulty in accessing distant markets, obfuscated market rates, lack of product quality standardization and absence of timely payment to farmers. Announcement of the lockdown and situations that emerged after were so abrupt that initially FPCs could not plan any pre-emptive actions. Therefore, the strategies to counter or minimize the impact of the lockdown were primarily evolving in nature as the FPCs continually streamlined their business operations.

**Responding to the crisis:** During the initial phase of the lockdown, the demand for produce in wholesale quantities diminished and traders

offered lower rates for disaggregated harvests of small and marginal farmers. JOHAR FPCs initiated the idea of creating a retail space for immediate produce liquidation. Retailing of produce commenced with dual objectives: of continued synchronized harvesting at the backend and of direct marketing from farm to consumers at reasonable price as frontend support. JOHAR FPCs arranged for 'movement passes' that enabled field staff to resume visits to fields and provided continuous backend support. The team engaged in quality assaying, supervising loading and dispatch of material from the fields.

However, after streamlining the initial processes, FPCs learnt that retailing was not a sustainable option for handling supply from the farmers due to increased cost of delivery, higher wastages, absence of full basket of vegetables, need for trained people for handling retail operations, cash management, keeping separate record of transactions and increasing risk of pandemic spread in retail handling and operations. Hence, the FPCs later strategically explored wholesale markets and alternative channels within and outside the state boundaries. This led to identification of wholesale buyers in different markets and transactions were initiated over a period through wholesale trading with processes adhering to quality requirements.

## LEARNINGS

FPCs had several operational learnings during the lockdown period. Firstly, an understanding of quality parameters among farmers and adherence to quality norms is a vital aspect for developing sustainable business relations with the traders.

Secondly, as transporters are one of the important value chain partners, engaging them within business operations with full responsibility and setting up efficiency-based

remuneration systems are important for timely delivery.

Thirdly, delivery time is key for realizing relatively better prices in the market for perishable produce; even a half-hour to one-hour delay in market arrivals could lower product prices by 20–50%. Fourthly, timely payments to farmers in a convenient mode is important for convincing farmers to sell their produce to FPCs.

Importantly, until properly trained retailing team; real time information of product availability and quality, continuity and diversity in supply portfolio are in place, retailing of products in urban markets is not a sustainable option for FPCs. Finally, the physical presence of FPCs in the form of CCs infuses confidence among member farmers to access a definite buyer/seller and switch from their existing trading partners.

## END NOTE

JOHAR's FPC promotion model testifies to the important strategic pathways in its role of supporting small and marginal farmers in tribal areas. Streamlining production systems and concurrently connecting them with market-led initiatives through collectivization, institution building and investments in quality support services appears to be a succinct and pragmatic strategy in resource-constrained areas. Moreover, FPC as a grassroots institution with robust management information system, trained cadre outreach, timely payment systems and strategic extended CCs makes for agile institutions to better manage risks and crises.

The learnings from the JOHAR model of FPC promotion seems promising and similar initiatives to promote the interface between the farmers and FPCs can be tested in other tribal dominated areas of India.

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## MARKETING HORTICULTURAL PRODUCE: STRATEGIES FOR THE COVID-19 LOCKDOWN PERIOD

Indian farmers producing horticultural crops faced difficulty in marketing their produce during Phase 1 of the COVID-19 lockdown period. In this blog, **R Venkattakumar, TM Gajanana and VKJ Rao** discuss some of the innovative models operated by four different agencies to help farmers overcome this crisis, and suggest some strategies that can be adopted during similar situations.

During Phase 1 of the COVID-19 pandemic period (April, May and June 2020), farmers, particularly in Karnataka State, faced difficulty in marketing their produce due to restrictions in logistics. The buyers and aggregators could not move freely to collect the produce produced by the farmers. In such a scenario, horticulturists had a tough time in reaching the consumers with their perishable commodities, especially fruits and vegetables. However, certain players such as development departments, voluntary associations, farmer producer organizations (FPOs), and private players, operated in their own way to help the farmers in marketing.

A total of 75 farmers were contacted through telephonic or personal interviews, apart from the office bearers of the models, to collect data about the operations of innovative models. Most of the models mostly operated in and around Bengaluru city of Karnataka State. Under FPO models, the Palamner FPO model was also considered because even though it is located in Andhra Pradesh, it operates in Bengaluru city due to its proximity to this place. These models were dealing with farmers, who were cultivating mostly fruits and vegetables, which are highly perishable in nature. The major fruits dealt through these models were mango, grapes, papaya, banana, guava, custard apple, lemon, rambutan and kamalam (dragon fruit), etc., while the major vegetables were tomato, chilli, beans, cucumber, brinjal, raw banana, greens, bottle gourd, yardlong bean, cabbage, pumpkin, etc. Farmers faced several challenges, such as getting transport passes, lack of information about actual demand, labour shortage, no demand for exports, no inter-state transaction, price fall due to decrease in demand and drop in demand due to closure of restaurants, etc., during Phase 1 of the lockdown period.





## INITIATIVES TAKEN BY DEVELOPMENT DEPARTMENTS AND THEIR COPING STRATEGIES

The Horticulture Producers Marketing and Processing Co-operative Society Ltd. (HOPCOMS) and Karnataka State Mango

Development and Marketing Corporation Ltd. adopted e-pass strategies to procure and supply the produce from farmers to consumers during Phase 1 of the lockdown period (Box 1). It was not easy for these organizations to facilitate the farmers to market their produce given the COVID rules and restrictions.

### Box 1: Initiatives by Development Departments

#### A. HOPCOMS Model, Karnataka

The Horticulture Producers Marketing and Processing Co-operative Society Ltd. (HOPCOMS) is the marketing wing of the Department of Horticulture (DoH), Government of Karnataka (GoK), involved in procurement and marketing of horticultural produce produced by the member-farmers of this society. It procures produce from the farmers and sells it through its sales outlets established in different parts of the states. During phase 1 of the COVID-19 pandemic in the country, HOPCOMS came up with an innovative marketing model not only for the member-farmers but also for other farmers. The farmers who got the special passes supplied fruits and vegetables to HOPCOMS. HOPCOMS in turn supplied these products to more than 90 government/private institutions, such as hospitals and hostels. HOPCOMS got a profit of Rs. 1.5 crores by supplying horticultural produce to these institutions. Apart from supplying to these institutions, HOPCOMS had a tie-up with more than 2500 associations of apartments in Bengaluru. The sales figures ranged from Rs. 45000- to Rs. 60000 per day during April 2020. HOPCOMS also sold the horticultural produce through its sales outlets and the sales through these outlets doubled during the lockdown period.

#### B. Karnataka State Mango Development and Marketing Corporation Ltd.

Karnataka State Mango Development and Marketing Corporation Ltd., is a unit of the Government of Karnataka (GoK), which acts as a development agency for the promotion of mango development and marketing activities through various schemes of the state. During phase 1 of the pandemic lockdown in the country, the Board came out with a model in order to support the mango growers of the state. The mangoes supplied by the farmers in pre-packed boxes were distributed by the Board through Post Offices (PO) via a marketing tie-up. The farmers were paid after the delivery and the GPO was also paid transportation and postal charges. More than 1000 tonnes of mango were sold through this model. The quantity that remained after delivery to the consumers were supplied to the apartments in Bengaluru at a sale price fixed on mutual consensus.

### **Managing the restrictions**

HOPCOMS issued e-passes to the farmers for free movement of their vehicles with the produce. Both the registered and non-registered farmers were asked to supply the produce to the nearby HOPCOMS collection centres. The farmers who supplied from far-off places such as northern parts of Karnataka were asked to supply directly to Bengaluru centres. In the case of Mango Development Corporation, the green passes issued by the Department of Agriculture were utilized by the mango growers, while supplying the fruits to Post Offices. Apart from green passes, the Mango Development Corporation also issued passes for the free movement of farmers' vehicles.

### **Ensuring quality of the produce**

The farmers were asked to send photos of produce sample to HOPCOMS. HOPCOMS assessed the quality of the produce and then approved it for transportation. As for the Mango Development Corporation, only registered growers were allowed to deal with the Corporation, who were already following the Global Guidelines for Good Agricultural Practices (GAP).

### **Informing farmers and consumers on the new arrangements**

HOPCOMS informed both the registered and non-registered farmers through targeted WhatsApp groups, so that the information about procurement reached the farmers in time. HOPCOMS had regular videoconference meetings with the consumers to collate their demands for fresh fruits and vegetables, especially from apartment associations. In the case of Mango Development Corporation, the Corporation maintained a portal (B2C), to which the registered farmers and consumers had access and got updates on demand and supply. In fact, the portal acted as a platform to connect sellers and buyers.

### **Monitory benefits realized by the farmers**

The beneficiaries of the HOPCOMS model, during the lockdown period, realized considerable incremental monetary benefits as compared to the previous period, as a result of arrangements made by HOPCOMS that bypassed middlemen. These benefits were to the tune of Rs. 11/kg for coconut, Rs.3/kg for

tomato, Rs. 6 for beans, Rs. 9 for capsicum, Rs. 2 for cabbage, Rs. 8 for ridge gourd, and Rs. 4 for onion and brinjal. This value was arrived at after accounting for transportation charges. Similarly, such profits were Rs. 14 for Alphonso mangoes, Rs. 13 for Mallika mangoes, and Rs. 3 for Totapuri as realized by the beneficiaries of Mango Development Corporation.

HOPCOMS maintained contact with the non-registered farmers for further supply even after the lockdown period. HOPCOMS' contact with the private organizations such as hospitals and hostels as well as Apartment Associations in Bengaluru continued for supply of fresh fruits and vegetables. In the case of Mango Development Corporation, the Corporation tried to have agreements with organizations like Flipkart, so that farmers from places far away from Bengaluru such as Mangaluru, Dharwad, Davanagere and Belagavi, can supply produce during shortage situation at the Corporation level.



### **INITIATIVES BY FARMER PRODUCER ORGANIZATIONS (FPOs) AND THEIR COPING STRATEGIES**

Puthari Horticulture Farmers Producers Company Limited (PHFPCL) and Palamner Horticulture Farmers Producers Company Limited, Palamner, Andhra Pradesh (Box 2) are the two FPOs, whose initiatives were studied in order to understand their coping strategies during the lockdown period.

### **Managing the restrictions**

The governments of Karnataka and Andhra Pradesh issued passes/green passes to needy farmers towards transportation of harvested fresh fruits and vegetables, through state development departments such as Department of Agriculture and Department of Horticulture.

## Box 2: Initiatives by FPOs

### **Puthari FPO, Kodagu, Karnataka**

PHFPCL was established in 2017. It is functioning in Kodagu district of Karnataka to extend diversified services to farmer-members from the district. This FPO is being promoted by Krishi Vigyan Kendra (KVK), Gonikoppal, Kodagu, Karnataka, which is functioning under the administrative control of ICAR-Indian Institute of Horticultural Research (IIHR), Bengaluru. It serves its member-farmers (1200 farmers and Rs. 7000/- is the value of each share) through inputs (fertilizers, chemicals, farm implements and tools, etc.), retailing, output procurement (black pepper and coffee), and sale of farm produce (milk, eggs, fresh fruits and vegetables, etc.). During the lockdown period, the supply chain was disrupted and the consumers of Kodagu district suffered from lack of supply of fruits and vegetables. Understanding this situation, the FPO initiated tie-up with horticulturists of five taluks in Karnataka, procured the produce and supplied to the consumers at the premises of KVK, Gonikoppal, Kodagu district. Based on this experience, KVK gave a regular space for the FPO to operate a 'Rural Mart', so that fresh fruits and vegetables could be supplied regularly.

### **Palamner FPO, Andhra Pradesh**

Palamner FPO is serving its producer members from Palamner taluk of Andhra Pradesh through different kinds of extension services such as supply of inputs (seeds, planting material, fertilizers, plant protection chemicals, farm tools and implements), and procurement and marketing of produce. The farmer-members (300-400) of this FPO had a tough time with marketing their produce, especially vegetables, during Phase 1 of the lockdown period of COVID-19. The FPO helped these farmers through direct marketing. Better rates than the market rate were given to the farmers and with a Rs. 1/kg margin for the FPO, vegetables were distributed to the companies. Farmers benefitted from the 'no commission' cost. Based on the demand, farmers started diversifying into cultivation of vegetables such as green chilli, ladies finger, ridge gourd, bottle gourd, and bitter gourd instead of merely growing tomato, cauliflower and cabbage. Every day, around three tonnes of vegetables were supplied to the companies. The remaining vegetables were distributed to apartments in Bengaluru and also sold through roadside stalls arranged by the FPO.

However, both the Puthari and Palamner FPOs managed their own transportation arrangements, so that they could aggregate the produce from farmers right from the farm gates. In the case of Palamner FPO, some of the farmers who got the green passes, directly supplied the produce to the FPO.

### **Arrangements to procure and sell fresh fruits and vegetables**

After assessing the huge demand for fresh fruits and vegetables from the consumers of Kodagu district, the Puthari FPO based on their earlier work and resulting contact with farmers of five taluks – Somavarpeta and Madikeri taluks of Kodagu district, Hunsur, Virajpet and Periyapatna taluks of Mysore district – procured fresh fruits and vegetables through their own transportation arrangements and distributed it to the consumers. Palamner FPO, after identifying the demand for vegetables decided to supply to three companies located in Palamner (Amara Raja Group of Institutions - some of the construction works for these companies such as battery manufacturers, fruit processing industries and guest houses had more than 1000 workers) that had about

7000 workers. The orders from companies were collected by the FPO, and in turn given to vegetable growers. The growers supplied vegetables to the FPO. The FPO procured, graded, packed, and supplied to the identified companies.

### **Farmer benefits**

Rural Mart is a concept that has been promoted by NABARD to FPOs to sell the produce from their member farmers. Puthari FPO, based on its experience of distribution of fresh fruits and vegetables, initiated this project of Rural Mart with financial support from NABARD. Now, apart from fresh fruits and vegetables, chicken, fish, pork, mutton and groceries are also being sold. The KVK facilitated the FPO to get the Rural Mart project cleared and provided the space for the FPO to establish the Rural Mart on its premises. With regard to Palamner FPO, the vegetable growers benefitted through the interest-free COVID loans arranged by FPO from financial organizations. The FPO is planning to establish a primary processing centre and buy air-conditioned vegetable vending vans under Operation Green project of the Government of India (GoI).

## Monitory benefits realized by the farmers

The beneficiaries of Puthari FPO realized additional monetary benefits during the lockdown period over the previous period as a result of arrangements made by Puthari FPO. These profits after accounting for the transportation charges was to the tune of Rs. 26/kg for mango. Likewise, it was Rs. 20 for grapes, 4 for papaya, 6 for banana, 8 for pineapple, 4 for cabbage, 2 for chilli, 6 for pumpkin, 5 for watermelon, 7 for tomato, 3 for sweet potato, 6 for elephant foot yam and Rs. 2 for yardlong bean. Similar benefits realized by the beneficiaries of Palamner FPO were Rs. 6/kg for mango, 8 for ridge gourd, 5 for tomato, 6 for cabbage, 9 for gongura (green vegetable), 9 for raw banana, 7 for chilli and 2 for brinjal.

## INITIATIVES BY VOLUNTARY ASSOCIATIONS AND THEIR COPING STRATEGIES

The UAS alumni association and Apartment Association of Bengaluru (HSR Layout), Karnataka State, adopted certain strategies to help farmers during the pandemic situation. Both associations operated in unique ways to establish links between producers and consumers.



### Recognizing the problem

Through the electronic media (TV news), the office bearers of this association came to know that the grapes harvested by the grape growers in and around Bengaluru were being wasted due to lack of access to marketing facilities during Phase 1 of the lockdown period. In order to support the grape growers during this crisis situation, the office bearers of this association took the initiative to link the farmers and consumers. They put out a press release in

newspapers and electronic media about direct marketing of grapes to the consumers in public layouts and apartments.

### Facilitating linkages

The association advised the grape growers to arrange common transport facility for supply of the harvested grapes through a group of grape growers and made them sell it in different apartments and layouts directly. The passes issued by the Government of Karnataka through the Department of Horticulture were utilized by the grape growers to arrange the transport facilities. The association also informed the residents of layouts and apartments through print, electronic media and WhatsApp groups. By this arrangement, both farmers and consumers benefitted. Around 400 tonnes of grapes were sold through this arrangement during April and May 2020. Here, the role of the association was mainly in linking the grape growers and the consumers through their facilitation (communication through electronic, print and social media). However, this kind of facilitation itself helped the grape growers to a considerable extent in selling their produce.

### Role of Apartment Association (HSR Layout), Bengaluru

In order to overcome the problem of consumers getting fresh fruits, an arrangement was made by the volunteers (one was a scientist from ICAR-Indian Institute of Horticultural Research [IIHR], Bengaluru, and another a retired bank official), who reside in and around the 30 apartments located in HSR Layout of Bengaluru, within a radius of 7 kilometers, to collect the orders from the public and the quantity that can be supplied by the farmers directly to the apartments. The scientist from IIHR, through contacts from his own native village and surrounding villages, mobilized the farmers in supplying fresh fruits. The retired bank official took the lead in collating the orders from the residents of apartments through WhatsApp communication and also through word of mouth. The communication between the volunteers and the farmers with regard to quantity to be supplied was made through e-facilities. Initially, the group of farmers themselves supplied the fruits at a common place, which was convenient for the residents of the apartment to come and

buy. Representatives from the farmers visited the apartments and involved themselves in sales. However, after some time, unemployed youth were engaged as delivery boys by the apartment association to supply the fruits from the villages on commission basis. The passes issued to the farmers for transportation was utilized by the delivery boys, while supplying the fruits to the apartments from the villages. Online payment was made to the farmers after collecting the money from all the consumers who had placed orders.

#### **Monitory benefits realized by the farmers**

As beneficiaries of the model operated by UAS Alumni Association, the grape growers realized additional monetary benefit of Rs. 18/kg more than the previous period, after accounting for the transportation charges. Similarly, such benefits realized by the beneficiaries of apartment association was observed to the tune of Rs. 63/kg for kamalam (dragon) fruit. It was Rs. 9 for papaya and banana.

### **INITIATIVES BY PRIVATE PLAYERS AND THEIR COPING STRATEGIES**

#### **Model operated by TENESIRI Vegetables, Karnataka**

TENESIRI Vegetables is a private initiative to link the sellers, buyers and consumers of vegetables through its specially developed mobile app. It helps in collecting the orders from both buyers and consumers and notifying the sellers. This initiative serves both the commercial vegetable growers and organic vegetable growers. The commercial vegetable growers are linked by B2C model of the app, whereas the organic vegetable growers are linked through the B2B model of the app. The organic growers are mainly from Belagavi region and the commercial vegetable growers are from Chikkaballapur and Hoskote region of Karnataka. During Phase 1 of the lockdown period, this organization helped many vegetable growers, who had registered through the app to sell their produce, without any problem. The additional monetary benefits realized by the beneficiaries of this model ranged from Rs. 9/kg for beans and capsicum to Rs. 1 for chilli, after accounting for transportation charges. It was Rs. 5 for cucumber, 6 for tomato, 4 for ivy gourd, and 4 for radish.

#### **Model operated by Village Story, Karnataka**

Village Story is yet another private initiative to bring together farmers, buyers and consumers. This initiative has its own Facebook, WhatsApp and Instagram applications, which have more than 25,000 clients. Clients include all the stakeholders of agriculture. Clients interact among themselves based on their business interests and needs, and thereby benefit each other mutually, through their transactions. The additional monetary benefits realized by the beneficiaries of this model was Rs. 4/kg for tomato, 3 for guava, 19 for grapes and custard apple, after deducting transportation charges.

#### **Model operated by Farmers of Kamalam (dragon) Fruit, Bengaluru, Karnataka**

Kamalam (dragon) fruit is gradually becoming a preferred fruit crop for cultivation by farmers in Karnataka due to its demand from health-conscious consumers. One such farmer is Mr Prasad, from Sira city, Tumkur district, Karnataka, who has started dragon fruit cultivation based on the demand from Mumbai markets. Usually, he sends the harvested fruits from his farm and that of the 5-6 neighbouring farmers to Mumbai market for an average price of Rs. 75/kg. Due to the lockdown they were not able to send the fruits to Mumbai market. In such a scenario, purchase of fruits from an IT employee through direct contact put forth the idea of supplying fruits to apartments. Hence, they identified a group of apartments as the target and supplied fruits (weighing 300 gm and above) to them for Rs. 130/kg, after grading and packing it under their own brand. After grading, the fruits weighing below 300 gm were supplied to a group of bakeries for Rs. 200/kg. Accrual of profit through such direct marketing made them go for contract farming with about 100 farmers, in order to sustain this model of direct marketing. Also, there is a move – through this initiative – to establish a processing unit exclusively for Kamalam (dragon) fruit for the preparation of fruit bars, jam, and powder, etc.



The initiatives of the development departments such as HOPCOMS and Mango Development Corporation provide confidence not only to the beneficiaries of these departments but also to the common farmers who are able to avail the services of these department during such uncertain times. These initiatives also provide support to a larger number of farmers and thereby ensure that farmers can undoubtedly avail adequate and necessary support in marketing of their produce without much difficulty. This will encourage farmers to participate in government-sponsored schemes with greater involvement. The initiatives of development departments are suitable for covering the stakeholders of a wide range of commodities on a large scale. On the other hand, the initiatives made by the FPOs provide their beneficiaries with assured marketing support and thereby enhance their faith in these FPOs. This will help improve their patronage in the business activities of the FPOs, and thus strengthen the overall business health of the FPOs, which is the main motto of the FPOs. The voluntary associations helped small groups of farmers, but benefitted a lot from the consumer point of view, hence it can be replicated for need-based situations. These applications can be replicated in densely populated cities, where the consumers look forward to buy fresh and high quality fruits and vegetables during lockdown like situations. Similarly, though the private initiatives address the marketing needs of a small target group (both farmers and consumers), it sets out a lot of lessons for the government mechanism in terms of innovations on linking sellers to buyers, sellers to consumers, and buyers to consumers.

### **COMMON STRATEGIES ADOPTED BY INITIATIVES**

- Effective utilization of social media (WhatsApp, Facebook, Instagram, etc.) to communicate among both farmers (sellers) and consumers, i.e., both B2B and B2C business models.
- Identification of appropriate sellers (farmer groups or FPOs) for procurement of produce, such as fruits and vegetables.
- Targeting hostels/business organizations/ restaurants and apartments to facilitate demand and supply in bulk.
- Entering into contracts/agreements with sellers (farmers/FPOs) for setting of prices of the

produce.

- Effective application of common online platforms to connect the stakeholders of both B2B and B2C transactions.
- Grading and packing the produce under their own brand name for distribution, in order to create trustworthiness among the consumers. This creates awareness among the sellers/ farmers to agree upon grade-based pricing for higher realization of returns.
- Better assured price for the sellers (farmers/ FPOs) than market price. Similarly, assured supply of quality produce for consumers directly from producers.
- Selling price set after discussion with the sellers (farmers/FPOs) and the consumers, which benefits farmers by saving on the commission charges paid to middlemen and unauthorized deductions.
- Apart from the use of social media, print and electronic media were also effectively utilized to popularize the business activities of these models.

### **CONCLUSION**

An understanding of the models operated by four groups of players for marketing of fruits and vegetables by farmers during Phase 1 of the COVID-19 lockdown period, helps in generalizing certain conclusions for further analysis. The models operated by the development departments, such as HOPCOMS and Mango Development Corporation, can be applied to address the needs of farmers as beneficiaries of government-run schemes. The situation-specific links and tie-ups developed through these initiatives with other public and private organizations can be further strengthened for the benefit of the farmers. The models operated by the FPOs suggest that such initiatives will strengthen the patronage by producer members. Such initiatives taken in the course of addressing the needs of the farmers during such unfavorable situations also lead to effective utilization of various schemes run by the government for the benefit of FPOs. The voluntary association models help greatly to address the needs of consumers in thickly populated cities, like Bengaluru, and also benefit a few groups of farmers. The models operated by the private players offer a number of strategies for effectively linking sellers, buyers, and consumers.

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## IS COVID CRISIS A TIPPING POINT FOR TRANSFORMATIONAL CHANGES IN DIGITAL EXTENSION?

While the world is struggling to fight the COVID-19 pandemic, Extension and Advisory Services (EAS) have been innovative in using ICTs to support farmers. In this blog, **Sheikh N Meera** illustrates these developments and argues the need for transformational changes within the EAS to mainstream the efforts and fully utilize the huge potential ICTs offer to support farmers.

It is a well-known fact that with any crisis, new opportunities and ways of doing things emerge. When the dust finally settles, the learnings and insights acquired during a crisis may become new norms. Extensive adoption of digital technology in Extension and Advisory Services (EAS) has been long due and its time may finally have come. Organizations with a digital plan will be better positioned to handle crises such as COVID-19.

EAS have been helping in addressing farmers' needs but COVID-19 is unprecedented and more demanding. As the world struggles to fight the pandemic, farmers across the globe face the dual burden of inadequate health services coupled with timely extension services for sustaining their livelihoods (FAO, 2020).

During the crisis, a few pre-existing challenges of EAS have become prominent and hence organizations took stock of their employee job charts and organizational mandates. At macro level, there are larger issues of ensuring food and nutritional security by strengthening disrupted food supply chains. The disruption in food supply chains mostly concerns logistics, labour, transportation and marketing of perishable and fresh products due to restricted mobility and lockdowns. At farm level, challenges include those of access to agricultural inputs, marketing, workforce availability in critical phases of agricultural production and harvesting, social safety nets, food safety and access to real time advisory services. Social distancing might affect access to workforce that may require EAS to evolve new functionalities for remotely contracting labour, accessing machinery and aggregating services. Lack of transportation and quick market access to the produce may pose a serious threat to the income security of smallholder farmers. In a few countries, evidences from harnessing existing electronic markets, mobile platforms,

direct to consumer apps are visible. To improve access to critical inputs such as seeds, fertilizers, chemicals, etc. and to overcome restrictions posed by COVID-19, a radical transformation of supply chain might be needed.

Careful analysis suggests these constraints did exist for smallholder farmers across the globe before the pandemic. Because organizations have mechanisms to meet the demands (though there were supply side imbalances that benefitted few select farmers from well-endowed areas, or for few select crop producers), these constraints were neither felt and nor were discussed at length. Thanks to COVID, many organisations realized that there's need for innovation and functional transformation to mitigate the crisis. Suddenly, there is a shift in the approach of EAS from traditional face-to-face farm advisory to supporting farmers with marketing and use of ICTs in supply chain management.

### **TIPPING POINT FOR TRANSFORMATIONAL CHANGES**

Extension Advisory Services roughly have millions of extension professionals representing the public, private and civil society located across the globe. Their role has often been underplayed though their contributions are proven. In the context of digital extension that gives enormous strength to EAS, it is expected that if 275-350 million farms gain access to mobile-based EAS services by 2030, about 250– 500 million more tonnes of food could be produced (and 20–65 million fewer tonnes of food lost) accounting to a total additional income \$100-200 billion. It is exciting to see what EAS could do with the power of mobile and cloud computing. Roughly, 3–6% increase in total production value could be achieved if only EAS services are provided the way farmers want on real time basis (World Economic Forum, 2018).

Need for new extension functionalities and job charts are echoed all over the world. New extension functionalities (like data driven personalized services in credit, insurance, markets, inputs supplies, aggregation models, traceability etc.,) followed by relevant capacities are going to define the efficiency of EAS

systems. Moreover, the responsiveness of EAS organizations will be determined by how quickly such adaptations are internalized into organizations.

I believe that in the context of EAS in the last couple of decades, several digital technologies are being used effectively such as mobile and cloud computing, remote sensing and precision agriculture technologies using aerial unmanned vehicle, Internet of Things. Value chain transformation is also attempted by using block chain and Enterprise Resource Planning. In the near future, extension systems may see use of artificial intelligence and machine learning applications. The digital disruption in EAS may define extension in the context of aggregation, traceability; quick and responsive advisories, finance and digital coordination of supply chain etc. It is not the digital tools, but their integration into the new functionalities of EAS that will determine the success of extension organizations.

While addressing emerging challenges, more extension organizations in last five months tried to solve immediate problems facing farmers, bringing adaptations to their regular way of delivering things. A closure look at digital extension strategies adopted by these agencies indicates a functional transition of EAS organizations to more responsive entities to mitigate challenges posed by COVID. There are several evidences from across regions of organizations offering innovative solutions to farmers based on digital technologies. The digital interventions at times are integrated with basic agricultural workflows of organizations that deal with agricultural inputs / services / knowledge / value chain.

To realize digital innovations in EAS, organizations need to create avenues for redesigning the extension processes (work on the frameworks), stimulate new thinking (capturing innovations and start-ups within the system) and dynamic inclusion of crowd sourced extension innovations (allowing partnerships and local redesigning to certain extent). It is high time now that we synthesize learnings from case studies and translate them into digital extension frameworks to formulate better extension strategies and policies.



## HOW IS COVID IMPACTING EAS – HAVE WE REACHED THE TIPPING POINT?

COVID is impacting agriculture and EAS in many ways. Most prominently, adverse effects are seen on immediate farm operations due to workforce shortage, inability to access harvest machines and most farmers were clueless in terms of harvest & post-harvest management operations. Due to inaccessible markets and complete lockdown of transport operations, particularly during summer harvests, there is a need to analyse how far unified markets in the present form responded to smallholders. For the upcoming season, EAS organizations need to ensure supply of seed, fertilizers, irrigation equipment, chemicals, machines, etc. EAS is completely clueless as what is going on in the supply chain.

Lack of access to the credit and insurance were age old problems for smallholder farmers. Recent government initiatives such as crop insurance and Kisan Suvidha Cards (a Government of India initiative) are yet to benefit smallholder farmers on a large scale. Due to COVID, the vicious cycle of market – insurance – credit – input perpetuates, thereby affecting farm households during next few seasons.

There is a general feeling that mismatch between the advisories - knowledge and services on real time basis made majority of the farmers more vulnerable. The EAS is expected to provide real time information (advisories) connecting farmers to sources of services and inputs. There are several other challenges posed by COVID, and surprisingly none of them are new to the EAS nor to smallholder farmers. These problems got amplified due to the pandemic, making the worst out of the vulnerabilities already faced by smallholder farmers.

## WHO RESPONDED WELL AND WHAT DIGITAL SYSTEMS ARE TWEAKED? – SELECT CASES

The organizations that have responded well are those that had digital systems in place and could quickly tweak them to suit the exigencies and collaborated with complimentary service providers. Adaptation is the new mantra! Let

us see quickly how the broader issues flagged in the earlier section were addressed by some. These cases are only indicative and in no way provide a comprehensive list of such organizations.

In order to address disrupted markets, FarmIT in Kenya provided farmers with agronomic support, market linkages and an e-commerce solution. eMsika, a Zambia-based e-commerce initiative, which is Africa's leading platform for wholesale and retail trade in agricultural products, also responded to the farmers' needs.

Aglonera, a start-up from Indonesia connected farmers with food truck owners and collaborated with a local NGO to use WhatsApp for demand aggregation and delivery of farmers produce. To reduce time and material used for repackaging, they are now giving a discount to people who buy staples in bulk. A sustainable local innovation with simple digital tools has transformed the way farmers and the consumers are served, ([thoughtforfood.org](http://thoughtforfood.org)).

Neurafarm, an Indonesian precision agriculture team, provides a chatbot-based AI-powered mobile app that lets farmers easily diagnose plant disease and receive instant recommendations to treat the crops. Due to COVID-19, they had to stop in-person extension to farmers and have thus shifted towards leveraging Facebook to access online farmer groups and obtain new customers. They are also organising topical webinars to share knowledge and build their brand. Given the fact that supply chains are collapsing, they have come up with a B2C initiative that allows people to donate to Neurafarm so they can buy fresh produce from farmers and deliver it quickly and directly to the end- consumer (<https://thoughtforfood.org>).

Agricycle Global works with more than 15,000 farmers in Uganda and is now producing dried fruit snacks, flours and briquettes made from coconut shells. The team is now looking at ways of reaching farmers without actually meeting. Since many do not have access to the internet, they are looking into SMS systems for an effective method (<https://thoughtforfood.org>).

While maintaining social distancing, marketing platform Mkulima Young and G- Soko connect farmers to suppliers and distributors, helping

their produce reach traders and consumers. A farmer is both a producer and a consumer. European Union's green lanes are connecting production areas with urban outbreak hotspots to accelerate the delivery of perishable (and nutritious) foods to affected populations. This in turn is providing farmers with better marketing opportunities in the present times. Many governments including Brazil, China, India and Italy have worked on postponement of rural credit payments and creation of new credit lines. Reduction and exemption of agricultural credit guarantee-related expenses coupled with support for cold storage and preservation etc., have substantial digital components and the role of EAS in facilitating them. Kisan Suvidha Bima (farmers Insurance) is a single package which offers benefits to policyholders including repair or reconstruction of damaged property. A mobile app, Kisan Suvidha, installed by 10 crore users, will help farmers with weather information, market prices, dealers, agro advisories and plant protection.

The credit support measures announced for farmers on 13 May by the Indian government including additional credit support to farmers through NABARD and the Kisan Credit Card facility. Imagine how responsive EAS has to be in materializing these measures in terms of awareness building and implementation.

Creating lasting profits for farmers everywhere, Ghana's Farmerline is focusing on real-time farmer education, input finance and market access where in the existing digital systems are harnessed.

Reducing food losses, fetching better market prices to farmers while helping consumers access food was effectively addressed by the '1917iTEAMS'. This is an excellent way of collaboration in Meghalaya with local entrepreneurs ensured that vegetables and fruits are available to the public. The '1917iTEAMS' is an initiative of the State Government working in the current crisis situation by procuring farm produces from farmers and making it available across the state. The existing in-house system that connects farmers to the market has aided the government to quickly harness the system for emergency duty (<https://www.aesnetwork.org/covid19-fieldnotes1/>).

While at provincial level local aggregation is helping balancing demand and supply, at country level many initiatives were strengthened due to COVID challenge. A massive scaling up of a federal e-commerce platform for farmers and traders, known as the Electronic National Agricultural Markets or e-NAM, will give much needed impetus to the cause of smallholder farmers. There are currently 166,000 registered farmers across the country selling their produce by transacting from home and practising social distancing, with nearly half of the country's 1500 major farm-end commodity markets now going online. For this to be effective, local level aggregation models play an important role.

Farmers on the e-NAM app can strike deals for their harvests remotely by first uploading pictures of their samples and then getting these samples quality tested remotely, unlike having to move entire truckloads to physical markets. With more than 785 markets connected online, the e-NAM platform of India is considered one of the largest online agricultural produce market platform.

Kevin et.al, (2020) described country responses to COVID-19 crisis showing how extension staff are working to spread information about the virus while continuing to share vital agricultural knowledge. In China, the Ministry of Agriculture and Rural Affairs (MARA) established an EAS big data platform linked to the National Cloud Platform for Grass-Root Agricultural Technology Extension (NAECP) to mitigate the pandemic's economic impacts, especially during spring planting season, in three ways: Providing training and technical support for spring ploughing, promoting delivery of online market information to guide farmers on crop selection to maximize economic benefits and contributing to pest monitoring and prevention.

As we can see in most cases, organizations tried to adapt existing digital systems without introducing new digital tools. We have also seen that they collaborated with agencies to provide complimentary services, which would enhance their core activities. At some point, EAS organizations have to look for complimentary services with additional functionalities. This crisis has also taught us that for forging partnerships can be straightforward without requiring a lot of time.

## FUNCTIONAL TRANSFORMATION OF EAS: INSIGHTS FROM CASE STUDIES

Based on analysis of above cases and drawing lessons from 105 digital projects, Shaik N Meera & Dina Saleh, 2020, proposed three hierarchical levels of evolution of Digital Extension in terms of functional transformation of EAS. Post COVID, it is expected that EAS organizations would intensify functional transformation as they already are exposed to these efforts. Organizations may explore using a combination of digital tools (on their own or in collaboration) such as Content Management Systems, Decision Support Systems, Management Information Systems, ERPs, GIS, Digital Apps, Modelling Solutions, Big Data tools, Sensory and Proximity Devices, UAV, IOTs, Digital Networking Solutions, Block chain, Mobile wallets, E commerce platforms, Remittance Platforms etc.,

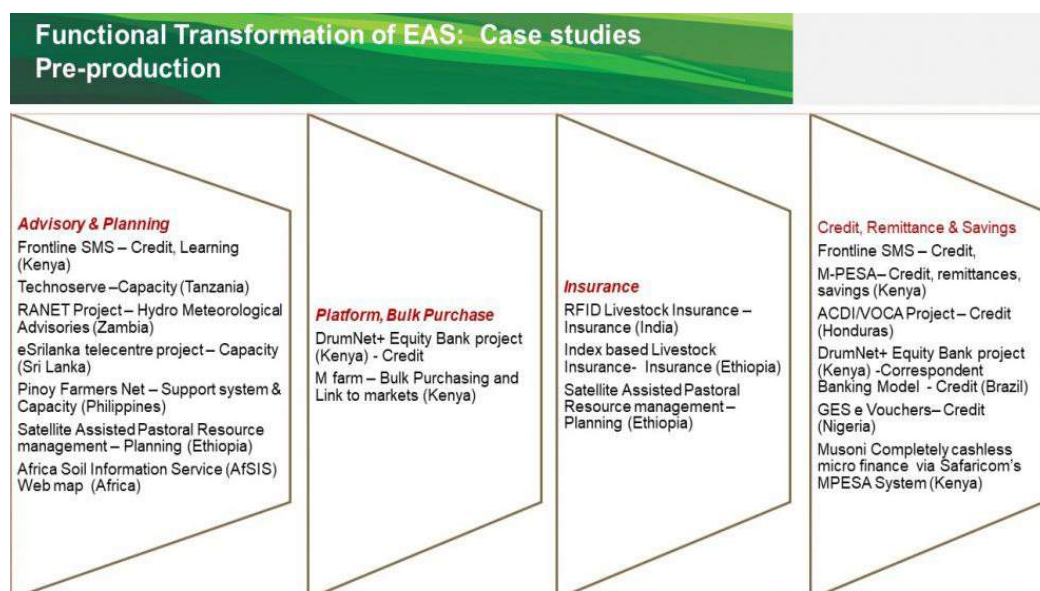
“Digital as usual” thinking improves the overarching conventional EAS functionalities such as awareness creation, market information, advisories, diagnostics, technology transfer, training farmers, feedback loops etc., using first generation digital tools such as radio, TV, video decision support systems.

In the context of EAS, “Digital Enablers” try to add a few emerging functionalities such as customised market access, market negotiations, personalization in advisories, input supply, providing isolated digital solutions in pre-production, production and post production, moderate value chain integration in certain crops, financial Inclusion etc., Basically, at this

level, organizations try to harness mobiles, computer networks, portals, apps, social media, IVRS, SMS push pull services etc.,

“Digital Disruptors” offer much advanced functionalities to EAS. Data driven personalization in knowledge, advisory, input supply and service coordination, supply chain management at organizational level, demand and supply integration at farmers’ level, making aggregation models work for small farmers, data driven extension, sequencing and automating the EAS services, coordination of input supply, harvest, transportation, markets, value addition, financial inclusion driven by four types of data (Shaik N Meera, 2018 Please see <https://www.aesanetwork.org/a-treatise-on-navigating-extension-and-advisory-services-through-digital-disruption/>), traceability, secure payments, remittances, unique(national) IDs enabled services, agricultural subsidies and remittances etc., At this level, organizations harness the power of mega digital tools and processes such as mobile /cloud computing, Internet of Things (IOT), Internet of farms (IOFs), artificial intelligence, big data Analytics, Distributed Ledger Technologies (DLTs), social media analytics, drones (for data capture and for operations), location based monitoring tools etc.,

Shaik N Meera and Dina Saleh (2020) have given detailed account of how these three levels of digital extension could be integrated with EAS functionalities in pre-production, production and post- production stages.



Source: Shaik N Meera and Dina Saleh, 2020

Functional Transformation of EAS: Case studies			
Production			
<p><b>Livestock Dairy</b></p> <p>Livestock Identification Trace Back System Project - Traceability (Botswana)</p> <p>Jamaica Broilers' group - Tra(Jamaica)</p> <p>e-Dairy - Information access (Sri Lanka)</p> <p>Chilean Aquaculture project (CAP) - Fishermen (Chile)</p>	<p><b>Crop Production</b></p> <p>Diagnostics / Input Management / Capacity/ Harvest</p> <p>Pest Control &amp; frost prevention - Alerts (Turkey)</p> <p>Digital Green, Access Agriculture - Video extension (Global)</p> <p>SMS Push of information (Sudan)</p>	<p><b>Agri Hubs, SME</b></p> <p>MoBlashara - Input orders and supply (Nigeria)</p> <p>Smart Agri Hubs - Precision farming, SME Development (Prague)</p> <p>One Acre Fund - Financing high quality inputs (Kenya)</p> <p>ain - India)</p> <p>National Farmers' Information Service (NAFIS) - Text to Audio - Swahili</p>	<p><b>Value chain</b></p> <p>DrumNet (Sun Flower value Chain - Kenya)</p> <p>E Choupal (Soya bean Value Chain - India)</p> <p>Naatal Mbay - power of data (Senegal)</p> <p>Bashaier Network - Alternate Supply Chains, Contract Farming (Egypt)</p>

Source: Shaik N Meera and Dina Saleh, 2020

Functional Transformation of EAS: Case studies			
Post-Production			
<p><b>Market Access</b></p> <p>FarmerNet (Sri Lanka)</p> <p>Soko Hewani (Kenya)</p> <p>E-purjee, Cell Bazar - Market place (Bangladesh)</p> <p>Xam Marse (Senegal)</p> <p>InfoPrix - Market ( Benin)</p> <p>Esoko - Market information (West Africa Region)</p> <p>Bashaier Network - Market Information (Egypt)</p>	<p><b>Women Youth SME</b></p> <p>E-purjee, Cell Bazar - Market place (Bangladesh)</p> <p>Uluguru Spice project - Women farmers' access to market information (Tanzania)</p>	<p><b>Transport, Aggregation</b></p> <p>Spoilage Sensors - ideo.org Storage (East Africa)</p> <p>Loop (getloopapp.com) - market and aggregation (India)</p>	<p><b>Value chain</b></p> <p>DrumNet (Sun Flower value Chain - Kenya)</p> <p>E Choupal (Soya bean Value Chain - India)</p> <p>Naatal Mbay - power of data (Senegal)</p> <p>Bashaier Network - Alternate Supply Chains, Contract Farming (Egypt)</p>

Source: Shaik N Meera and Dina Saleh, 2020

Based on a critical analysis of digital extension efforts before and after COVID, we can expect transformational changes in EAS organizations post the pandemic. We may witness increased use of digital tools in training and awareness, capacity building, input supply (e-marketing), machinery rental, financial inclusion (credit and insurance), weather information, prior market information, agri input directory, soil testing, information on government schemes, crop insurance, precision agriculture installations (drip, sprinkler), protective structures installation, drones for decision making, etc.

Much of what EAS organizations are doing may see radical changes in the use of advanced digital tools for linking farmers with experts (even to AI experts) for crop management advisories, AI based Crop and pest management

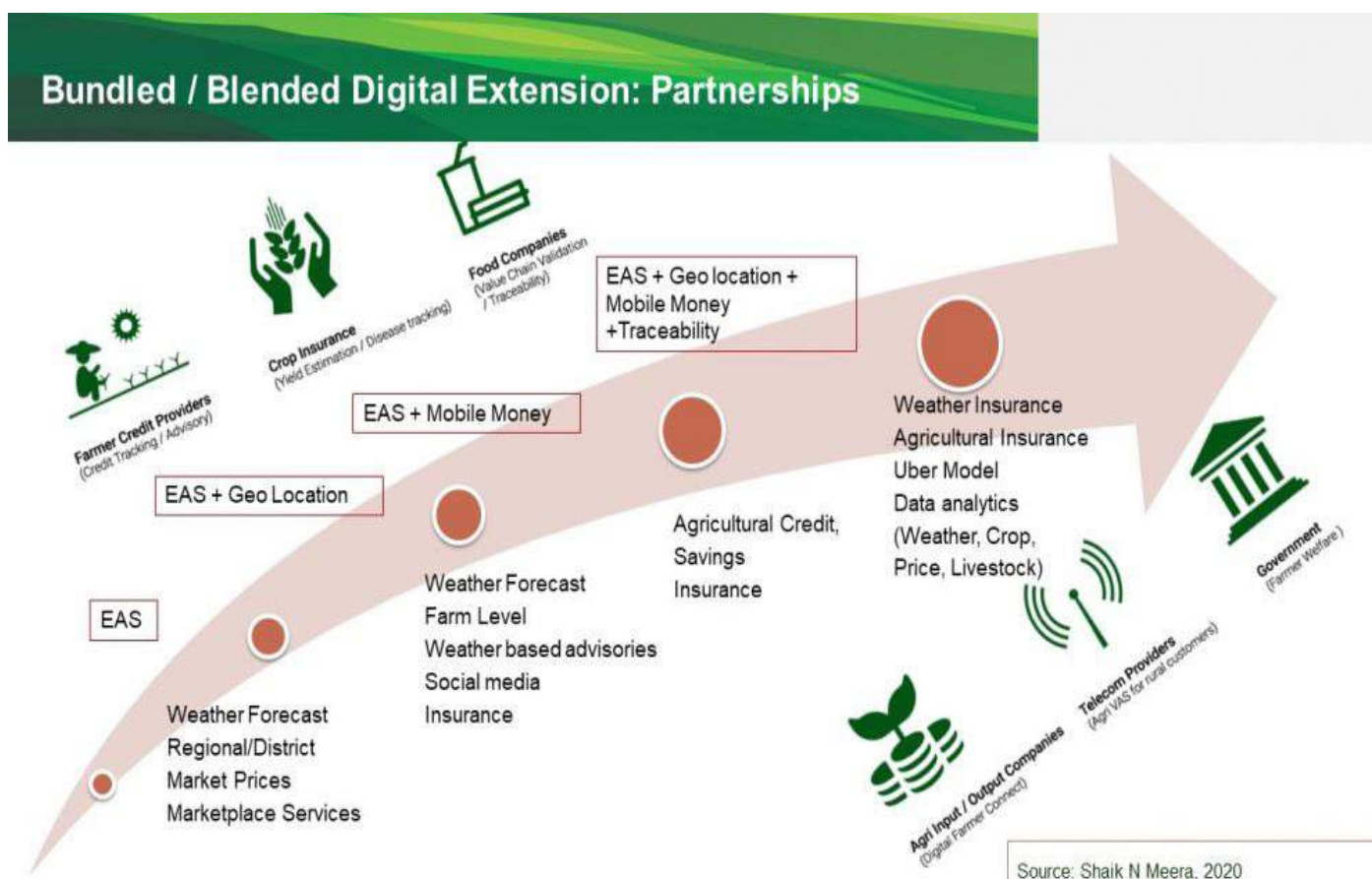
advisories, farmers forum, smart devices for agriculture, real time training and skill development, digital apps, prediction services, contract farming, drones for application, seed chains, harvesting and post-harvest management, Uber models, adoption tracking / management, smart supply chain activities etc.,

EAS may have to respond to growing needs of farmers with the functional transformation in post- harvest management as well. The digital transformation could be seen in smart grading, packing, transportation, processing, cold storage, linkage of buyers and sellers, procuring produce from the farmers, direct to consumer models, aggregation, digital payments, traceability, smart storage, warehouse slips, e-vouchers, etc.,

## ACCELERATING DIGITAL EXTENSION: BUNDLED AND BLENDED WITH PARTNERSHIPS

In future, EAS organizations have to identify the value proposition for every need of the farmer and try to bundle extension services with production inputs, financial inclusion with mobile money, machine rentals etc. Contrary to the fact that public extension has an advantage in terms of scale, reach and data, they also have limitations in terms of rigid workflows and inability to bring innovations abruptly. This necessitates forging partnerships with a

range of stakeholders. For this we need to map functionalities for deployment in comprehensive digital extension ecosystem. As time passes, extension services (with both information and technology interventions) should bundle with personalized advisories and weather forecast models. If either of these services lag behind it would result in inappropriate and ineffective solution at farm level. For example, simple weather Forecast services can be enveloped with value added services by partnering with several stakeholder organizations as shown in the illustration.



In the future, new digital partnership may evolve with the AgTech and Fintech agencies or start-ups for improving the impact of EAS. As per NASSCOM's 2019 report, India is home to more than 450 agri- tech start-ups, growing at 25% annually. The sector has received more than \$248 million in funding, which is a clear indication of the agri-tech industry's growth potential. Given that the food economy impacts human population, there's huge scope for building a seamless ecosystem in the agri-technology space.

The challenge to farmers is in the timely and adequate accessibility of finance, which

is a prerequisite being addressed by a few start-ups. Most rural FinTech start-ups are developing innovative approaches to financing farmers and agricultural value chains, while others are creating technology- enabled solutions for insurance, savings, or commodity risk management. A few start-ups include Sannunati, GramCover, Kisht and Jai Kisan.

There is an interesting collaboration that was forged during COVID i.e., between the multi-national Bayer and a Pune-based e-commerce firm AgroStar to deliver its products like seeds and pesticides to farmers. Farmer get services such as seeds and crop protection products

along with the knowledge intensive advisories. AgroStar is fulfilling farmers' orders through its 500+ strong network of last mile delivery partners, who are doing doorstep delivery of agri-inputs while following hygiene and social distancing norms.

## **DIGITAL EXTENSION IS DYNAMIC AND DO WHATEVER IT TAKES**

In several sectors it is not the well-established organizations but new entrants and entrepreneurs who are creating waves by meeting consumer needs in novel ways. The job charts of professionals are changing fast with strong digital skill sets. Their workstyles are different, ways of approaching a problem are different. If we are sceptical about this for agriculture, it's probably because we have seen many digital projects before without much "wow" factor.

### **Box 1. How to digitally disrupt EAS**

- 1) Engaging farmers and providing them a retail like experience.
- 2) Empowering extension professionals to take up challenges. Encouraging them to enjoy flexibility in terms of tasks and making them aware that they are judged by the outcomes/ impacts.
- 3) Optimising extension systems with available digital start-ups, collaborations and partnerships. Recognizing the role of plurality in digital strategies and their complementarity is essential.
- 4) Transforming EAS in the digital era with structural and functional adjustments along with focus on collective action.

Source: Shaik N Meera, 2018

COVID type of crises give us an opportunity to redefine our approaches, particularly in harnessing of digital tools. Unlike other sectors, public EAS is relevant even when agricultural value chains are witnessing digital disruption. There is no better and opportune time than now to work on blended approaches and bundle extension services with new partnership models. To realise the digital disruption in public EAS we need to create avenues for redesigning extension processes (work on the frameworks not on the guidelines), stimulate new thinking (capturing innovations and start-ups within the system) and dynamic inclusion of

crowd sourced extension innovations (allowing partnerships and local redesigning to certain extent).

EAS must acquire and implement digital tools for a truly modern, farmer-centric, retail-like operating model that integrates available and emerging digital technologies to meet and exceed expectations of agriculture sectoral needs.

Jason Furman, former US President Barack Obama's Chief Economist, adds some guide rails to the 'do whatever it takes' idea. His advice, which I feel is relevant to current EAS response, comes in six points and I am modifying the same with a digital extension perspective:

1. Better to do too much rather than too little: Explore comprehensive solutions for farmers without any boundary of structured mandates that we are programmed with for last several decades. Do whatever that could be done with digital systems available with organizations.
2. Use existing mechanisms as much as possible: We know that there is no single EAS agency that has not started using digital tools for disseminating information, technology and services to the farmers. However small the effort may be, keep exploring the use of digital tools innovatively.
3. Invent new programmes where necessary: New challenges cannot be handled with older methodologies. As Shiv Khara says, winners don't do different things, they do things differently. While handling newer challenges, keep inventing new extension programs and while doing so do not shy away from leaving the comfort zone.
4. Diversify and do not fear duplication or the unexpected in the process: Remember how EAS organizations worked towards community development in rural areas during 1950s. The narrow restrictions of organizational mandates will hamper achievements in our own mandates. For example, if providing market information was thought of our job, if we do not work on aggregation, our impact of market information delivery will be limited. Reach out with a bouquet of solutions. I must say,

majority of the KVKs do diversify thanks to individual champions answering the call of farmers.

5. Engage the private sector as much as possible: Do not shy away from collaborating with the private sector. The technology edge that AgTech and FinTech companies and start-ups have, public and civil society organizations might not have. Private players may be roped in (if not enlisted for a brief period during the disasters / emergency situation) for making concerted efforts on mission critical strategic extension interventions.
6. Ensure that response is dynamic and persistent: Majority of EAS agencies do enjoy flexibility of operations towards achieving overall objectives of a programmes. Compared to organizations in other sectors, EAS do have adaptation capability and approval for adaptation exists. The responsiveness is more important than organizational workflows / approvals. It is easier said than done in organizations that have strict hierarchy in administration. But agencies such as KVKs and certain private agencies are more flexible in terms of approaching a problem. Once the dust settles, EAS organizations should continue to innovate to bring in scalable extension strategy.

## CONCLUSIONS

In the past, the Extension Advisory Services (EAS) have helped countries move towards meeting food needs, conserving natural resources and developing human and social capital. However, the need for new extension functionalities and job charts are echoed all over the world. Especially, the small holder farmers need real time solutions and become

connected to the service providers (even at affordable costs). The crisis situation such as COVID, can act as a tipping point for digital transformation of EAS organizations. As we have seen in the blog, the organizations that have responded well are those that are already having the digital systems in place, and tweaked them to suit to the exigencies and quick enough to collaborate with the other complimentary services.

For providing 'what farmers want' in faster, better and cost effective way, EAS organizations need to innovate continuously with the better functionalities. New extension functionalities (like data driven personalized services in credit, insurance, markets, inputs supplies, aggregation models, traceability etc.,) will transform the way EAS was carried out in the recent past. There are other aspects of digital transformation that should be simultaneously taken care such as building appropriate infrastructure with proper scales of economy, building relevant capacities of extension professionals, integrating the complex digital processes into the basic agricultural workflows (such as agricultural inputs / services / knowledge / value chain).

In future, EAS organizations have to identify the value proposition at every need of the farmer and try to bundle the extension services with production inputs, financial inclusion with mobile money, machine rentals etc., In future, new digital partnership may evolve with the AgTech and Fintech agencies or Start-ups for improving the impact of EAS. There is no better and opportune time than this to work on blended approaches and bundling extension services with new partnership models. Yes! COVID can truly be a tipping point for Transformational Changes with Digital Extension. If not now when? If not we, who?

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# 94

## ASIAN FARMERS CONSULT VIBRANT E-PLANT CLINIC NETWORK IN PANDEMIC TIMES

E-Plant clinics are meeting places where local agricultural advisory officers, known as plant doctors, help farmers struggling with plant pests and diseases. During the COVID-19 pandemic, plant clinics continued to provide advisory services to farmers by going online.

**Malvika Chaudhary** shares her knowledge here.

COVID-19 has brought the world to a near standstill. The daily rush to the office, school, and various other destinations that engaged people has suddenly telescoped into the recently adopted term – ‘lockdown’. Yet, when all other activities took a back seat there was one routine that thankfully continued as it was for a large percentage of the world’s population, that is, our three square meals per day. While a few of us are reassured by national politicians that the lockdown would not affect our jobs, there is one service giver, the farmer, who relentlessly and irrespective of the situation is striving and continuously contributing to national food security. Even at this time farmers must produce sufficient food, and they still need inputs, and most importantly, advice. This blog is about how CABI Plantwise (Box 1) has come forward to support farmers with advice during this pandemic, through its network of plant clinics.

### Box 1. CABI Plantwise

CABI Plantwise (<https://www.plantwise.org/>) is a global food security programme wherein efforts were directed to skill extension workers to give functional recommendations based on early field diagnosis through a network of plant clinics. Over a decade, with its experience and growing engagement with diverse partners, Plantwise has evolved to reach out to more than 44.1million farmers through 175 partnerships with public, private, as well as civil society organizations in more than 30 countries. Plant clinic networks continue to grow; currently, about 11,500 trained plant doctors and extension officers provide advisory services to farmers through over 3,000 plant clinics.

### EXPERIENCES

In Asia, Plantwise has been operational in ten countries where COVID-19 has especially hit hard – in South and East Asia, especially China. With restrictions on movement and mass gatherings,

plant clinics appear impossible. On deeper introspection various innovative ways to reach out to farmers were identified, and currently plant doctors are delivering effective services online with the use of ICTs.

For instance, in China, trainings to refresh the knowledge of plant doctors were carried out virtually by the Beijing Plant Protection Service. The presentations covered application techniques in controlling natural enemies and pollinator products in vegetables, diagnosis and management of bacterial diseases in vegetables. More than 420 plant doctors (168 females and 252 males) from 12 districts of Beijing participated in the online training.

In Pakistan where Plantwise is completely built into the extension services of the Provincial Government of Punjab and Sindh, the COVID-19 situation did not stop the plant doctors from giving advice to over 6000 farmers in the period of April-May. Plant doctors continued to exchange their experiences through cluster meetings and online consultations with national partners, which CABI coordinated.

During the COVID-19 lockdown, Indian farmers have been able to join 'e-clinics' to get a diagnosis for the problems plaguing their crops,

thus helping limit the damage. Approximately 30 physical clinics across five Indian states have now been replaced by online ones. So far seven sessions – during the lockdown – have seen more than 350 farmers participate from Tamil Nadu, Odisha, Assam and Puducherry. The farmers could not afford to neglect any disease, as their lockdown losses would also impact their activities in the next cropping season.

The plant doctors of MSSRF (a Plantwise partner in India) have been able to provide timely advice via the web to farmers who showed them samples of damaged crops. After seeing it they advised them on how the problems could be addressed and where they could buy the needed inputs to address specific problems. Encouraged by these experiences, the plant doctors now feel virtual clinics could expand their reach tremendously in the future. The only concern is that farmers have to learn to use the technology better. For example, they need to figure out how to hold the plant in front of the camera without blocking it, so the plant doctors can diagnose the problem. If other issues and internet connectivity are resolved, this mode could support plant doctors in reaching thousands of farmers, and thus resolving issues in real time.



**Plant Clinics at Mardan Khyber Pakhtunkhwa in Pakistan**



### Online plant clinic consultations offered by plant doctors to the farmers of India

Our experiences in Nepal during the pandemic have been both positive and negative. On the positive side, this difficult time has made us realize the value of coming together and being connected as a community. IDE in Nepal has teamed with PW to train its community-based facilitators (CBFs) as Plant Doctors. These CBFs are instrumental in bringing knowledge and inputs to the doorstep of farmers. IDE Nepal teamed up with CABI Plantwise and government agencies to host a workshop on the validation of plant clinic data contained in the Plantwise Online Management System (POMS). This was done online – bringing stakeholders of India and Nepal together for knowledge exchange and learning. The validation of clinic data is equally important in order to record the quality of services provided by CBF plant doctors. Hence this workshop was a success considering the learning gained, and it was also a beneficial platform for strengthening coordination with government bodies, and for inter-country experience-sharing with the ultimate goal of providing superior services to smallholder farmers.

Other South Asian Countries where the pandemic was wide spread but still had noticeable support from Plantwise was Sri Lanka and Bangladesh. In Sri Lanka the concept 'Doctor on Skype' was popular in pandemic times. CABI initiated a Skype clinic for one of the Young Farmer's Club in Mullaithivu in Sri Lanka, in association with the National

Agriculture Information and Communication Centre (NAICC), Department of Agriculture (DoA). By embedding growing communication technologies and bringing experts into the existing plant clinics remotely, DoA has started this Skype service. Farmers brought along a range of plant samples, including those with more difficult or complex problems, all of which were shown to the experts via Skype video call. To ascertain as much background information as possible, the experts asked sets of questions which the farmers were quick to answer.

Even during the COVID lockdown, news channels buzzed in Bangladesh on the arrival of swarms of an unknown pest that were partially covering mango and guava crops, as well as some forest trees in Teknaf Upazila, Cox's Bazar District. The Ministry of Agriculture (MoA), Bangladesh, took immediate steps and a team from Department of Agricultural Extension (DAE), Bangladesh Agricultural Research Institute (BARI), and others from the National Agricultural Research System (NARS) rushed to the site to safely collect samples, in order to identify the pest and take immediate steps for its management. After uploading pictures on social media the insect was identified as 'Spotted Coffee Grasshoppers'. Though it is not a new pest in Bangladesh, it had never previously been seen in such huge numbers, so much so that it overwhelmed farmers. Plant wise in Bangladesh supported its partners, DAE, with help through an online workshop with

Bangladesh Agricultural University and media experts to draft a Pest Management Decision Guide (PMDG) for the country.

At this time when many countries are in lockdown, social media is an effective channel, and this is true in Bangladesh especially, to disseminate information. There are several WhatsApp groups with more than 3,000 members, and Facebook pages which include not only extension officials but several farmers' associations. The PMDG is being disseminated through these communication channels and will thus reach a wide number of farmers that need it the most – particularly now when physical plant clinics are not operating.

## END NOTE

During these troubled times, farmers have difficulty in getting information on new/existing pests and diseases. The extension wing of Agriculture Departments of various countries are striving hard to reach out to all farmers with input and knowledge. Plant wise is working continuously to support governmental and non-governmental partners to develop sources with functional information and thus complement their functioning. ICT is the main driving force which is helping in implementation and monitoring. Efforts are directed at overcoming the difficulties that smallholder farmers are facing in pandemic times in the best possible way.

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# 95

## 1917 iTEAMS – HOW DEPARTMENT OF AGRICULTURE & FARMERS' WELFARE, MEGHALAYA, IS SUPPORTING FARMERS DURING THE COVID-19 LOCKDOWN

In this Note, **Canning S Shabong** illustrates how the Department of Agriculture & Farmers' Welfare, Government of Meghalaya (India) is using ICT solutions to support farmers who are facing marketing issues resulting from the lockdown imposed due to COVID-19 Pandemic.

On the evening of 26 March 2020, in the midst of the national lockdown because of COVID-19, the Government of Meghalaya took a Cabinet decision that the 1917 iTEAMS (Box 1) of the Department of Agriculture and Farmers' Welfare will procure vegetables for distribution to retail outlets at Shillong and other urban areas. To start with, there were no wholesale and retail outlets selling vegetables in the city as the main market – 'Iewduh' which is the largest wholesale and retail market in the city – was totally closed and shut down as soon as the lockdown was announced. In this scenario, the conventional marketing channel was totally closed and unavailable for public service.

### FIELD CHALLENGES

The challenge before the 1917 iTEAMS was how to organise this huge task in the midst of the Corona virus scare and the risk of exposure to the dreaded virus and link both the distressed farmers and the consumers who were unable to get their daily dietary requirements, and thus keep them going in this sudden closure. The iTEAMS' management team activated its connections and links to all the value chain players, who are, though not directly involved in vegetable logistics, yet are involved in other processed produce generated by the farmers. Even though all these players were willing to help in this hour of need, they were averse to dealing with highly perishable items like vegetables, which have a very short shelf life. They do not have huge State wide distribution logistics which this operation requires, nor the matching demands from their customer base. The whole scenario now became one of economy of scale and speed and efficiency of the value chain, which had not been tested before in such a situation.

The iTEAMS' task was cut out and although the entire fleet of 17 Agri Response Vehicles and the backend

## Box 1: 1917 iTEAMS?

The 1917 iTEAMS programme can be considered as India's first-ever disruptive farmer centric, market-oriented, cloud-based facilitation service that connects farmers to markets through real time agro advisories, affordable logistics, and market information. The programme was established by the Department of Agriculture in collaboration with the Department of Animal Husbandry, Meghalaya Small Farmers Agri Business Consortium (MgSFAC), Department of IT, Meghalaya Institute of Entrepreneurship (MIE), Central Agriculture University (CAU), and Digital India Corporation (DIC). To utilise the 1917 iTEAMS' ([www.1917iteams.in](http://www.1917iteams.in)) service, any citizen, farmer, or a buyer of agriculture, horticulture, livestock products, etc., can call the Agriculture Response Centre's (ARC) Toll Free Number 1917, from 7am to 7pm, Monday to Saturday, which is manned by Incoming Call Officers (ICO Level 1) and Vehicle Despatch Officers (VDO).

### MANDATE

1. Agro Advisory: Providing farmers with timely and accurate information for proper decision making. Farmers can call the toll free number of 1917 for any queries on Agriculture, Horticulture, Fisheries, Animal Husbandry, Apiculture, and Sericulture. Farmers can call and request for a package of practices, pest/disease management in crops, health management in livestock, or any other information pertaining to departmental schemes and training.
2. Logistics Solutions: Providing evacuation and transportation logistics solutions to farmers and buyers who wish to transport their goods to any farms or markets of their choice through a network of pickup trucks, which are known as Agri-Response Vehicles (ARVs) at a highly competitive rate of INR 0.02 per kg/km.
3. Market Connect: Providing information about potential markets and sellers, and making farmers and buyers aware of the different selling/buying options available to them. 1917 iTEAMS connects the Registered Farmers having commodities to sell to the Registered Buyers looking to buy the same commodities – but does not by itself participate in the buying or selling negotiations.

team were ready to respond, connecting all the dots became a big challenge under these circumstance, as it meant that iTEAMS had to play a bigger role than what was originally mandated, which is to just provide logistic support, market linkage and advisory to farmers. iTEAMS was not designed to be a relief and rehabilitation agency nor a disaster or emergency response agency. Therefore, it had to work purely on a business model, which is partly subsidised by the government. iTEAMS cannot take on the role of a buyer from the markets as it does not have the mandate to do so, nor the distribution network to successfully run a trading business. Farmers need to be paid in cash for their goods, which was the need of the hour, but this was not the role of iTEAMS. Many government agencies<sup>1</sup> had tried their hand in this role but had run into severe losses and had to eventually close down.

### A Catch-22 Situation

It was very clear that there was a Catch-22 situation at play in the beginning and it was decided by the iTEAMS' management to concentrate only on semi-perishables under those circumstances, as these have a longer shelf life and can also be sent to processing agencies for processing. Thus the plight of the

farmers whose vegetables were ripe for harvest/ already harvested, seemed to present a bleak picture, as they were staring at huge losses this season. Some brave farmers even posted on Facebook that they are ready to sacrifice and support the government at this time of calamity, as they have reached a point of acceptance of the situation. But on the other hand, there was a huge demand in the entire State to the tune of 475 metric tons for fresh fruits and vegetables per day by quick estimates. The East Khasi Hills alone required about 132 metric tons of fresh fruits and vegetables every day, based on conservative estimates and the 2011 Population Census. If the decadal population growth rate of about 28% is added to this figure, the demand for fresh fruits and vegetables is huge, which cannot be met from local production alone.

In this backdrop, how can iTEAMS play a role which is over and beyond its original mandate – was the question before the team. Further, with the uncertainties of the situation which was evolving by the day, how can an operation of this magnitude be run, which was a first for iTEAMS. The whole team got to work and activated all its resources, connections and channels to try to come to some sort of strategy and coherent response.



## ADDRESSING THE CHALLENGE

### Initial steps

The team requested all the ATMA extension functionaries posted in the various Community Development (CD) Blocks of the State, and the district agriculture and horticulture officers to assess the availability of produce from the main production clusters so as to understand the supplies. As this exercise was going on, the other team contacted some of the local Headmen and Dorbar Shong to help facilitate and join hands in this endeavour, so that the entire operation could be organised in an orderly and effective manner. Many local headmen called the 1917 iTEAMS hotline and were connected to this logistic chain. Another team got to work with the State Government and the local administration to request issuance of curfew passes for the 1917 iTEAMS' personnel and ARVs. The third team went to work with connecting all the local online players so that they can take orders from the citizens and provide home delivery. All these online players' delivery vehicles were also provided with curfew passes from the district administration. The Deputy Commissioners and their team also provide all the necessary support and facilitation during this planning exercise.

## Implementation

### Logistics

On the morning of March 27th, the team despatched its Agri Reponse Vehicles to all the major vegetable production clusters, especially pea producing clusters. Ten tons of peas were lifted from Khweng, Ri-Bhoi, and delivered to NARI FRESH in Mawiong for onward distribution to Fair Price Shops (FPS) in the city. Another vehicle was sent to Laitjem in East Khasi Hills to lift five tons of peas and distributed to Nongthymmai and Lapalang.

Another vehicle was sent to Syntung to lift strawberries, and one to Myllem to pick up vegetables. In West Garo Hills, four vehicles of 1917 iTEAMS were sent out to Rimrangpara, Rombagre and Amindarangsa and also to Hajongpara in South West Garo Hills District, to purchase vegetables such as yams, papayas, peas, tapioca, brinjal, rosella, etc., and later on these were distributed in the localities of Babupara, DC Park, Akongre, Tetengaja and Police Reserve.

One vehicle also ferried essential services to Rombagre village. In Jaintia Hills, vehicles were despatched to Niriang village and assorted vegetables were lifted for distribution in Jowai market.

## ICT Deployment

The backend team got to work right from 7am till 11pm and the Agri Response Hotline received no less than 700 incoming calls on its hotline as well as to the team project management numbers which were opened via various social media channels, WhatsApp group and mobile sms. The interesting part is that this entire operation was managed by a cross functional team comprised of government officials, domain experts, and market experts who worked remotely and from their homes, due to the lockdown.

The entire 1917 iTEAMS systems is Cloud-based, where its core technology system is hosted remotely in servers located in Delhi. All

the calls made to iTEAMS is via an Interactive Voice Response (IVR) system via a 32 PRI line system, which is multi-lingual and linked to a farmer database of 24,000 farmers connected and registered from across the State. Callers are routed to different Incoming Call Officials (ICO) based on their specific requirements. Those who require an ARV are diverted to the Vehicle Despatch Team; those requiring advisories are routed to an ICO Level 1 Expert. If the query is not closed by the L1 Expert, it is escalated to a Level 2 Domain Expert for resolution.

The ARV operations are also tracked via a GPS system and Vehicle Tracking Software developed locally, which keeps a tab on the trips, distance, time and location of the vehicles.



## IMPACT

During the pre-Covid-19 period, 17 Agri Response Vehicles were making one trip per day lifting loads (2.5-3 MT per vehicle per trip) from mostly progressive farmers who have medium or large holdings. The number of farmers they benefitted was 20-25 farmers/day.

But during the Covid period, 10 vehicles were added and these vehicles make 27-30 trips each day. These vehicles are also lifting produce not only from medium and large farmers, but also from farmer collectives (20-25 farmers who aggregate their produce in one place where the ARVs come to collect the produce).

Now produce is collected from about 500 farmers each day and each vehicle is collecting up to 4-5 MT per vehicle per trip. While only five districts were covered ( East Khasi Hills, West Khasi Hills, West Jaintia Hills, Ri-Bhoi and

West Garo Hills), currently the area of operation has extended to 11 districts.

### Feedback and Public Response:

*"1917 has done a commendable job lifting produce of distressed farmers from different parts of West Jaintia hills. We are indeed grateful to the team for helping the farmers in this difficult time and of course for the vegs on our plates,"* said one FB post.

Another reads *"Thank you 1917 iTEAMS, for the quick response - it has benefitted the farmers as a whole"*.

A comment by Kupar Lyngdoh also keeps team morale high. It reads *"Since its inception the project mission and vision is unique and the farmers count on 1917, unprecedented, today turnout. The people of the State can count on your service - Bravo 1917 iTEAMS you excite us with your service. When this is all over, rewards from everywhere will hunt you."*



## LESSONS

The 1917 iTEAMS project is a first of its kind in the country, which is designed with a very lean and agile model of functional, operational and staffing system, where the government does not own the assets, such as vehicles. These ARVs and drivers are totally outsourced from transport operators who are then assimilated onto the iTEAMS platform. The entire staff is also hired from a local recruitment agency on a contractual basis. This provides the business environment of a corporate sector agency with the flexibility of a private agency along the lines of a PPP model.



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## ENDNOTE

<sup>1</sup>Mizoram is a case in point where the State Government through a State Agency tried to help farmers by purchasing ginger directly from the farmers and selling it in the open market. Due to inherent market risk, and fluctuating market demands, market volatility, and the highly non-asymmetric forces, the agency had run into huge losses and could not provide this service on a sustainable model. Similar agencies in other States had also tried to help farmers market their perishables but they too do not have the resources to sustain such operations due to high overheads and low margins.

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## KVK KODAGU AND PUTHARI FPO COMING TO THE AID OF FARMERS DURING THE LOCKDOWN

While farmers face new challenges from the lockdown imposed due to the COVID-19 pandemic, local agricultural extension centres, such as Krishi Vigyan Kendras, have to step in and support farmers. In this note, **Saju George, Prabhakar B and Subbaiah KP** illustrate how ICAR-KVK Kodagu and Puthari FPO is supporting farmers to deal with these new challenges.

The lockdown announced by the Government of India in the wake of the COVID-19 pandemic has thrown up unique challenges for farmers and farmer-related institutions. There is a sudden drop in demand for agricultural produce as movement of agricultural output has come to a standstill. The traditional market and supply chain of fruits and vegetables have come to a sudden grinding halt. Under this situation wherein there is a need to relieve farmers' distress and help move farm produce, the government came up with subsequent clarifications that exempt agricultural produce and agricultural operations from lockdown restrictions. However, farmers are still facing problems because of the lack of transportation facilities to send their goods to other districts. It is a herculean task to send goods even to neighbouring districts, let alone other States.

The situation has been worsened by strict interstate border controls that have been implemented. There is a drastic reduction in the demand for high value vegetables due to closure of the hotel industry, and ban on large events. Though there was panic buying at certain points of time, it is difficult to predict the demand and market produce on a regular basis. The local institutions at the district level, such as Krishi Vigyan Kendras (KVKs) need to step up their efforts to help farmers. They need to connect farmers directly to consumers. ICAR-KVK Kodagu (Box 1) is playing an active role in addressing some of these challenges.



**Vegetable outlet operating at KVK during lockdown**

## Box 1: ICAR-KVK, Kodagu

ICAR-KVK, Kodagu hosted by ICAR-Indian Institute of Horticultural Research, Bengaluru, was established in 1976 to meet the technological needs of Kodagu, Karnataka (India). It is a hilly district, and at its lowest elevation it is 900 metres above sea level and at the highest 1750 meters. The annual rainfall is 2800 mm with major precipitation during July and August. Much of the land in the district is used for agriculture. While paddy fields are found on the valley floors, coffee and pepper are cultivated in the surrounding hills. The Kodagu KVK has been promoting farmers' produce through an FPO, with support from NABARD since 2017, for coffee, pepper, paddy and other horticultural crops such as arecanut, coconut and vegetables. This FPO, named as Puthari Farmers Producer Company Limited (PFPC), currently has 750 farmers as members (George and Prabhakar 2019).



ICAR-KVK, Kodagu

### KVK INTERVENTIONS DURING COVID-19

**Advisory Services:** The KVK is regularly providing agro advisories to help farmers maintain their farms through different WhatsApp groups, newspapers, radio and SMS services. KVK-Kodagu has disseminated crop specific advisories, general government advisories relating to agriculture, and Arogya Setu App to more than 7000 farmers through an mKisan portal message advisory, to 3800 farmers through different WhatsApp groups, and also through four local newspapers. A new service of online consultation has also been launched by the Community Service Centres (CSCs) under an MOU with ICAR, so that the

farmers from remote areas need not visit KVKs. They can approach the CSCs established by the government and ask for timeslots to discuss their problems. The timing is determined in consultation with KVK online and farmers can directly interact with KVK scientists online. All KVK heads have been registered in the CSC advisory portal as per the MOU between ICAR and CSC. Farmers can take advantage of this facility by visiting the nearest CSC facility.

**Supply of Planting Materials:** The KVK farm and nursery are functioning normally and the nursery is preparing high quality planting material of coffee, pepper and arecanut to cater to the demands of farmers. KVK is also

preparing about 12,000 seedlings of pepper variety Arka Coorg Excel, 6000 coffee seedlings, and about 6000 arecanut seedlings of improved varieties.

## **KVK AND FPO INTERVENTIONS DURING COVID-19**

**Agri input outlet at KVK:** The agri input outlet of Puthari FPO (initiated in September 2017), located at KVK Campus is functioning in compliance with the district administration's directives. The outlet remains open from 7am to 12 noon on three days of the week (Monday, Wednesday and Friday). On average about 40 to 50 farmers are coming and purchasing critical inputs required for their farms. The outlet is mainly catering to their requirements of vegetables seeds, pesticides, fungicides, and plant nutrients like water soluble fertilizer, which are critical for maintaining plantation crops such as coffee and pepper. Apart from this agricultural machines – weed cutters, small farm implements, harvesting ladders – are also available in the outlet.

Farmers are advised to use hand sanitizers, face masks and social distancing while purchasing agricultural inputs. This also creates awareness among farmers about the importance of social distancing.

**Sale of small farmer produce:** At the same time the outlet is also facilitating farmers in selling their animal products like eggs, thus providing an outlet to market these items, which have also suffered a price crash during this period. Added to this were the fears about the incidence of bird flu, which had erupted in the neighbouring districts of Kodagu.

**Marketing of fruits and vegetables purchased directly from farmers:** The FPO was contemplating starting a rural mart which NABARD has already agreed to fund. But with this lockdown, the FPO has informally started that process by foraying into the marketing of fruits and vegetables that will greatly help both farmers and consumers. Whereas farmers are looking for minimum support price, consumers are looking for safe and fresh vegetables at reasonable prices. The FPO is purchasing vegetables and local fruits directly from local

farmers and also from neighbouring Mysuru district, where the farmers have felt the blow of a sudden crash in vegetable prices. The FPO is voluntarily offering twenty per cent higher prices to such farmers while purchasing directly from them. The KVK has given space for marketing these vegetables inside the KVK campus itself, while maintaining all social distancing norms. The SMS staff from KVK and FPO staff insist upon carefully following the social distancing norms. Once again, the vegetable market is functioning on three days of the week (Monday, Wednesday and Friday) from 7am to 12 noon as per district administration guidelines. On average the FPO is selling INR 30,000 worth of vegetables on any day.

**Coffee marketing:** In these difficult times the farmer members of the FPO can look forward to the coffee marketing initiative taken up by the FPO from this year onwards. The Board of Directors of Puthari FPO has given a call to its farmer members to contribute coffee to the FPO. The aggregation effort was started during February-March season. The FPO has already collected 1000 bags (50 tonnes) of coffee from its members. Sixty farmers have contributed coffee towards this end. This will be cured in a cooperative curing works at Hunsur operated by the Kodagu Coffee Growers Cooperative Society. From there this coffee will be auctioned to national and international buyers with support from the Coffee Board. If successful, this will be the first such export initiative from an FPO. Otherwise coffee marketing is very complex with well-entrenched private players where individual farmers cannot think of exporting their own coffee. As a result of this effort, the buyer can always trace back the origin of the coffee to a 'farmers run FPO' who are growing coffee in the most eco-friendly way.

**Scaling up:** If the export initiative works well the model will be expanded by next year to cover all the 750 registered farmers (as on March 2020). A separate coffee marketing team will be formed by the FPO to scale up the export, and this will benefit a large group of coffee growers. If these initiatives bear fruit the farmers will have a lot of confidence in facing such calamities in future. They will be confident that whatever happens, the FPO is solidly

behind them in helping them market their coffee and pepper produce. Thanks to all these reasons farmers will be able to realize higher incomes.

## LESSONS

It must be noted that problems in every district within the country is unique and requires location- specific interventions. KVKs located

in each district can help address – to some extent – some of these challenges faced by farmers. To do this, KVKs have to go beyond their normal mandate, and start mobilizing farmers into groups, strengthen their capacities (organizational, managerial and technical), and respond quickly to the new challenges that are emerging. It is our professional and moral responsibility too.



Meeting of the Board of Director, PFPCL

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## REFERENCE

George S and Prabhakar B. 2019. AESA Good Practices 27: KVKs in support of producer companies. Agricultural Extension in South Asia. (Available online at <https://www.aesanetwork.org/kvks-in-support-of-producer-companies/>)

# 97

## USING SOCIAL MEDIA TO ADVISE LIVESTOCK FARMERS IN INDIA DURING THE COVID-19 LOCKDOWN

In this field practice note, **Tamizhkumaran J and Saravanan Raj** illustrate the use of social media in advising livestock farmers who face several new challenges from the current lockdown imposed to tackle the spread of Covid-19.

The lockdown resulting from the impact of Covid-19 has been adversely affecting the livelihood of livestock farmers in several ways. Extension and Advisory Services (EAS) have to support farmers in dealing with their problems. Social media applications, especially YouTube and Telegram, can help livestock farmers during this lockdown period. I (Tamizhkumaran J) have been experimenting with the use of social media for providing advisories to livestock farmers since November 2016. I initiated a small WhatsApp group for this then and now it has grown into a global network with YouTube and Telegram.<sup>1</sup>

In this field note, I share some of my experiences in helping livestock farmers with EAS via virtual world. Livestock farmers in Tamil Nadu have been facing the following challenges during the lockdown period:

- Non-availability of veterinary services at their doorstep;
- Transport of both inputs like concentrates and all the livestock outputs;
- Restricted movement for grazing of animals;
- Difficulty in taking sick animals to veterinary dispensary due to restrictions;
- Increase in the price of concentrate feed;
- Stoppage of milk purchase by people for fear of contracting the disease.

### INTERVENTIONS

While working as a private large animal practitioner in the Indian State of Puducherry during 2016, I created a small WhatsApp group to share my knowledge among my clients. Many farmers joined the group subsequently (Box 1) and later a YouTube Channel was also created (Box 1).

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<sup>1</sup>Telegram is a Mobile app similar to that of WhatsApp but it has more options.

## Box 1: Experimenting with social media for livestock extension delivery

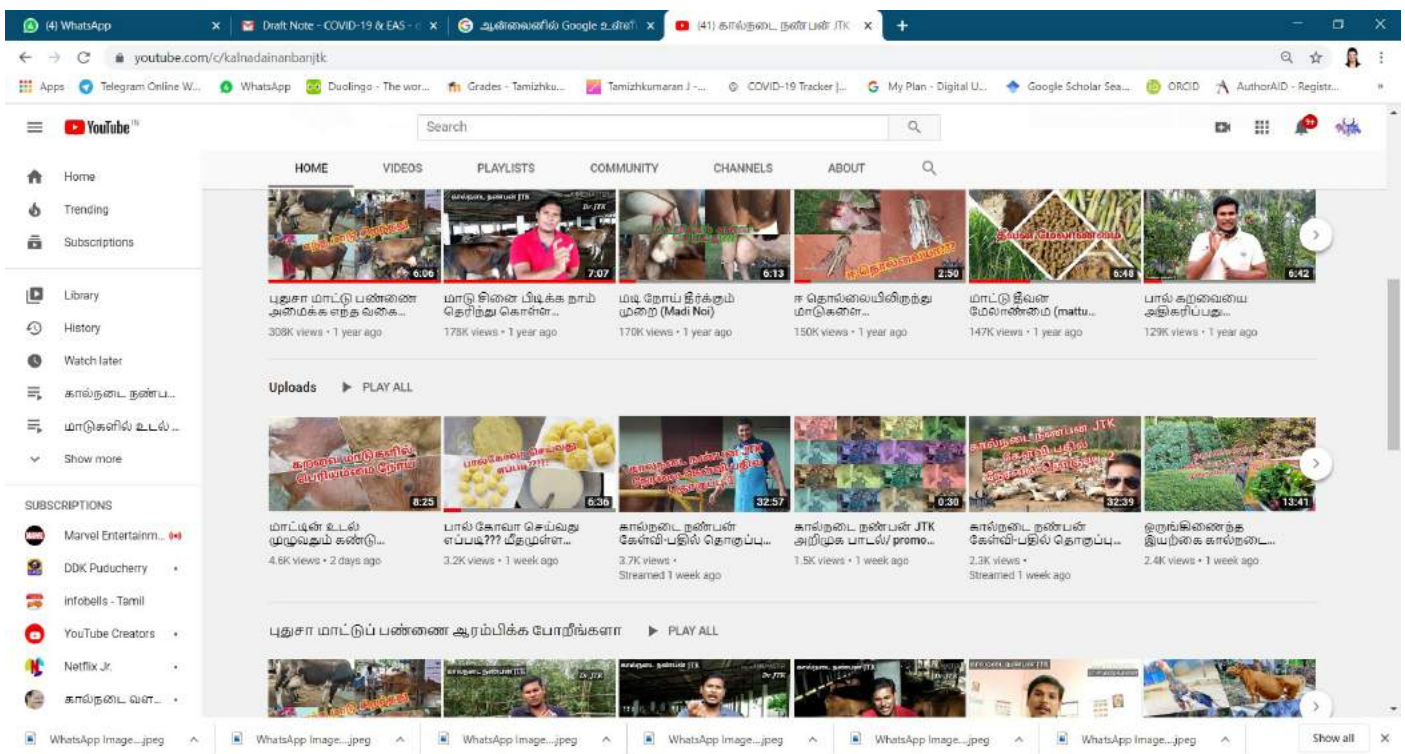
### JTK Telegram Group

Started as a WhatsApp group in 2016, it later grew into 12 WhatsApp groups by 2019. Since it was a herculean task to handle all the 12 groups, a Telegram group was started by shifting all the members from WhatsApp to Telegram in 2020. The main aim of the group is to share information related to first aid and management techniques in livestock farming. The livestock owners in the group used to post their questions in the form of text, voice or video messages and the answers would be given to them by the experts in the group. The group has more than 2100 members from different parts of the world.

Farmers owning a few animals, small-scale diary entrepreneurs, extension personnel and veterinarians are a part of this group. The members of the group were from different countries but had a common identity through language (Tamil). Most of them were from Tamil Nadu. The other States from where members came were Kerala and Andhra Pradesh. They also hailed from other countries – United Arab Emirates, Saudi Arabia, Sri Lanka, Malaysia, Singapore, Kuwait, the USA and UK, etc.

### JTK YouTube channel – 127.6 K subscribers worldwide

This YouTube channel was started in March 2018, to document the frequently asked questions repeated in the WhatsApp /Telegram group and share the answers to these questions through short videos. Videos on general management practices are also uploaded. These videos are produced and uploaded every week for the benefit of the group members. This group has more than 127,650 subscribers worldwide.



Homepage of YouTube channel displaying the different playlist of Videos uploaded

## INTERVENTIONS DURING COVID-19

### Understanding constraints

To tackle the crisis situation faced by livestock farmers during Covid-19 a small group discussion was carried out on 03 April 2020, in the Telegram group to ascertain the constraints faced by them. It was then planned that the constraints could be solved by creating awareness and providing the required clarity on the existing situation/problem. A question was posted on the group in the form of a video – to ask them what the constraints were that they were experiencing during the lockdown

period, and whether they have any suggestions to mitigate them? We received different constraints from the members.

### Offering advice

Live-in Programme through YouTube (URL: <https://www.youtube.com/c/kalnadainanbanjtk>) After collecting facts about the Covid-19 lockdown from the group members we started providing advice through live-in-programme through YouTube channel. A total of 82, 137, and 93 participants joined the programmes on 5, 6 and 14 April 2020, respectively. It was decided to have a question and answer session

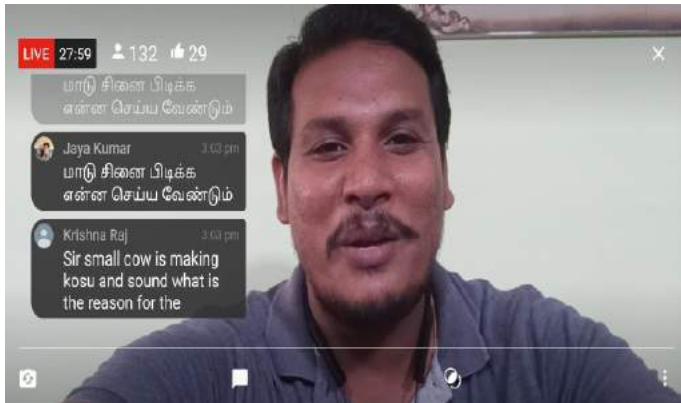
on 4 April 2020, exclusively to address the constraints faced during the lockdown. The general queries from the livestock owners were also addressed. The session was planned for half an hour. On 14 April 2020, out of the 153+ questions, around 50+ questions/session were answered.

Live- in Programme links:

Programme-1: <https://youtu.be/7Z4Kxx4MkOQ>

Programme-2: <https://youtu.be/XqoE1Y21Cos>

Programme-3: <https://youtu.be/Nf0ZG4lw7Mw>



**Interacting with my subscribers through YouTube Live streaming regarding Covid-19**

The problems and the suggested measures to be taken were discussed during the programme as discussed below:

### **Constraint-1: Problem in transporting milk from farm to Dairy Cooperative Societies (DCS)**

Police were not allowing the peri-urban and urban dairy farmers in Villupuram and Salem district of Tamil Nadu to transport milk from their farm to DCS. A young educated entrepreneur was upset that he was not even considered as a livestock owner. The police were mocking him for trying to cheat them. He suggested that livestock farmers also be given vehicle passes by the DCS to transport the milk.

### **Constraint-2: Disposal or sale of milk**

Police were not allowing livestock owners in Rettanai village, Villupuram district, and Thiruvallur district of Tamil Nadu to sell their milk in peri-urban and urban areas. As many farmers lost some of their regular customers they didn't know what to do with the excess milk which they had. So we thought we would help them utilize that excess milk by value addition. A few farmers even suggested that videos be made on these topics. So a video on

value addition to liquid milk was also prepared with the help of the concerned experts and was circulated among the group to help farmers gain knowledge on value addition.

YouTube links to the video: Value addition during crisis time

1. Khoa preparation: [https://youtu.be/4UcoS0dJ\\_xE](https://youtu.be/4UcoS0dJ_xE)
2. Small Scale Milk Processing: <https://youtu.be/knsqW8DMPBc>
3. Make Paneer in Small Scale: <https://youtu.be/bBToqR5IGAQ>

### **Constraint-3: Police not allowing the owners of sick animals to be taken to the Veterinary Dispensary**

One of the farmers tried to take his cow to the nearby dispensary for follow-up treatment. Police didn't allow him to go the veterinary dispensary. We could help him by negotiating and explaining the importance of the treatment to the police.

### **Constraint-4: Discontinuance of milk purchase due to scare of corona**

A few of the consumers were not interested in buying milk from the farmers due to the scare of corona spread. We clarified their doubts on the spread of diseases. Requested them to follow hygienic practices.

### **Constraint-5: Non-availability of veterinary services at their doorstep**

Generally the Artificial Insemination services are rendered by Lay Inseminators and Veterinarians are called only for clinical cases. Usually the minor cases are attended to by para veterinarians and quacks at the village level. Only for emergency cases do livestock owners seek the help of veterinarians. Due to the lockdown-imposed travel restrictions, the para veterinarians were unable to travel. Since then for every service, the livestock owners had to dependent on veterinary assistant surgeons. For a few of the emergency cases we could identify fresh veterinary doctors, who were willing to attend the cases on site, especially when it was too far for the livestock owners to take their animals to veterinary dispensaries.

### **Constraint-6: Increase in the price of concentrate feed**

Many livestock farmers asked whether they can feed their animals with rice and wheat, as there



was scarcity in concentrate feed and increase in the price of the available feed. Proper feeding suggestions were given based on the questions.

In general, we could clear the doubts on how to feed the livestock during the crisis period, how to get the e-pass, preventive measure to be carried out to reduce the spread of corona virus etc. In addition, they were made aware of the present crisis and their responsibility as a citizen during this crisis time. We also advised them to maintain social distance whenever they come out for grazing, care of animals, or sale of produce.

## IMPACT

Advice provided through the Telegram group was effective enough to clear the doubts of livestock farmers. The first aid advice was of great help to livestock owners, although it was a routine practice of the group. Advice during this crisis situation was much more useful as they don't have many other means to seek professional advice. We could identify the stakeholders and share their contact details with the group members. We could even identify young veterinarians who were really interested in helping livestock farmers during this crisis by attending to the emergency cases.

## LESSONS

Livestock owners are more interested in the YouTube Live-in programme. When asked, "Should we organise this programme daily during this lock down period?", many answered "yes" and a few even wanted to increase session duration as well. This itself is a clear indicator that advice through social media can play a huge role during the Covid-19 lockdown. Social media, especially YouTube, plays a great role in this context.

The livestock owners are satisfied with the timely advisory services provided to them through social media. They have learnt how to get an e-pass for transporting livestock produce and have understood the importance of hygienic management practices. We tracked the adoption of feeding practices recommended during the interactions and several farmers reported that they have modified the feeding

pattern given the available feed and fodder. They have realised the importance of saving the animal during this crisis situation more than sustaining the milk production. Many farmers got some moral support while participating in the live-in programme. Over 1000 subscribers and 250+ group members have joined our social network after we started this initiative.

### Box 2: Questions raised by livestock farmers via YouTube/Telegram group

Questions related to Covid-19 lockdown

1. Does Corona spread to animals?
2. Does Corona spread through milk/egg/meat?
3. Do animals get Corona? If yes, what should be done?
4. Do animals also exhibit symptoms like human beings if they have Corona?

Questions related to Livestock rearing

We got around 153 question on YouTube Live-in Programme and we get around 30-40 questions in Telegram group daily. Only the major topics are listed here:

1. How to control parasite infestation in livestock;
2. How to rectify infertility in cows;
3. Feeding management of livestock;
4. How to control Lumpy Skin Diseases.

The social media tools can surely help livestock farmers to communicate beyond borders and seek advice.

# 98

## CRISIS MANAGEMENT THROUGH AGILE INTERVENTION – HELPING PINEAPPLE GROWERS IN KERALA

A social experiment by Extension Officers of the Kerala State Department of Agriculture and Farmers' Welfare changed the fate of pineapple farmers who were bracing for a huge financial loss arising from the COVID-19-imposed lockdown in the State. In this Field Note, **Philipgi T Kanatt and Jony Jos** narrate how this small pilot was conceived and implemented, and how it got upscaled across the State.

Amidst the New Year celebrations of 2020 news flashes on Corona virus at Wuhan, China, started trickling in. It snowballed into a pandemic at a rapid pace, forcing governments to declare lockdowns. Normal life and activities in Kerala came to an abrupt stand still from 21 March 2020. Farmers became panic-stricken as it coincided with the main harvest season of paddy, vegetables and fruits. Farmers work long and hard to finally reach harvest time, which is the culmination of all their farming activities. These activities were planned and executed well ahead of the lockdown, and long before the emergence of COVID-19. Crops require a long gestation period from seed to harvest. As such the impact of the sudden lockdown left the farmers thunderstruck.

The State departments promptly rolled out crisis management plans. Crisis management groups were formed in each district, with the block level assistant directors and agricultural officers roped into social media groups – to facilitate sharing information of a glut in this situation and for dynamic decision making. Government-owned market intervention agencies, such as the Vegetable and Fruit Promotion Council, Keralam (VFPCCK), and Hortcorp, started aggressive procurement of fruits and vegetables.



### PINEAPPLE DILEMMA

Pineapple is one of the major fruit crops in the midlands of Kerala, with farmers leasing out large areas of land to cultivate it. The best pineapples are harvested in the summer months prior to the rains. Vazhakulam near

Muvattupuzha in Ernakulam district of Kerala, is well known for cultivation of the GI tagged variety of pineapple ('Vazhakulam' was registered as Geographical Indication No. 130 & 141 at Chennai during 2009-2010 under Goods - Agricultural category). On average 500 tonnes of pineapple were sent to various cities across India as well as overseas on a daily basis.

Convoys of trucks usually wait at Vazhakulam market to be loaded with mature (but still green pineapples), so that they reach as ripe fruits in distant markets. This also prevents them from getting damaged when stacked one above the other. Then, when the country got locked down and the State borders closed, the movement of pineapples got stalled. The fruits which were not harvested started getting ripe on the plant, which led to an alarming situation as the farmers were left with just a 'now or never' option. Farm gate price of Pineapple plummeted to Rs. 5 per kg in the auction markets. Farmers, our food suppliers and the guardian angels of our environment, are on the verge of extinction. Their survival is imperative to our food self-sufficiency as well as the management of our ecology. The paradox is that while farmers are facing a glut there is scarcity at the consumer end. It was time to experiment with innovative ideas in order to effectively bridge these gaps to develop a viable producer-consumer linkage.

## **SOCIAL EXPERIMENT**

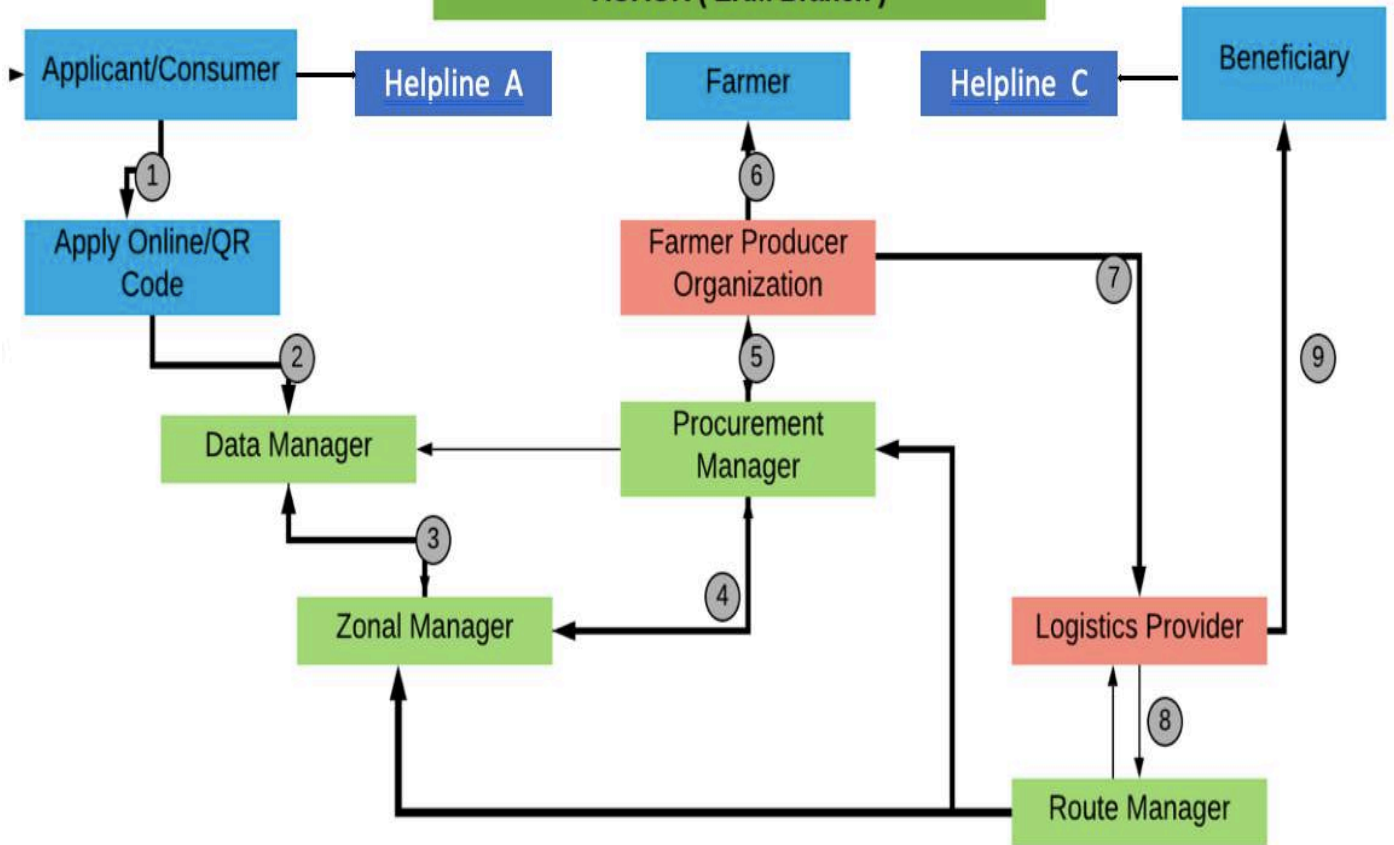
This is where the district branch of the Association of Agricultural Officers - Kerala (AOAOK) decided to intervene in the market with a social experiment. A rough estimate revealed that more than 500 tonnes of pineapples would get spoiled in one week. The procurement mechanism alone could not meet the sudden surge in supply, so there was a need to create a matching demand if the impending glut had to be avoided. A tele-conference of the office bearers and a few members, who were familiar with the pineapple growing and trading regions, was called. The conference was held in a structured manner where in-depth discussion on each stage of procurement, logistics and marketing were done and documented. On its basis a proposal was submitted to the District Crisis Management Committee for their approval.

On receiving a favourable reply from the District Crisis Management Committee, a virtual war room was set up. A select group of volunteering officers were split into different teams, with clear and well-defined functions and responsibilities. Data handling, logistics management, setting up of a customer feedback helpline, etc., were assigned to separate teams. Online platforms were created with input forms for collection of online orders. Social media posters were designed incorporating hyperlink and QR codes of order forms and widely circulated through the various groups and contacts of the members. A press release exhorting urban consumers to come out in support of the farmers, including a set of telephone numbers of the helpdesk, were widely published in the print media. Another group was entrusted with compiling easy pineapple recipes to be circulated among customers.

The Pineapple Farmers' Association (PFA), a group of enterprising farmers based in Vazhakulam, agreed to join the intervention plan – Pineapple Challenge. Minimum order quantity for each order was fixed as 100 kg at a rate of Rs. 20 per kg for premium grade (weighing not less than 1.250 kg per fruit) pineapple. The rates were intentionally kept lower than the local retail prices so as to spur demand by encouraging consumers to buy in bulk, which was the only way to suck up the market surplus. Logistics, distribution protocols, and sanitary measures that were to be followed were clearly laid out to PFA. Figure 1 illustrates how the entire operation was organized. Payment was on Cash on delivery mode directly to the farmer group. The transportation and distribution charges were borne by the farmers.

The media coverage drew overwhelming response. Within a span of two days, 376 applicants confirmed their requirements. All of them were residents' associations, with an average of 35 members. A total of ten days of active duty – involving 22 staff volunteers, 55 farmers and 25 freight vehicles – was super hectic. As a result 56 tonnes of pineapples were supplied benefitting 7500 people living in and around Ernakulam city. All safety measures to prevent the spread of Corona virus during harvesting, loading, and logistics was carried out by the Pineapple Growers' Association.

**Pineapple Challenge : Process flow adopted by AOAOK ( EKM Branch )**



**DM - Data Manager**

- Identification of consumers through QR Code/Online process.
- Segregate the consumers according to zones.
- Assigning consignment.
- Communicate with ZM
- Divide district into zones.

**ZM - Zonal Manager**

- Communicate each consignment with PM.
- Communicate with RM.
- Verify consignment with Applicants

**PM - Procurement Manager**

- Communicate with FPO.
- Ensure timely delivery by FPO.
- Monitor LP.

**RM - Route Manager**

- Communicate with PM and ZM.
- Monitor LP.
- Verify consignment with Applicants

**FPO - Farmer Producer Organizations**

- Arrange the produce according to the consignment.
- Coordinate with LP for timely procurement and movement.

**LP - Logistics Provider**

- Arrange vehicles according to consignment.
- Ensure timely pickup, movement and delivery.
- Report delivery data to RM

**Database:**

- A : Applicant
- F : Farmer
- B : LP&Beneficiary

**Applicant database**  
 Managed by Data manager  
 View & comment access to procurement manager & Helpdesk

**Helpline A**  
 The persons will have view access to the Applicant database, so that they can give confirmation on booking status.  
 Comment customer feedback in Applicant database  
 Assist applicants for data entry through forms

Form route chart for the zone Add beneficiaries into a temp. Whatsapp group with all rights reserved to admins. Add Logistic manager & Helpdesk members as admins

**Route Chart** for each zone  
 Prepared by concerned Route managers on Google spreadsheet arranging delivery points in order  
 Edit access to Logistics manager  
 View access to Zonal manager, Procurement manager & Helpdesk C

**Helpline C**  
 The persons will have view access to the route charts on google spreadsheet, so that they can give confirmation on delivery status

**Figure 1: Pineapple challenge process flow**

Customers who were provided with a soft copy of pineapple recipes were motivated to produce different products. Pineapple recipes (in pdf file) shared via WhatsApp and Gmail had a positive impact. Home scale production not only ensured a safe product but also provided a learning experience and creative family time. One of the feedbacks read: "Initially we ordered 100 kgs. We were surprised to get a soft copy containing 18 pineapple recipes. Added to that the assurance of straight from farm and it's freshness encouraged us to double the order while pineapples were delivered." Another feedback describes their first time experience in preparation of jam, kesari, etc., and that too with the joint effort of all family members. Such experiments have instilled confidence in preparing various dishes at homes rather than depending on packed products from shops.

The order and supply details are in Table 1.

Orders were received from essential services establishments that were functioning during the lockdown. In an empathetic move, they gifted employees with pineapples. AOAOK was successful in arranging two mega processors and four women SHG micro units for pineapple procurement and value addition. This entire intervention, which began from 5th April 2020, has brought about a radical change. Meetings, consultations, discussions and debates were all online. A digital system for identifying beneficiaries, collecting and transmitting basic information were utilised effectively. Farmer Producer Organisation was empowered to handle issues pertaining to farmer identification, pineapple aggregation, arranging logistics, and swift delivery.

**Table 1: Pineapple challenge – Order and Supply details**

Day	Order		Supply
	Nos	Qty (kgs)	Qty (kgs)
Day 1	11	1205	
Day 2	201	27743	
Day 3	164	29735	6240
Day 4			18650
Day 5			24945
Day 6			1960
Day 9			2005
Day 10			2321
Total	376	58683	56121
*Some orders from distant districts were not supplied			



**Pineapple loaded onto the truck and unloaded at a housing society**

Thus Digital Agricultural Extension proved successful when right material was delivered to right person at the right time. We were able to create a valuable and reliable database that is easily retrievable. The success of the intervention prompted Agriculture Department officials of other districts too to come up with a Pineapple Challenge in their respective districts. As a result of this entire intervention, market prices recovered to Rs. 15/kg; and once interstate movement was reinstated, the pineapple market could be steered away from certain disaster.

## CONCLUSION

Overall, the impact of the social experiment by the fraternity of agricultural officers, helped to provide much needed social support to farmers. Generally farmers are not seen as a part of the social fabric, so consumers are less sensitive to their conditions. This campaign helped to highlight the vulnerability of farmers, which led many customers to join the Pineapple Challenge and extend their support to them. It is high time our society acknowledges farmers – not only as our food providers, but also as the guardian angels of our ecology.

# 99

## BEHAVIOURAL CHANGE TO CONTAIN THE SPREAD OF COVID-19 IN SRI LANKAN TEA SECTOR

Ceylon Tea is well known globally for its outstanding quality and unparalleled taste. In this field note, **Tharaka Jayasinghe** explains the role of EAS in creating behavioural change to contain the spread of COVID-19 in Sri Lankan tea sector.

With more than 150 years of customer recognition, Ceylon Tea is well known globally for its outstanding quality and unparalleled taste. The advent of COVID-19 Pandemic increased the demand for the tea owing to its high quantity of theaflavins (antioxidant polyphenols that are formed from the condensation of flavan-3-ols in tea leaves during fermentation). Research evidence published in several medical journals have shown the positive impact of theaflavins on viral diseases. High levels of theaflavins in Ceylon Tea has thus resulted in a competitive advantage for it in the international market. It is also among Sri Lanka's main sources of foreign exchange.



## EXTENSION AND ADVISORY SERVICES (EAS) IN THE TEA SECTOR

Safeguarding the reputation and competitive advantage of Ceylon Tea is a priority for the Tea Extension System in Sri Lanka. The government, plantation sector and private companies (e.g.: A Baur & Co.(Pvt.) Ltd.) are engaged in EAS in the tea sector and this is the right time for all the stakeholders to come together and convey a united message to the tea sector in Sri Lanka.

The main topics for the entire extension system of Ceylon Tea should be:

- a. Good Handling Practice (GHP),
- b. Good Hygienic Practice (GHP) and
- c. Good Agricultural Practice (GAP)

Good handling and hygienic practices ensure sanitation of the packing house, pest control and sanitation of containers while ensuring hygiene of the workforce. Also, ensuring safety of the work personnel is a part of good

agricultural practice, especially in the time of COVID-19 spread. Therefore, for extensionists, this is the time to train our workforce engaged in plucking tea leaves and working in tea factories in all the above aspects.



We also need to change the traditional management system of tea plantations and smallholdings in the country. About 80% of green leaves are produced by the smallholding sector in Sri Lanka while the remaining comes from plantations. The labour engages in plucking work in plantations and on smallholdings, especially in the low country, depending on the demand. So, spreading of COVID-19 can increase in plantations. Because migration between plantations is common, intra-plantation migration should be stopped. The workforce in tea factories

also fluctuates due to many reasons. These two labour categories have a higher risk of spreading COVID-19. So, we have to train the plucking and factory staff about hygiene, social distancing and washing hands throughout the manufacturing process of black tea.

This is a critical time for Sri Lanka. Therefore, traditional labour management practices should change now. The priority for extension officers of the plantation, factory and fertilizer companies in the present situation is to train the pluckers and factory staff as soon as possible.





## WHAT NEEDS TO CHANGE?

### Field level: Labour Management

The traditional practice of labour management needs change. Normal management practice is to gather all the tea green leaf pluckers into one master meeting every morning and the manager speaks to them to assign daily duties to the pluckers. This practice should be avoided.

Also, gang plucking (as a team plucking in one area) should change and individuals should be allocated separate land area for plucking. This practice will help maintain distance between the workers and help reduce the risk of viral spread.

In the mornings, pluckers usually gather at one place for tea and for lunch post-noon. They are used to sharing food and tea during this time, which will have to be advised against.

After plucking the workers come to a common point to weigh the leaf plucked. We have to change this practice. It would be better to organize weighing twice a day to reduce risk.

### Factory level: Selling green tea to the factory and operations within the factory

Sri Lankan small green leaf tea producers often like to give their product to two or three bought leaf factories in a day. This practice should stop and the entire day's production should be sold to one factory, and on another day it could be

given to a different bought leaf factory. Also, we have two sets of green leaf collection bags, one set for each one day, which can be kept under direct sunlight after use.

We should also be concerned about the labour involved in factory operations and they should be educated about good hygiene practices within the manufacturing process.

### E-auction

Though discussions to digitize tea auctions were ongoing in the past several years, it did not happen until COVID-19 emerged. Sri Lanka's 126-year old Colombo Tea Auction has now moved online. Over 16.5 million kg of tea were sold during Sri Lanka's first three e-auctions between April 4 and 19, allowing the country's tea export industry worth USD 1.5 billion to continue during a nationwide curfew imposed to contain the pandemic.

## CONCLUSION

As a leading extension team in the private sector, we already have started extension programs via social media and zoom, and we are planning to organize more campaigns to create awareness about good handling and good hygiene practices for the labour in Sri Lanka's tea sector.

# 100

## EXPLOITING THE POTENTIAL OF WHATSAPP TO HELP FARMERS MARKET DURING COVID-19

Extension officials in Kerala are playing a proactive role in linking farmers to markets during the current lockdown. In this field note, **T Dileepkumar** narrates the experience of using WhatsApp to link vegetable producers to markets.

From January 2020, the Kerala State Department of Agriculture Development and Farmers' Welfare (DADFW) initiated a programme for cultivating vegetables and fruits in all homesteads and other available cultivable areas in public and private institutions. As articulated by the Honorable Minister for Agriculture, Kerala, Adv. VS Sunil Kumar, the vision of the department was to achieve self-sufficiency in the State for safe-to-eat vegetables and fruits. This year Ernakulam district considerably increased the area and production of fruits through cluster-based targeting (Box 1) so as to meet the enhanced demand for vegetables and fruits during Easter, Vishu (an important festival of the State), and Ramzan – all falling in the months of April and May. To promote vegetable cultivation, another project was also implemented by the DADFW wherein institutions, including NGOs, were granted assistance (based on the existing rates of cost of cultivation and project guidelines) to take up vegetable cultivation in the premises of public and private institutions.

### Box 1: Cluster-based cultivation of vegetables

Under this scheme, a farmer group with an aggregate minimum of five hectares of land suitable for vegetable cultivation will be selected, and the group will be given financial assistance at the rate of INR 15,000 per ha as subsidy (up to a maximum of INR 75000/for five ha) for cultivation of vegetables. Additionally, the cluster members will be given need-based assistance for irrigation pump set and plant protection equipment (sprayers).

The officials of the DADFW in Ernakulam district played a proactive role in promoting this scheme among farmers, and cluster-based cultivation of vegetables was initiated in most of the blocks in the district. Moreover, some of the vegetable growers were also identified for commercial cultivation of vegetables.



**Farmer market at Kothamangalam, Ernakulam**

Farmers as well as the common man wholeheartedly embraced the programme, and by March 2020, the foliage of vegetables was seen thriving in many homesteads and roof tops/terraces. However, when vegetables and fruits reached the harvest stage, challenges emerged in marketing these products due to the nation-wide unprecedented lockdown due to COVID-19. While some households are happy that this initiative helped them to have their own safe-to-eat vegetables harvested from their own backyards, those growing vegetables commercially found marketing these perishable commodities a great challenge.

### **MARKETING HURDLES RESULTING FROM THE COVID-19 LOCKDOWN**

In Ernakulam district, the farmers have adjusted their cropping cycle so that they could harvest and sell these vegetables and fruits at a good price during the festive season in April-May. The major fruit crop of the district with GI tag, the Vazhakulam pineapple, is harvested during the summer months of March-May. The main vegetables grown during this time include cowpea, cucumber, amaranth, okra, bitter gourd, ashgourd and snakegourd, etc. The lockdown devastated the expectations and hopes of the growers as they failed to harvest, transport and find markets for their produce. At

the same time, the people in the urban areas faced problems arising from the unavailability of quality products for their daily use. The growers were afraid that their produce might rot and go waste due to the prevailing lockdown, which would then make them bankrupt.

Ernakulam district, located in Central Kerala, is the commercial capital of the State and includes the largest metropolitan region of the State, that is Greater Cochin. As per the 2011 Census 31.93 percent of the district's population live in rural areas and 68.07 percent live in the urban region. This clearly shows the need for ensuring that the food supply chain stays intact in the district.

The DADFW has presence in all Gram Panchayats, Municipalities, and Corporations in the State in the form of Krishi Bhavans which are headed by an Agricultural Officer and 2-3 Agricultural Assistants. The department has already set up marketing facilities for farmers to sell their produce through Ecoshops, cluster markets, agro service centers, and farmers' markets.

To help farmers during the lockdown, the State Government directed its officers to strengthen all the markets aided by the government and start farmers' retail outlets in all Krishi Bhavans

with minimum arrangements, so that farmers can sell their produce. As per this direction, the existing markets were strengthened and 38 new Farmers' Retail Outlets (FRO) were set up as

Jeevani Sanjeevani Markets in the Krishi Bhavan premises. Even though all the markets started functioning, product movement did not happen as expected.



**Students cultivating in schools with assistance from Krishibhavan**

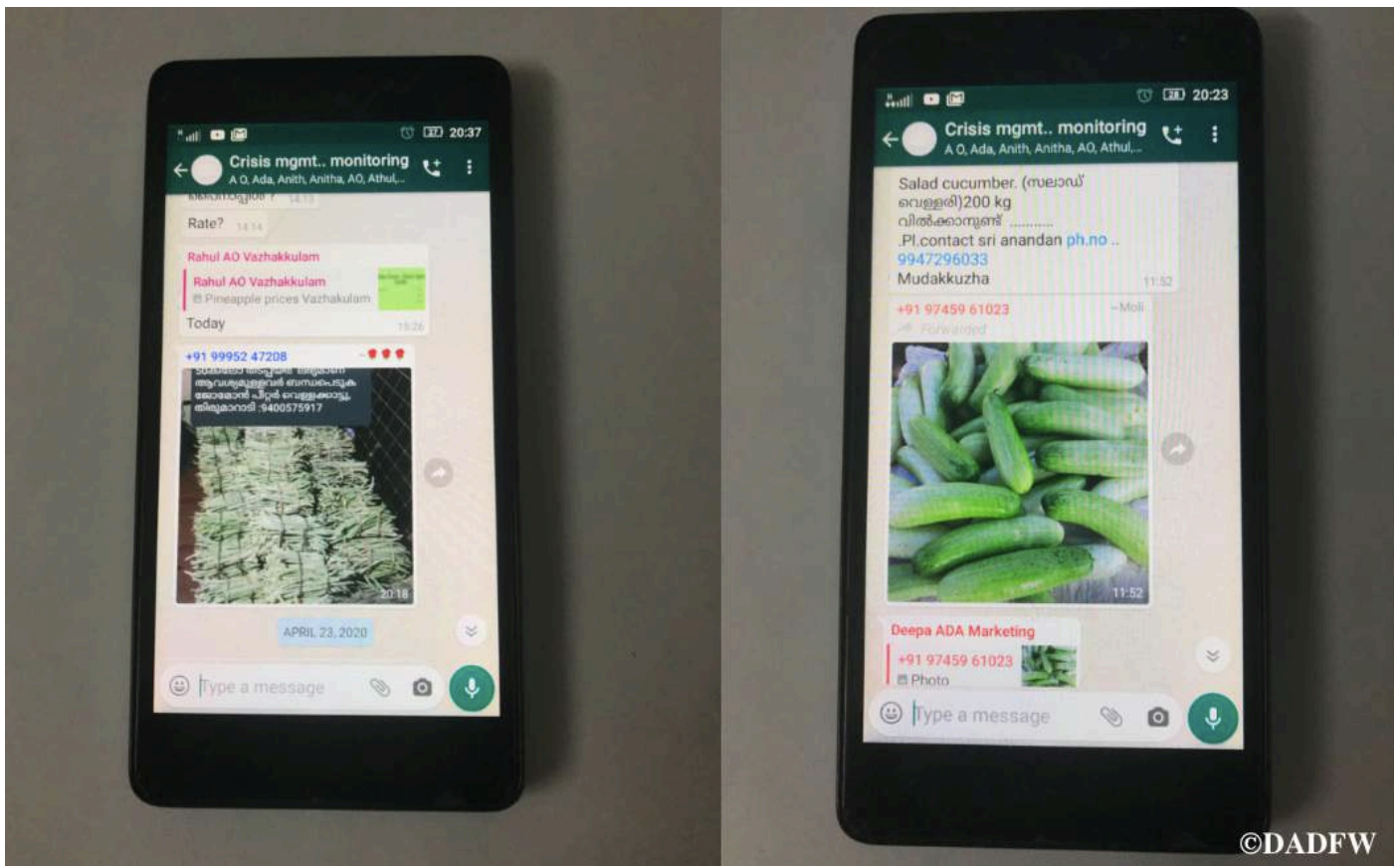
## **MARKET INTERVENTION WITH DIGITAL EXTENSION**

During the first week of lockdown, farmers could dispose their produce in the nearby areas. But as the days passed, the situation changed as farmers failed to sell their produce in the nearby areas. These problems were shared by growers through newspapers, television channels, and also through social media. In response to these constraints experienced by farmers, the Director of Agriculture instructed the department officials to intervene in the issue and explore social media options to connect farmers, traders and consumers. By that time, the Ministry of Home Affairs (Government of India) had issued orders for relaxation in lockdown guidelines with respect to transportation of farm produce and logistics connected to transport of farm inputs and outputs. Based on these guidelines, the Director of Agriculture asked the district functionaries of the department to make urgent interventions in the marketing of fruits and vegetables.

## **Formation of WhatsApp groups in different levels**

At the district level, a crisis management WhatsApp group was then formed, comprised of the Principal Agricultural Officer, Deputy Directors, Assistant Director (Marketing), Block level Assistant Directors in the district, and two Agricultural Officers from each block.

Subsequently, WhatsApp groups were formed for farmers and traders in all blocks who have more areas under vegetable cultivation, so as to notify that marketable surplus was available at the block level. The traders can directly contact the farmers and collect the produce from the farm itself in the lockdown period. At the same time, if the product is required in a residential area, the Ecoshops or agro service having vehicles can supply farm fresh products to these residential areas and apartments– on request. If the product surplus cannot be cleared within the district, the same can be shared with the groups of other districts and the produce sold in other districts, based on demand.



**Whatsapp post by farmers sharing the produce ready for sale**

**IMPACT**

As days passed the system started showing excellent results. Formation of groups in all the blocks enhanced farmers’ access to more buyers and more markets (Table 1). Almost all farmers started to post the details of the surplus they have along with the image of the produce and

their contact number, and these were shared with all other groups so as to generate orders from residential associations and traders. The trader or the consumer can directly contact the producer and take produce on mutually agreeable prices after considering the base price fixed for that day.

**Table 1: Quantity sold through WhatsApp group sharing \*\***

Period	Item	Quantity (Metric tonnes)
23 March-25 April 2020	Tubers	90
	Fruits	85
	Vegetables	145

\*\* Based on formal data available through Ecoshops, agro-service centres, etc. Data is not available for sales that has happened directly between the producers and traders and housing societies.

The department officials played a facilitator role while performing all their other routine work. The district level monitoring committee, having access to all the groups as well as the state level

monitoring committee, can monitor the product surplus and movement within the district as well as in and outside the district as required.

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## SUPPORTING CHILI FARMERS TO COPE WITH COVID-19 LOCKDOWN: A CASE FROM THE TRIBAL AREAS OF PALGHAR, MAHARASHTRA

While forming farmers' collectives to promote the most relevant technologies and to engage in collective marketing are important, farmers do need immediate support for marketing their produce during pandemics and disasters. Providing such support is critical to ensure sustainability of such initiatives, and is also a moral responsibility for change agents, argues **Mukund Patil, Sreenath Dixit, Satish Gahukar and Arun Seshadri.**

Maharashtra State in India, has been reeling under the impact of the COVID-19 pandemic for the last two months. The economy of the State, known for its agrarian workforce and bustling markets, has come to a virtual standstill ever since the national lockdown was imposed from 24 March 2020. With a large-scale economic setback looming large, the State's agriculture and allied sectors have also taken a beating. The Government of India has been working extremely hard to ease the suffering faced by farmers and have granted exemption to movement of farm produce during the lockdown. Many other organizations across India have also pitched in. In this blog, we focus on how the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and JSW Foundation have been helping chili farmers cope with marketing of their produce in view of COVID-19.

### PARTNERING FOR A CAUSE

From 2015 onwards, JSW Foundation and ICRISAT, along with rural communities, have been working with the Government of Maharashtra to reduce malnutrition in Jawhar taluk of Palghar district. The farming community from six project villages (Ghivanda, Kogdha, Jamsar, Dabheri, Sakharshet, and Chambharshet), came together to develop a site of learning for demonstrating livelihood improvement through the integrated watershed management approach with the specific goal of increasing agricultural productivity and improving rural livelihoods. The key project interventions include rainwater harvesting, soil conservation, and crop productivity enhancement, with active participation from the community.

The journey started with the formation of the village level watershed committee: 'Pragati Bahu- Uddeshiya Sevabhavi Sansthan', comprising of members from all six selected villages.

The watershed committee is an important stakeholder for planning and implementing watershed interventions. The farmers from the six villages and the watershed committee with guidance from ICRISAT and JSW Foundation came together to address the key challenges of water scarcity and land degradation by implementing soil and water conservation measures for rainwater harvesting and reducing soil erosion, and creating water storage capacity of about 65000 m<sup>3</sup>. The farming community also actively participated in the demonstration of good agricultural practices, and witnessed improvement in crop productivity by 30 to 50% as compared to traditional cultivation practices.



**Green chili harvesting at farmers' fields**

## **DEALING WITH THE LOCKDOWN CHALLENGES**

In 2019, chili cultivation started with 46 farmers – covering 50 acres – with an expected production of 350 tons of green chili. The harvest season started as per plan in February 2020 and Del Monte (a multinational agribusiness company involved in fresh and processed fruits and vegetables) initiated the buying process for the export market. During March 2020, central and state governments imposed strict restrictions as precautionary measures to control the spread of COVID-19, which would have a direct impact on the movement of harvested chili. Moreover, Del Monte also stopped purchasing the chili, during the early days of the lockdown, as export operations were restricted. The entire nation has been under lockdown since the last week of March 2020, but fortunately, the markets for agriculture commodities were allowed to function with strict guidelines to maintain social distancing and hygiene at market yards.

## **Dealing with the logistics**

A series of logistical issues awaited the staff. The following measures ensured that the chilies were sold before any losses could be incurred by the farmers. The project team had two possible options: first contact the traders in the APMC market for selling the chilies; and second let the chili mature on the plant and opt for dry red chili. While the ready-to-harvest green chili stayed on the plants in the fields, the project team contacted several traders in the market yards at Navi Mumbai and Nashik for the possible sale of chili. Fortunately, a trader from Navi Mumbai market yard agreed to buy the chili at the market rate, but he wanted the chili to be brought to the market yard.

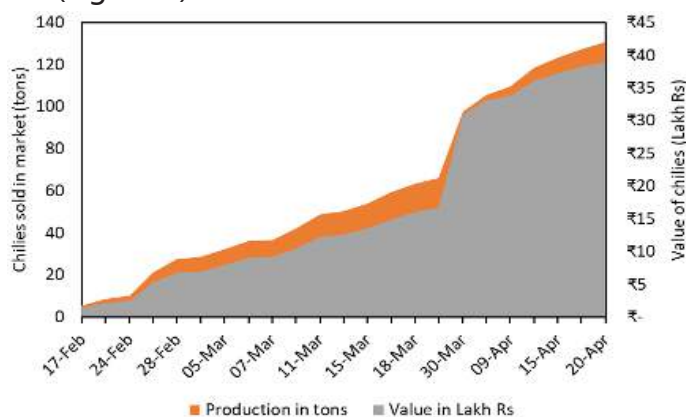
The project team then contacted the Tahsildar and Taluk Agriculture Officer for their support to allow the movement of vehicles carrying the chili from Jawhar to Navi Mumbai. Once permission was granted, the entire project team worked on a war footing to coordinate the chili harvesting and subsequent delivery of harvested chili to the collection points. The coordination activity included the following:

- About five tons of chili were collected and dispatched to the Navi Mumbai market in the first attempt on the evening of 29 March 2020. The project team members accompanied the vehicles to the market. Since it was the initial period of lockdown, there was a lot of confusion and rumors about the operations in the market yard as the state government also announced the shutting down of a part of the market yard, and shifting the vegetable market yard to a different place.
- In-between all the chaos, vehicles reached Navi Mumbai during the wee hours of the morning to find a long line of vehicles struggling for entry into the market yard.
- Each vehicle was allowed to enter into the market yard after sanitization and with proper documents from the trader. Finally, the trader arranged to unload the chili into a cold storage unit outside the market yard with a commitment to make payment as per the market rate. After this transaction, the same trader has shown interest in buying the chili, but this time the trader sent a vehicle from Navi Mumbai. Up to 20 April, a



**Farmers engaged in grading and packing the green chilies**

total of 130 tons of green chili worth Rs 39 lakhs were sold through either Del Monte, Navi Mumbai market yard, or local market (Figure 1).



**Figure 1: Production and value of green chilies from 46 farmers**

- The restrictions imposed during the lockdown has certainly reduced the quantity of green chili sold, but with the kind cooperation of district administration, traders, and Del Monte, the project team could sell the green chili at market rate.
- So far 50% of the anticipated production has been sold as green chilis, and market linkages again closed after 20 April.
- The project team is trying to establish new linkages, as another sale of 100-150 tons is required to cross the break-even point and earn a profit. As a last resort, the remaining/upcoming chili produce will be dried and stored for the red chili market.

## LESSONS

Implementation of this initiative as a collaborative effort, over the last three years, gave us five lessons on dealing with issues related to productivity, marketing and raising farm income, including dealing with uncertainties in marketing during COVID-19. These are discussed below:

### Importance of farmer collectives

The key drawbacks for improving the income of farmers from this area were small land holdings, traditional cultivation practices, and limited access to the faraway market places. Farmers, although not all, being aware of these limitations, attempted collective marketing of jasmine flowers. Collective or group farming provides a scale to produce a good quality crop and also to negotiate with the market while optimizing available resources, and reducing the cost of production.

### Technology demonstrations

The integrated watershed management approach, while addressing the issues related to water security and soil erosion, also facilitated the introduction of improved agricultural practices. The project team piloted the activities toward improving profitability through collective farming of vegetables. The project team, along with Del Monte, supported the farmers on field preparation, installation of drip irrigation, fertilizers, pesticides, and technical know-how, which has ensured adoption of good agricultural practices.





**Family members engaged in grading, packing, and dispatching the green chilies to market**

### **Establishing buyback agreements**

Realizing the benefits of collective farming during the pilot phase, the activity was further strengthened through a formal operational and marketing support agreement with Del Monte for green chili cultivation. A buyback agreement was done with 30 farmers for the cultivation of green chili on 25 acres. During 2018-19 around 75 tons of chili were produced, of which 39 tons were purchased by Del Monte, and the remaining production was sold in the local market. The additional income through this initiative was about Rs. 85,640 for each farmer. With this success, more farmers joined the collective farming venture and area under this activity increased to 50 acres in 2019-20.

### **Producing to meet market standards**

The key elements of collective farming at Jawhar were to produce high-quality chili as per market requirements, which was ensured while planning and implementing all the operations – right from selection of chili variety to grading of the harvested chili. The chili variety was specially selected for export purpose, and use of agrochemicals including nutrients and pesticides were done as per guidelines set by the export market.

### **Organizing emergency support during crisis**

While farmers follow our advice and invest more time and resources in growing crops, it is our moral responsibility to support them while they face a crisis. This is critical to gain their confidence, and to ensure sustainable improvements in their livelihoods. Extension and Advisory Services (EAS) have to go the extra mile and engage in crisis management activities to protect their livelihoods, and the project team supported farmers in marketing their produce which wouldn't have been possible for them if left unsupported.

### **FINAL WORDS**

While forming farmers' collectives to promote most relevant technologies and engage in collective marketing are important, farmers do need immediate support for marketing their produce during pandemics and disasters. Providing such support is critical to ensure sustainability of such initiatives. But more importantly, it is a moral responsibility for Extension and Advisory Services.

# 102

## CO-WE-DID: HOW COLLECTIVE WOMEN ENTERPRISES IN BIHAR ARE BEATING COVID

In the shadow of COVID-19, women owned enterprises have found their space under the sun and have provided a lesson or two in embedding empathy into the very fabric of enterprise, opines **Siddharth Chaturvedi**.

*Bhayya, aap yahin gadda dalwa dijiye, hum canteen mein so jayenge, lekin mareezon ko jab khana chahiye tab denge* (Get us a bed here in the canteen itself, we will sleep here but serve patients when they need it), remarked Sanju Devi and Priyanka Devi from *Didi Ki Rasoi*, Buxar in Bihar as they left for home after serving quarantined patients through the day. Around 45 million women who are now part of the 4 million Self Help Groups (SHGs) under National Rural Livelihoods Mission (NRLM) are moving towards the next wave of livelihoods in the form of entrepreneurship. These women are no longer satisfied with the age old *achaar-paapad* units earning daily wages. They are looking to take centerstage with their entrepreneurial journey.

As we stare at COVID times, here are two stories from the hinterlands of Bihar on how nano and micro women owned enterprises are providing *Raashan, Khana, Paani* (grocery, food and water) to the rural populace and giving reassurance that they are true blue entrepreneurs who would survive the bad times as well.

### **Raashan through Gramin Bazaar**

A dipstick enterprise survey conducted in 2017 by JEEViKA<sup>1</sup> revealed that 34% of nano and micro<sup>2</sup> enterprises were doing retail business with almost 10% of them being kirana stores. Building community institutions had always been JEEViKA's strength; hence the same collectivization approach was taken to set up Gramin Bazaar, a wholesale store owned and managed by an association of kirana store owners, that supplies only to members of the association.

The *kirana* store owners are all SHG members – each of them pays a share capital of Rs. 2000 while the project provides one-time startup capital and training support. The association conducts a market survey to identify vendors, does procurement of items and decides sale prices in weekly meetings.

A small margin is retained by the *Gramin Bazaar* to ensure economic sustainability. The association also places a store manager who handles the digital inventory management system.

While there is fear of unavailability of essential items as the lockdown has been extended multiple times, the impact on rural kirana stores in the catchment of *Gramin Bazars* has been unexpected. First, the demand from the rural households has not seen much change as many small towns remain unaffected. Second, raashan items such as rice, aata, daal have been made available at pre-COVID prices to association members with the buffer stock maintained at *Gramin Bazaar*, beating market volatility. The associations have also extended sales to non-members and community institutions such as

Village Originations (VOs) while following social distancing norms all along the supply chain.

Of course, they have also faced their fair share of problems, the foremost being movement due to lockdown. *"Thana area mein bahut sawaal jawaab hota hai, kahan jaana hai, kyun jaana hai"* (A lot of questions are asked near the local police post, where are you going, why are you going" said Gitanjali Devi, a kirana entrepreneur from Asthawa. Passes were issued to some association members and doorstep deliveries were enabled for members who could not come to the store. Nevertheless, the entrepreneurial spirit has prevailed as push on sale of hand sanitizers has picked up and nano entrepreneurs are feeling confident of the *"vishwaas, ki gram in bazaar hai"* (we have faith that Gramin Bazaar is there)" or as the marketing gurus would say, customer loyalty.

**Table 1: Gramin Bazaar in numbers**

18 Gramin Bazars (block level)	800 kirana stores	Eight districts		
Average number of members/Gramin bazaar=40 2-3% margin retained	Average purchase= Rs. 15,000/month 3-4% additional margin earned	Gaya Nalanda Patna	Bhojpur Buxar Aurangabad	Sehikhpura Vaishali

Source: Anecdotal information from JEEViKA



**Members follow Social Distancing in Ghusawri, Patna**

### Khaana Paani through Didi Ki Rasoi

Didi Ki Rasoi (Kitchen) are women owned and operated social enterprises providing quality food in civil hospitals of Bihar. The idea took root when JEEViKA partnered with the State Health Society, Bihar, to manage food services for in-house patients through JEEViKA didis while also running it as a restaurant for walk-in guests. Since, the quality of food and hygiene set it apart from existing vendors, Kudumbashree<sup>3</sup> was brought on board as a technical partner for training of entrepreneurs and instituting food quality management systems. A rigorous selection process of entrepreneurs that included a relatively higher quantum of equity investment was matched by a one-time support grant from the project.

These enterprises are today an essential arm of the team of health workers. As patients add to quarantine centres, the normal schedule of cooking food for a pre- decided number of

patients does not hold. The didis have managed to successfully handle this, keeping in view rising health risk with addition of patients in quarantine. This risk has only strengthened their resolve with all *rasois* operating overtime, but they are also efficiently managing their working hours and finding their own solutions. While *Didi Ki Rasoi*, Vaishali, has restricted delivery through packed thalis, the Buxar unit has hired an additional service executive for delivery in multiple quarantine centres.

A testimonial to the food quality is in the fact that the same food packets are being supplied to patients as well as health workers (nurses, doctors and attendants) and not a single complaint has come in. On the contrary, the doctors requested administration to get *Didi Ki Rasoi* back as the food supplier when a different vendor was engaged due to a surge in number of quarantine centers, from three to six in the district of Buxar.

**Table 2: Didi Ki Rasoi in numbers**

Control rates for inpatients	Average sale/month = Rs. 1.5 lakh	Vaishali Buxar Sheikhpura Purnea	10 new jobs/unit
Market rates for walk-in guests	Average sale/month= Rs. 2 lakh		

Source: Anecdotal information from JEEViKA

### TAKEAWAY

The emerging lessons from these initiatives are:

1. The concept of equity investment or micro equity is still not prevalent for micro enterprises; providing a start-up grant has helped take away the fear of failure as there is no burden of debt and there is room for experimentation.
2. Decentralized approach to enterprise development allows each unit to build nuanced solutions as contexts emerge and helps build enterprises and entrepreneurs.
3. Initial handholding in the form of technical and business training to stoke the entrepreneurial mindset are key elements in making the decentralized approach work.

In the shadow of COVID-19, it is these women owned enterprises that have found their space under the sun and have provided a lesson or two in embedding empathy into the very fabric of enterprise.



**Note:** *Gramin Bazaar* and *Didi Ki Rasoi* are initiatives under the World Bank funded Bihar Transformative Development Project implemented by JEEViKA (BRLPS). In his role as a Consultant with the World Bank, the author has provided technical support to JEEViKA team for its roll out.

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## ENDNOTES

<sup>1</sup>Bihar Rural Livelihoods Promotion Society (BRLPS), an autonomous body under the Department of Rural Development, is spearheading the World Bank aided Bihar Rural Livelihoods Project (BRLP), locally known as JEEViKA with the objective of social & economic empowerment of the rural poor.

<sup>2</sup> Nano enterprises are mostly self-sustenance enterprises with an annual turnover of approximately Rs. 4-6lakhs Micro enterprises in this context are enterprises with a slightly higher turnover than nano enterprises with an annual turnover of Rs. 6-15 lakhs and employ one or two people apart from the owner.

<sup>3</sup>Kudumbashree is the State Rural Livelihoods Mission of Kerala that has developed support groups engaged in providing technical and marketing support for promotion of women owned foodservice enterprises and have supported over 1500+ such enterprises in Kerala

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## GOVERNMENT INTERVENTIONS IN SUPPORTING MANGO FARMERS IN KERALA DURING COVID-19

The timely intervention by extension officers of the Department of Agriculture Development and Farmers' Welfare, (DoAD&FW) Kerala, coupled with support from people representatives and farmers during the COVID-19 lockdown period led to the emergence of new channels for marketing the popular Muthalamada Mangoes. In this Field Note, **Sujith SS and Mary Vijaya** discuss how extension personnel helped farmers to turn the tide in their favour during this uncertain period.

Muthalamada - The Mango City of South India is very popular for its mango orchards. This place on the foothills of Thenmala has more than 3,500 hectares of land under mango cultivation. Here, the mangoes flower early and the fruits get ready for harvest very early in the season. Muthalamada mangoes start flowering by the end of October and the harvesting season starts by mid-January and the season lasts till the end of April. The harvested mangoes are usually sold at a high price right from the beginning of the season. In a normal year, the prices of Muthalamada mangoes in the local market peaks during Vishu festival in April. Muthalamada mangoes are usually transported to fruit markets in Delhi, Ahmedabad, Mumbai, Indore, Hyderabad, Bangalore, Goa, Chennai, etc. First grade quality mangoes are exported to UAE, Qatar, Oman, Bahrain, etc. However, this year the lockdown imposed to reduce the spread of COVID-19 has adversely impacted the harvesting and marketing of mangoes. With markets closed and transportation disrupted, the farmers' hopes of selling the mangoes at good prices were crushed.

### GOVERNMENT INTERVENTIONS TO SUPPORT FARMERS

With the nation-wide lockdown imposed on 25 March 2020, the problems of farmers with regard to the likely market glut situation was initially brought to the direct attention of the Ministers in charge of Agriculture and Irrigation by the Agricultural Officer, people's representatives, Producer Company representatives, and farmer representatives. On 26 March 2020, the issue was discussed in the cabinet and the Government took a decision to procure the mangoes through its agencies – HortiCorp and VFPCK – and giving a minimum support price to farmers.

On 31 March 2020, a joint meeting of farmer representatives, people's

representatives, Agricultural Officer, Farmer Producer company representatives, and mango cluster representative was conducted which was presided over by the Hon. Nenmara MLA Sri. K Babu. Support price for individual varieties of mangoes were fixed (Table 1), and procurement conditions were discussed during this meeting. The government offered a support price which was the highest for all the varieties of mangoes as compared to the existing local price.

Hortcorp agreed to procure 15 tonnes a week with complete monitoring by Krishi Bhavan-Muthalamada. A sub-committee was formed by the MLA/his representative, Panchayat president, Assistant Director of Agriculture-Kollengode, Agricultural Officer-Muthalamada, Hortcorp District Manager and Farmer Producer Company representatives for the necessary modifications of procurement price and other required changes in the process.

**Table 1: Procurement price offered for different varieties of mangoes**

No.	Variety	Procurement price (per kilogram)
1	Sindooram	Rs. 50/-
2	Banganapalli	Rs. 60/-
3	Alphonso	Rs. 90/- Rs. 70/-
4	Imam pasand	Rs. 100/-
5	Kalapadi	Rs. 70/-
6	Thotapuri	Rs. 20/-
7	Moovandan	Rs. 20/- Rs. 25/-
8	Neelam	Rs. 55/-



**Field Visits by Krishi Bhavan Muthalamada team**

Initially, the 10 Paramparagat Krishi Vikas Yojana (PKVY) clusters under Krishi Bhavan-Muthalamada were targeted to mobilize mango farmers, and Lead Resource Persons (LRPs) of each cluster were given charge for collection of applications and assigning procurement quantity. These 10 PKVY clusters comprising 500 farmers from various parts of the panchayat is an accurate representation of mango farmers of Muthalamada. Thus, the 10 clusters were further grouped into three groups for preventing rotation gap between first and last cluster. On the basis of variety wise mango requirements by Hortcorp, the Lead Resource Person (LRP)

of each cluster was given responsibility for identifying true beneficiaries and allotment of variety wise permit without any local issues between farmers. First such procurement happened on 2 May 2020, but unfortunately, a few farmers raised questions about the transparency of the procurement process while selecting beneficiary farmers and allocating permits. To address this concern of the farmers, the Krishi Bhavan called a meeting of the sub-committee formed for mango procurement the very next day, and it made necessary modifications to make the procurement process more transparent. Farmers were asked to submit

the application at Muthalamada Krishi Bhavan. As the work force was not enough to manage the file and field activities, the Agricultural Officer, Muthalamada, requested the Principal Agricultural Office (PAO), Palakkad, to put

together a team of interested department staff to support the procurement process. PAO-Palakkad responded quickly (by 6 April 2020) by forming three teams of its staff (Table 2) to organize the procurement process.

**Table 2: Details of the Teams formed by DoAD&FW to support the procurement process**

<b>Team 1</b>	<ol style="list-style-type: none"> <li>1. Sri. Arun TT, Agricultural Officer, Peruvembu</li> <li>2. Sri. Vineeth Kumar, Agricultural Assistant, Nenmara</li> <li>3. Sri. Karthik P, Field Assistant, State Horticulture Mission, Palakkad</li> </ol>
<b>Team 2</b>	<ol style="list-style-type: none"> <li>1. Sri. Aswin T, Agricultural Officer, Pudussery</li> <li>2. Sri. Varun V, Agricultural Officer, Nenmara</li> <li>3. Sri. Pravanadas, Agricultural Assistant, Vadavannur</li> <li>4. Sri. Satheesh M, Agricultural Assistant, Pattanchery</li> </ol>
<b>Team 3</b>	<ol style="list-style-type: none"> <li>1. Sri. Gautham L, Agricultural Officer, Vandazhy</li> <li>2. Sri. Jiji Allen, Agricultural Officer, Elapully</li> <li>3. Smt. Ranjini R, Agricultural Assistant, Ayiloor</li> </ol>



Team 1 was given the responsibility of receiving applications in the office and subsequent digital data entry and further telephonic interactions in connection with the availability of specific varieties on a day-to-day basis. Allocation of permits according to the requirement is also the duty of Team 1. Team 2 was given charge of daily field inspections so as to avoid unknown mangoes from getting the benefit and also to prevent any deception. Field inspection ensured that only true beneficiaries are enjoying the government support price. Team 3 took charge of receiving the mangoes from farmers and monitored sorting and grading activities. Other activities of the team included local purchase of cartons for packing, monitoring the weight and giving weigh slips to farmers on completion of an individual's procurement.

13 days of procurement HortiCorp collected 48.191 tonnes of mangoes (Table 3) worth 23.12 lakh rupees directly from farmers for supply to various parts of Kerala. This is the first time that Muthalamada Mangoes reached Kerala markets in such huge quantities. Every farmer got better prices until the end of the season as the final HortiCorp procurement happened on 30 April 2020.

Claims are prepared and submitted based on the weigh slips of individual farmers. Claims thus prepared were recommended by ADA Kollengode and forwarded to PAO Palakkad the very next day, which allows release of funds into farmers' accounts via DBT. Thus during the





**Table 3: Procurement Details**

HORTICORP MANGO PROCUREMENT – KRISHI BHAVAN-MUTHALAMADA												
No	Date	Details of Procurement - Variety wise Quantity in Kg									Total Qty procured Per Day (Kg)	Total Value of produce procured per day (INR).
		Sindooram	Banganapally	Alphonsa	Thotapuri	Moovandan	Kalapad	Himapasand	Neelam			
1	02.04.20	1000	760	0	0	0	0	280	0	0	2040	123600
2	03.04.20	1527	1367	960	518	460	0	0	0	0	4832	264330
3	05.04.20	2470	1360	2783	330	1370	140	0	0	0	8453	499370
4	06.04.20	0	0	0	0	2040	0	0	0	0	2040	51000
5	08.04.20	1371	1040	0	1510	1160	0	0	0	0	5081	190150
6	09.04.20	2660	2583	1220	520	110	0	0	0	0	7093	410930
7	12.04.20	0	0	0	0	1085	0	0	0	0	1085	27125
8	13.04.20	1758	1167	0	230	492	0	0	0	0	3647	174820
9	16.04.20	1390	1506	0	0	2210	0	0	0	0	5106	215110
10	17.04.20	444	0	0	0	0	0	0	0	0	444	22200
11	18.04.20	1076	714	0	0	0	0	0	0	0	1790	96640
12	22.04.20	560	0	0	2260	420	0	276	0	0	3516	111300
13	30.04.20	800	866	0	650	668	0	0	0	80	3064	125660
	TOTAL	15056	11363	4963	6018	10015	140	556	80	80	48191	2312235



**Flag off of Mango Procurement Operations of Horticornp by Hon MLA K Babu**

### Other marketing interventions

Every crisis creates an opportunity. This is the first time, Muthalamada farmers realized the local marketing possibilities within the State and the purchasing power of its customers.. When the Horticornp procurement processes started, a few of the individual farmers came forward with their own WhatsApp and other social media networks to sell their products at better prices. Farmers joined together, formed into groups and organized door delivery to flats and residence associations in and around Palakkad.

Muthalamada Mango Producer Company has collaborated with Evangelical Social Action Forum (ESAF) in forming a marketing network in Thrissur, and later this network was extended to parts of Ernakulam. Farmers themselves realized the profitable marketing network that was possible within the State. This was the very first time for Muthalamada mangoes to reach these many consumers in Kerala, and we all hope that there will be more demand for Muthalamada mangoes within Kerala in the coming season as well.

The Association of Agricultural Officers Kerala (AOAOK) also joined hands in supporting Muthalamada farmers by procuring the products at the Government fixed support price. AOAOK's Palakkad and Malappuram units actively came forward and procured around 30 tonnes of mangoes directly from farmers during this time of distress. AOAOK-Malappuram unit came forward to visit the mango orchards, interact with farmers and then procure mangoes as per their pre-booked orders. Both the units of AOAOK (Malappuram and Palakkad) collected orders via online media platforms such as WhatsApp and Facebook according to their requirements. The Krishi Bhavan collected mangoes from farmers at a common collection point for packing and loading for dispatch to respective destinations. The 2020 mango season was one such season when consumers in Kerala experienced the real taste of excellent quality mangoes at reasonable prices. During the lockdown period, Muthalamada mangoes got prime place among other exotic fruits and we hope this will continue in the coming years.



**Muthalamada Mango Farmers Producer Company's first load**



**Field visit by members of the Agricultural Officer Association from the neighbouring Malappuram District**

## INTER-STATE TRANSPORTATION OF MANGOES DURING LOCKDOWN PERIOD

By the end of March 2020, major fruits and vegetable markets around the country started to reopen, though for a very limited time, with adherence to the COVID-19 protocols issued by the Government.

This again raised the hopes of mango farmers in selling their produce through the available markets. However, the transportation restrictions – especially between the state borders – again shattered these hopes and a few trucks with mangoes were stuck at state borders without further transportation clearance. The Krishi Bhavan intervened and with the support of the Department of Agriculture, came forward to issue essential commodity (fruits/vegetables) transportation passes to the mango transporting vehicles. Using these transportation passes, Muthalamada mangoes started reaching Delhi, Ahmadabad, Indore, Mumbai, Goa, Chennai, and Hyderabad markets and also other foreign destinations such as Qatar, Oman, Bahrain etc., via Bangalore Airport without any trouble.

The staff of the Department of Agriculture worked 24X7 to verify and issue essential commodity transportation passes to the

loaded vehicles and for their timely arrival at destination markets. Like this about 1,600 tonnes of mangoes were transported during the initial strict phase of the lockdown period. This ultimately saved Muthalamada farmers from having a glut of mangoes and suffering from low prices and rotting fruits in warehouses. Gradually, agricultural operations and transportation of perishable agricultural products and farm inputs were classified under essential services and farmers themselves were able to continue their usual farm and marketing activities by following COVID-19 prevention protocols.

Media coverage on Muthalamada mangoes further increased the demand among the public for these mangoes during this lockdown period. Due to this, a number of enquiries were received at the Krishi Bhavan and these were directed to farmer contacts. This lockdown period especially connected producers to end users and that too without the use of middlemen; and consumers were extremely satisfied with the excellent products they received. The Hon'ble Minister for Agriculture appreciated the efforts of the Agricultural Officer and the Krishi Bhavan's teamwork in addressing the marketing challenges during the lockdown period on his official Facebook page.



## CONCLUSION

To conclude, the COVID-19 lockdown period opened up new marketing channels to farmers within the State which had hitherto never been exploited. For us, as officials of the Department of Agriculture in charge of the region, the experience of lending a helping hand to farmers in their bad times has been very satisfying. Due

to the goodwill generated, mango farmers in Muthalamada are now more connected to the Krishi Bhavan and we hope this will help the latter to offer more need-based programmes to farmers in future. It is high time that a government procurement centre for mangoes is established at Muthalamada to support farmers in the years to come.

# 104

## Harvest your Vegetables at a KVK Farm

**Mahesh Chander and Raj Karan Singh** share their experience of launching “Harvest your own vegetables” programme, which allows consumers to visit a KVK farm to harvest vegetable and pay for farm fresh produce at farm gate, once a week.

Apart from routine problems associated with fruit and vegetable marketing, COVID-19 pandemic and the resultant lockdown has further put producers and consumers in distress due to supply chain disruptions not seen before. The consumers are hesitant to buy and consume fruits or vegetables from the market fearing spread of COVID-19. Experts have opined that alternate arrangements are needed to maintain supply of fruits, vegetables and food grains.

If we as consumers change our buying behaviour and if institutions orient to a new normal in times of COVID-19, problems can be minimized to an appreciable extent. The pandemic has changed our thinking in some ways. Choosing products which are local and have travelled less to reach the plate may be helpful. There could be several ways of doing this. One approach tested in a limited manner has been described here.

### Harvest your own vegetables

KVK-IVRI Bareilly (Box1) has currently grown a variety of vegetables in its farm for demonstration purpose. Considering various problems arising out of COVID-19 lockdown and consumer fear of visiting markets or consuming market purchased vegetables, we conceptualized and implemented the “Harvest your own vegetable programme”. Since its launch on 21st May, 2020, at KVK-IVRI, Bareilly, the program has completed three weeks while being organized once a week every Thursday. Under this programme, vegetables and other farm produce grown in limited quantities (Table 1) at KVK farm was opened to consumers for harvesting and sale. We used to employ labour to harvest these vegetables, send it to ATIC for sale, engaging staff and incurring expenses and spending time. We believe this arrangement will save on labour charges, which at times is scarce. Also, the crop demonstrations are not affected as we are weighing the produce and keeping a record.

**Box 1: KVK-IVRI, Bareilly**

One of the 713 Krishi Vigyan Kendras (KVKs) in India, Krishi Vigyan Kendra, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, was established in 1985. It is located on the main campus of the institute at Izatnagar. Like any other KVK, it is primarily mandated for technology assessment and demonstration for its wider application and to enhance capacity development (TADA-CD), horizontal expansion of proven agricultural technologies through on-farm testing (OFT), frontline demonstrations (FLDs), farmers' trainings, vocational trainings for rural youth and farm women, interactive meetings between scientists and extension functionaries, field days and Kisan Melas. The KVK has a crop cafeteria and produces seeds of wheat, paddy and mustard for National Seeds Corporation in its 21-acre farm. The KVK farm also raises poultry, ducks, fish and grows vegetables and fruits in limited quantities for demonstration purposes and occasional sale.

**Table1: Sale of produce in three weeks**

21.05.2020				
No.	Vegetable	Quantity (kg)	Rupees/kg	Amount (INR)
1.	Cucumber	8	16	128
2.	Lady's finger	5	16	80
3.	Ridge gourd	4	16	64
4.	Bottle gourd	4	16	64
5.	Brinjal	3	16	48
6.	Spinach	3	16	48
7.	Red cabbage	4	16	64
8.	Star fruit	4	25	100
9.	Banana	5	20	100
	<b>Total sell</b>	<b>40</b>		<b>696</b>
28.05.2020				
1.	Cucumber	9	16	144
2.	Lady's finger	5	16	80
3.	Ridge gourd	3	16	48
4.	Bottle gourd	3	16	48
5.	Cow pea	4	16	64
6.	Onion	7	15	105
7.	Corn	5	20	100
8.	Fig	4	100	400
9.	Banana	6	20	120
10.	Star Fruit	2	25	50
	<b>Total sell</b>	<b>48</b>		<b>1159</b>
04.06.2020				
1.	Cucumber	0	16	0
2.	Lady's finger	4	16	64
3.	Ridge gourd	2	16	32
4.	Bottle gourd	0	16	0
5.	Cow pea	0	16	0
6.	Onion	2	15	30
7.	Corn	4	20	80
8.	Fig	1	100	100
9.	Banana	5	20	100
10.	Star Fruit	0	25	0
11.	Grapes	7	50	350
	<b>Total sell</b>	<b>48</b>		<b>756</b>

Consumers followed social distancing guidelines and wore masks while harvesting. About 35 men and women, who harvested and purchased vegetables, expressed satisfaction

and congratulated KVK staff for the innovative practice. Their views were live-streamed; the event was posted on IVRI homepage and on Facebook.



While inaugurating the programme, Dr R K Singh, Director, IVRI, appreciated the KVK for the innovation and encouraged the KVK to take it forward by developing KVK farm as an agri-tourism centre, an idea supported by ICAR. Farmers visiting the farm may be apprised about new ways of income making like rural/ agro tourism and home stays etc. to generate additional income.

organic foods. Also, harvest festivals can be organized to promote local sale, which is good for local economic growth. Problems from COVID-19, mainly problems in farming activities including marketing of farm produce, has led to some welcome initiatives globally. In Bangladesh, to support farmers distressed due to lockdown, students came forward to help in harvesting rice and marketing vegetables. Linking farmers to markets is currently recognized as one of the mandates of extension and advisory services. KVKs can promote local WhatsApp groups linking producers to consumers, especially those living in housing societies/flats. Farmers too are increasingly interested in eliminating middlemen and branding their commodities to gain more. Such initiatives could be the new normal in days to come.



To empathise with farmers while availing fresh local produce at low cost, consumers may like to align with farmers, in a way similar to the concept of Community Supported Agriculture (CSA). CSA is popular among consumers of

Excellent support and motivation from Dr R K Singh, Director of the KVK host institute i.e. ICAR- Indian Veterinary Research Institute helped in initiating the programme.

# 105

## INPUT DEALERS SUPPORT FARMERS DURING THE COVID-19 CRISIS

Input dealers, trained under the DAESI programme by MANAGE, has played a key role in providing advisory and marketing support to farmers during the COVID-19 lockdown. Here, **Vincent A and Balasubramani N** talk of the roles played by input dealers in Karnataka during this challenging period.

The COVID-19 crisis impacted the food security and livelihoods of millions of farmers worldwide. Extension and Advisory Services (EAS) have been playing a major role in supporting farmers in addressing the challenges. While most reports discussed in detail the extension services carried out by public extension during the COVID-19 crisis and lockdown, there is very little reference to the role input dealers (who are an important source of information for farmers in India and elsewhere) played during this crisis in supporting farmers. Given this, an attempt was made to understand the contributions of input dealers who were trained under the Diploma in Agricultural Extension Services for Input Dealers (DAESI) programme in Karnataka (Box 1).

### Box 1. DAESI

The Diploma in Agricultural Extension Services for Input Dealers (DAESI) was conceptualised by MANAGE during 2002-03 as a one-year diploma programme to train input dealers on scientific agriculture, and develop them as para extension professionals. Since then, this course has been implemented by the National Institute of Agricultural Extension Management (MANAGE) and State Agricultural Management and Extension Training Institute (SAMETI) at national and state levels, respectively. Various Nodal Training Institutes (NTIs), such as Agricultural Technology Management Agency (ATMA), Krishi Vigyan Kendras (KVKs), Farmers Training Centre (FTC), NGOs etc., are implementing the DAESI programme across India. Since 2002-03 a total of 28,313 input dealers have been trained until February 2020.

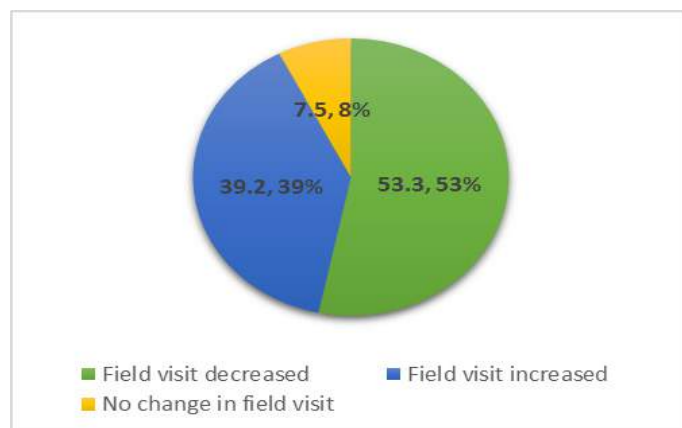
To understand the extent of involvement of these dealers in providing EAS, as well as to learn from their experiences, a study was conducted in March 2020, among 120 DAESI trained input dealers of Karnataka State.

Though the dealers are providing various extension services to farmers, the study has focused mostly on their extension roles that directly refer to the problems

faced by farmers during the lockdown. For example, the study has analysed the dealers' field visits, their marketing interventions to save farmers from distress sales, and the use of ICTs to provide solutions to farmers that address the present farm crisis.

About 39% of the dealers said that they have managed to visit farmers' fields even during the lockdown. Interestingly, their visits to fields have increased during the lockdown. The dealers who have visited farmers' fields indicated that they have provided advisories on various good practices of agriculture, such as rate of fertiliser application, management of pest and diseases, assessing the quality of farm produce, direct marketing of produce, organising farmers' collective, etc. Around 53% of them stated that visits to farmers' fields have decreased

during the lockdown. The major reason for the decrease in field visits is that the timing of their shops coincided with the timing of their field visits that is, mostly early morning to noon or late noon.



**Fig. 1: Field visits of input dealers during the lockdown**



**Mr Nagaraj Chamaraj, Hukkeri, Belgavi district sells Guava to local buyer**

## SERVICES PROVIDED BY INPUT DEALERS DURING THE LOCKDOWN

### Extension and soil management



Mr Anil Kumar, an input dealer from Kalaburagi district, indicated that he has visited his farmers' fields and provided advisory services on the procedure for soil sampling and application of fertiliser based on soil sample test results. He also spoke to them about the soil testing facilities at KVK Kalaburagi. He realised that this summer was the best time for advising farmers on the importance of soil testing since most of the farmers had left their lands fallow due to the lockdown, which therefore might help them get a good yield in the monsoon season. Up until the end of April he had advised about 50 farmers since the start of the lockdown period.



## Advisory on pest management



Mr Narayan Kotriki, an input dealer from Chincholi, Kalaburagi district, has visited about 50-60 farmers who were growing watermelon that were found to have infestations of leaf burning disease. He advised them to mix 2 g Ridomil gold in one litre of water and spray it in the evening time for effective control of the disease. He mentioned that he has been advising farmers about crop management. He further stated that farm advisory is more important, especially during a crisis time like this, as it helps farmers to build trust in input dealers, for more than crop management. He also said that the scientists of KVK, Kalaburagi, have become his major point of contact after the DAESI programme. During the lockdown, his contacts with scientists have become even more significant since their advisory has helped him to address the immediate needs of farmers, such as marketing, transportation, etc.

## Networking is key



Mr Mohan Kumar DR, is an input dealer who has his shop at Doddaballapur, Bangalore Rural. As most of his farmers reported non-availability of transport facilities to go for input purchase, he arranged his brother's Tata Ace for the transport of inputs directly to farmers' doorsteps. He made an inventory of the inputs required by his customers twice every week. After preparing the inventory, he had arranged a vehicle from his brother and supplied the inputs required directly to four to five farmers every day during lockdown phases 1.0 and 2.0. He stated that this initiative has minimised the transport charge of each farmer to just Rs. 10 per bag. Previously, the same farmers had to spend about Rs. 50-100 per bag for transport alone. The most significant part of his services is that he advised his farmers to pay the amount online using Phonepe or GPay.

It is interesting to note from the above that the dealers have played a significant role in meeting the needs of farmers during the COVID-19 pandemic. What is mentioned above are only a few examples of what the dealers are contributing to the farmers' welfare through their extension services. There are many more such happenings in the fields, yet many of them go unnoticed.



**Burning disease on watermelon**

## MARKETING INTERVENTIONS OF THE INPUT DEALERS

The most devastating problem faced by farmers during the lockdown is low price. As the transport of goods and services was suspended, the intra and inter districts transport have become a major issue, let alone the interstate movement of vehicles. This is followed by the

non-availability of traders and buyers which has further aggravated the marketing problems. Thus, the farmers were forced to sell their produce at throwaway prices. Many of the government organisations, such as Agricultural Produce Marketing Committee (APMC), Farmers Producers Company, Krishi Vigyan Kendra (KVK), etc., have intervened and tried to facilitate marketing the produce at better farm gate prices. Similarly, input dealers have made efforts to link their farmers with various marketing institutions, thereby helping them to realise a better price.

The study is also revealing that more than half of the input dealers (58%) have linked their farmers with local buyers. Nearly half of the input dealers (50%) have pointed out that they have linked their farmers with the Agricultural Produce Marketing Committee (APMC), and they have provided the contact details of the nearby APMC markets. Similarly, one-fourth (25%) of them have linked their farmers with KVKs and nearly one-fifth (23.3%) have facilitated a marketing arrangement with Farmer Producer Companies (FPC). A few examples of input dealers' marketing interventions are given below:

## Direct procurement



**Mr Raghunatha Reddy**, an input dealer from Gauribidanur, Chikkaballapur district has directly procured vegetables from 15 of his farmers. He offered a relatively higher price to the farmers. He purchased tomato @ Rs. 4.5/kg, brinjal @ Rs. 8/kg, and onion @ Rs. 14/kg. In total, he bought around 4.5 tonnes of vegetables and distributed them freely to the needy people of Gauribidanur Taluk.



In a similar case, **Mr Sumukh DM**, a young input dealer from V V Puram, Bangalore, bought about a half ton of mangoes from his customers. When the lockdown was announced, two of his customers who grow Alphonso and Rajapuri varieties of mango approached him to buy their mangoes, for a lower price as these two farmers were forced to sell their mangoes @Rs. 20 per kg at the local markets. Mr Sumukh after contacting all of his relatives and friends bought a half ton of mangoes at the actual price i.e., Rs. 400 for 3 kg of Alphonso and Rs. 350 for 3 kg of Rajapuri. He noted that these two farmers were his best customers and he did not want to give them a trivial price for their hard-earned mangoes.

## Linking farmers with the potential buyer



A farmer of Chitradurga district, **Mr Rajashekhara Reddy P**, complained about the low price for their pomegranates as there were inadequate buyers and poor transport due to the lockdown. Hence, he visited their fields and organised them into a small farmers' collective. Further, he identified a potential buyer who promised to buy pomegranate @ Rs.40-50/kg, which was Rs. 10 higher than the price offered by the local buyers. This way, he procured about 400 tons of pomegranate from his farmers and helped them to realise a better price for their produce even during the lockdown. All the 10 farmers have thus gained a profit of Rs. 10-15 per kg of pomegranate by selling it @ Rs.40-50/kg on different days, which would otherwise have been sold @ Rs. 30-35/kg to the local traders.

## Linking farmers with supermarkets

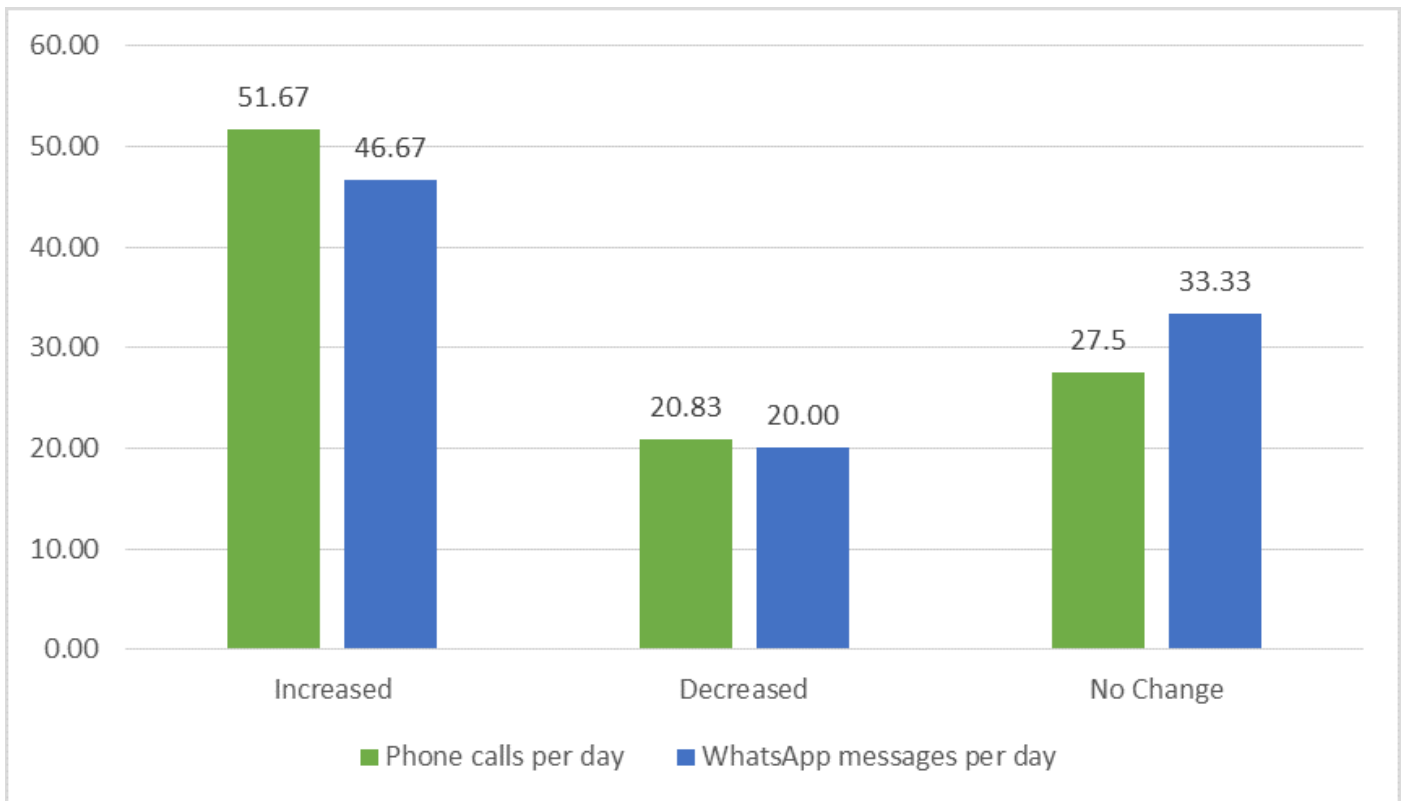


**Mr AV Badrish** has his input shop at Doddaballapur, Bangalore Rural, a city which is 40 km away from Bangalore city. As marketing has become a serious problem due to the lockdown, most of his farmers contacted him to facilitate marketing of their vegetables. Though having no options, he wanted to help these farmers. Moreover, they are his regular customers. Thus, he took an initiative to link his vegetable growers to Reliance Fresh, Ninjacart (<https://ninjacart.in/>), and Big Basket. With the help of contract farmers of these supermarkets, he linked about 30 farmers to these supermarkets. All the three supermarkets agreed to buy vegetables from these new farmers although they were not their regular contract farmers. Once in two or three days, these farmers sell about 500 to 600 kg of vegetables to the agents of supermarkets at their designated outlets. He said that the farmers get a fair price on their produce. For example, farmers gained about Rs. 8-10 per kg for tomato; Rs. 14-15 per kg for cucumber, Rs. 30-35 for ridge gourd, Rs.30-35 and Rs. 20-25 for bhendi, and a considerable price for cabbage and cauliflower.

## UNLOCKING THE POTENTIAL OF ICT DURING THE LOCKDOWN

Another interesting episode from this lockdown is the increase in the use of ICTs. More than half of the dealers (52%) have indicated that they have received more phone calls from their farmers during the lockdown compared

to before the lockdown, so is the case with WhatsApp messages. The dealers have recommended several good practices through WhatsApp messages, which include delivery of daily market price to their customers through WhatsApp group, sharing the Mobile Apps related to crop production such as IFFCO Kisan and Apni kheti and other crop production technologies.



**Figure 2: Increasing trends in mobile communication during the lockdown compared to before lockdown**

It is also evident from the results that most of the input dealers (72.5%) confirmed that the farmers have started ordering their required inputs over phone calls during the lockdown. Of them, nearly, 37% have door delivered the inputs ordered by their farmers. It was possible

because nearly half of the input dealers have obtained special permission as well as vehicle passes from the Department of Agriculture for transporting essential goods such as inputs, which helped them to deliver these inputs to farmers even during the lockdown.

*"I have sent the daily market price of various commodities to my farmers through WhatsApp group for selling at the right price during the lockdown"*

Swamy BT,  
an input dealer from Doddabalapur, Bangalore Rural.

## CONCLUSIONS

Overall, the study reveals that the input dealers have played a significant role in safeguarding farmers from the lockdown distress to a certain extent. Though the lockdown has affected input dealers' business and extension advisory services, the dealers have tried their best to

gain the farmers' trust and to cater to the needs of farmers during this COVID-19 pandemic. It is high time that the government extension system leverages the capacity of input dealers (who are also one of the most important sources of information for Indian farmers) during the crisis and thereafter as well.

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## INSTITUTIONAL EFFORTS TO ADDRESS CHALLENGES OF BACKYARD POULTRY FARMERS IN BIDAR DISTRICT DURING COVID- 19 PANDEMIC

Backyard poultry farmers faced several issues and challenges during COVID-19 pandemic. **Vidyasagar, Prakashkumar Rathod, D Dilipkumar and Prashant Waghmare** discuss efforts made by Veterinary College, KVAFSU, Bidar, Karnataka, to address the challenges and support farmers.

The first case of COVID-19 pandemic in Karnataka was confirmed on 9th March 2020. Two days later, Karnataka state became the first in India to invoke provisions of the Epidemic Diseases Act, 1897. The State was under lockdown, and barring essential services no commercial activity in majority of the districts was allowed. However, the first case of COVID-19 in Bidar district was reported in first week of April and has crossed 1400 cases very recently. This pandemic has created huge loss to livestock and poultry farmers across the state and Bidar district. Within the livestock sector, poultry sector was badly affected due to an outbreak of bird flu in January in some regions of Karnataka followed by COVID-19 pandemic from March.

During the initial phase of COVID-19, poultry farmers and sellers received reduce prices in the market compared to high production cost, ultimately leading to heavy losses to the poultry sector. The poultry breeders association estimated a loss of 22,500 crore rupees during mid-February to April (<https://www.outlookindia.com/newscroll/covid19-outbreak-poultry-sector-faces-rs-225k-crore-loss/1790419>.) Further, unorganized poultry sector, also referred to as backyard poultry, which plays a key role in supplementary income generation and family nutrition to the poorest of the poor (Rathod, 2020), has also suffered heavy losses during this pandemic.

### SPECIFIC CHALLENGES IN BIDAR DISTRICT, KARNATAKA

Veterinary College, Bidar (under the aegis of Karnataka Veterinary, Animal and Fisheries Sciences University, Bidar, Karnataka) and the poultry farmers in Bidar have faced several issues and challenges during lockdowns. Some of them are discussed below:

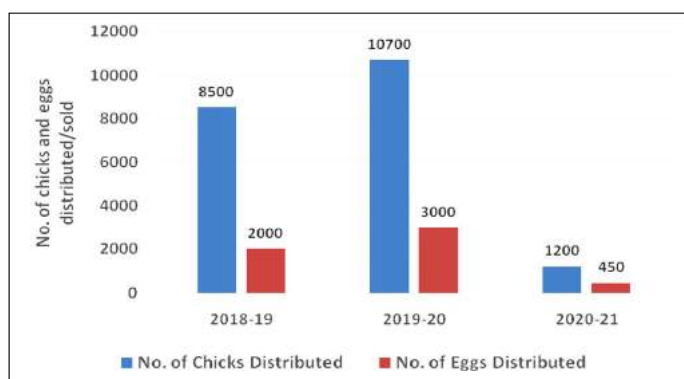
#### **Lack of Extension and Advisory Services (EAS)**

Restrictions on movement of people during the lockdown resulted in a situation where farmers were not in a

position to visit farm advisory and solution centres such as KVKs, veterinary college, etc. Also, COVID-19 and subsequent lockdown prevented direct contact with farmers; trainings/ direct interactions were affected. Although Veterinary College, Bidar, has been organizing training programmes and giving hands-on trainings for the benefit of farmers, all the activities were stopped due to lockdown. The trainings and demonstrations focused on management aspects like brooding, nutrition, common diseases and their prevention, vaccination, etc. The farmers from Bidar district, its neighbouring districts and neighbouring states were also affected as Bidar is located close to Maharashtra and Telangana borders.

### Poor demand for poultry chicks and eggs

Veterinary College, Bidar, has Giriraja breeder farm and hatchery unit with two breeder sheds of 500 capacities, incubator of 10,000 eggs capacities and hatcher of 10,000 eggs capacity. There was an increasing demand from farmers for poultry chicks and eggs over the last two years. However, during the lockdown period, farmers who had visited Veterinary College, Bidar, with a plan to procure Giriraj chicks and eggs did not turn up due to restrictions on movement. However, as the lockdown situation is getting relaxed, farmers have been demanding for chicks and eggs. It is clear that they were worried about the lockdown situation and did not plan to take risk by rearing those birds during lockdown period.



**Distribution of chicks and eggs during last two financial years.**

### Lack of Market and Marketing

As an institution, Veterinary College, Bidar, also faced the problem that consumers and stakeholders faced in selling or distributing chicks and eggs. Almost similar problems were also faced by small and marginal farmers who

faced the problems in securing their livelihood since they usually sell their poultry birds as well as eggs directly in the local markets or to hotels. Further, lockdown scenario under COVID-19 resulted in disruption of marketing channels on both consumers' and suppliers' side as majority of the shops were closed. As a result, the overall demand in wholesale markets fell drastically as supply of these perishables to distant places was stopped. Several myths created against chicken meat and eggs during COVID-19 were a big blow for the poultry industry in India.

### Issues in procuring veterinary and input services

COVID-19 lockdown restricted the availability of veterinary and input services like medicines, poultry feed, etc. used specifically for poultry birds. Since feed accounts for major cost of rearing birds, sudden lockdown closed down many feed industries/suppliers, ultimately causing decrease in production and rearing birds on maintenance basis only. Lockdown also created financial hurdles to purchasing inputs like concentrate feeds as farmers did not have cash or the inputs were not available in the local market. Due to lack of markets during this crisis, farmers had to rear existing birds for extra period with more investment. Most of these issues related to timely input purchase and increased investment were also noted in Veterinary College, Bidar.



**Vaccination of day-old chicks © VCB**

## Culling or disposal of birds

Veterinary College, Bidar, has observed very good demand over period of time and the same was also expected this year. However, sudden lockdown and rumours regarding poultry industry affected many institutions and farmers. The hatched chicks which were ready for sale could not be sold and were retained in the hatchery unit itself. Further, feeding of these retained chicks was also a tough task due to non-availability of feed. Further, due to non-availability of feed to parent stock, many adult birds were culled at very low prices. Also, about 3000 fertile eggs were disposed due to decrease in demand during lockdown period.

## EFFORTS OF VETERINARY COLLEGE, BIDAR, TO ADDRESS THE ISSUES AND CHALLENGES

During COVID-19 pandemic in India, one of the greatest challenges was to sensitize and educate masses about myths regarding poultry industry apart from addressing the issues and challenges faced by farmers during such crisis. In this direction, few of the efforts undertaken by Veterinary College, Bidar, to address the issues and challenges are discussed below.

### Mobile based EAS delivery



EAS-service through WhatsApp © VCB

As most farmers were unable to visit the college, farmers called experts on phone and

messed them on WhatsApp. The problems were understood with the help of photographs and video clips, and online solutions were provided as per requirement. The WhatsApp group, which was created during October 2018, became very active during lockdown period. Several issues faced by farmers were discussed and demand related advice was also given to the farmers. The farmers were guided scientifically for feeding, vaccination, marketing, etc.

### Addressing the emergencies

As most farmers faced difficulties in accessing different input and health care services, experts suggested the farmers to utilize local resources to address those issues. Some of the issues addressed were home remedies for treatment, preparation of alternative cost-effective feed resources, marketing, summer management of birds, etc. The farmers were also advised through mass media about precautionary measures to be followed during poultry rearing, marketing, meat cooking and consumption.



### Advisory through mass media in Kannada language for farmers and consumers © VCB

#### Field / farm visit

As this hatchery unit has a revolving fund and is not supported through ongoing projects, it was difficult for the experts to visit the farm or farmers in villages. This is also a common problem for majority of the government institutions bound by several rules and regulations for budget expenditure. However, upon request by the nearby farmers, field visits were conducted with all precautionary measures by the concerned personnel to address issues in field conditions.

## Linking to markets

During lockdown period, all the meat shops were closed in the district. In this context, Department of Animal Husbandry and Veterinary Services, Bidar, and Karnataka Sheep and Wool Development Board initiated a mobile van facility "meat on wheel" for meat consumers which delivered meat while following distancing measures. Although Veterinary College, Bidar, could not be a partner in this initiative directly, it advised farmers to sell their birds to these units. Through this model, many farmers could sell their birds while consumers could get good quality meat.



**Mobile van facility "meat on wheel" for meat consumers**

## END NOTE

In the existing pandemic scenario, the authors realized a great demand for backyard poultry farming and its related information despite the lockdown situation. Major issues of farmers included lack of veterinary and input services, and identifying the right market that can give them fair remuneration. Institutions like Veterinary College, Bidar, could assist the farmers to a limited extent due to certain restrictions and lacunae. A policy shift emphasising delivery of inputs and regular follow-up for such interested farmers is critical to enhance production and productivity. The announcement by Government of India for infrastructure development in livestock sector may support creating linkages with market, creating mobile input service facilities (using a mobile van, for instance) and feed preparation units to meet such crises in future. Further, public private partnerships and formation of farmer interest groups or farmer producer organizations needs to be promoted to a greater extent in the days to come.

## Acknowledgments

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**CLOSED  
INDEFINITELY  
AS A  
PRECAUTION  
DUE TO  
CARONA  
VIRUS**



# Impact of COVID-19

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# 107

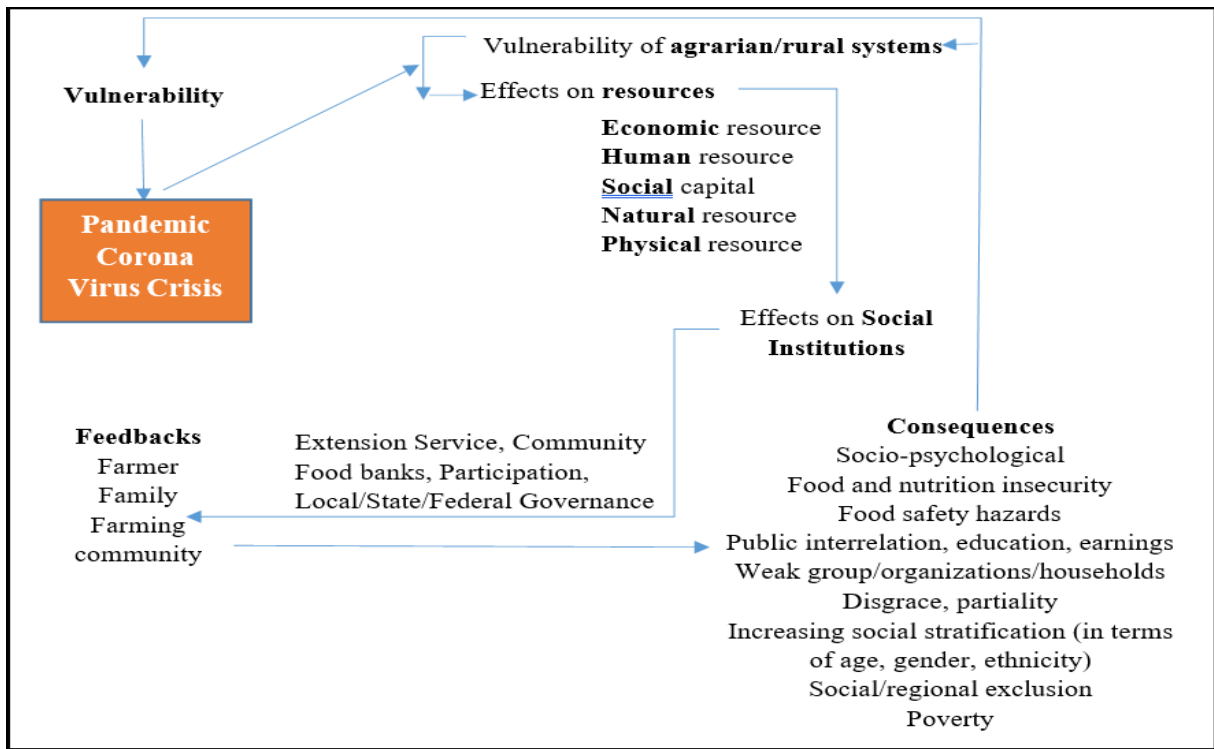
## EFFECT OF CORONA CRISIS ON FOOD SYSTEM OF NEPAL: AN EARLY APPRAISAL

The service delivery mechanism of federal, state and local governments in Nepal should be mobilized to minimize the consequences of the Covid-19 pandemic so as to save both the lives and livelihoods of the Nepalese people, argues **Rajesh Paudel** in this blog.

Farmers are the group most vulnerable to the Covid-19 pandemic. Majority of the poor people in Nepal rely on agriculture and its associated businesses for their livelihoods. Lockdowns – as an effective method of protection from the corona virus – had direct impact on migrant workers and the agriculture supply chain but the cost was severe as migrants lost wages and the basic spending of vulnerable groups dropped (Scott et al. 2020). Maintaining a steady food system (in the USA) has become a challenge at the time of the Covid-19 (L. Laborde & Bucknavage 2020). The existing rural system of Nepal is being affected as the global economy is being influenced by various factors arising due to the corona pandemic. In Nepal a significant portion of the economically active population is in foreign employment. The major regions that supply those human resources are from rural and suburban areas of Nepal. As the global economy is in crisis, it's certain that the rural system of Nepal will be influenced significantly. This blog is based on an appraisal of review papers, reports, online newspapers, journals and research articles, supplemented with my understanding and knowledge on the topic and the specific country context.

### IMPACT ON FARMERS

With the spread of COVID-19, farmers in Nepal are now exposed to new major challenges. The most alarming challenge is its immediate impact on farming activities that is bringing about a new economic and political order in its wake. The next major challenge is its negative impact on the livelihood of farmers given the unique features of the Nepalese agrarian or rural system (Figure 1).



**Figure 1: A proposed model showing the impact of COVID-19 on the Nepalese agrarian/rural system**

Lockdown of rural and urban areas as a first preventive measure against COVID-19 contributes to a drop in the demand for daily consumption of agricultural and livestock produce. In countries such as Nepal, food demand depends on people’s earnings and so fewer earning opportunities impact consumption (FAO 2020). Consequently, if the lockdown continues for a lengthier period there will be less production in the coming season.

The Asian Development Bank (ADB) has already stated that the economy of Nepal will go down after the COVID-19 crisis and is expected to decelerate economic growth to 5.3 percent in 2020 (Asian Development Bank 2020). Farmers are the economically most affected community under the COVID-19 crisis. The financial crisis in Nepal could delay/stop financial assistance for farmers from the government.



## SOLUTIONS

FAO (2020) recommendation for mitigating risk of COVID-19 on food security and nutrition are; meeting the urgent food needs of vulnerable population, boosting social protection programs and reducing the trade related costs. Economic and social assistance measures like fiscal stimulus and social safety would obstruct poverty and famine in developing countries (D. Laborde et al. 2020). In Nepal, these mitigation measures would have positive results in decreasing vulnerability and developing local food systems. Furthermore, the three levels of government (federal, state and local) may include additional packages so as to address food and nutrition security, implement cash transfer, and help migrant workers – as done in India (Dev 2020).



### Strengthening agricultural production

In Nepal, a vast majority of the rural and suburban population is involved in agricultural activities for their income. Nepal's largest economic activity is agriculture; and its contribution to the GDP was 26.98 percent in 2019 (Ministry of Finance 2019). So it is urgent to organize proper planning in agriculture service delivery through local, state and federal governments. To address the impact of COVID-19 on food systems line agencies in agriculture, food safety and health have to work together. Quick adaptation strategies to new conditions and intensive care from the community are critical. Good agricultural practices (GAP) and good handling practices would be helpful in preventing the possible transmission of Covid-19. (GC 2020). Social protection programmes that include the most helpless farming communities should be the priority (Swinnen 2020).

Protection should be given to all those engaged in agricultural production, which includes farmers, farm workers, agricultural experts and all those engaged in farm mechanization (tools, equipment and machineries), and farm input/output marketing. Extension and Advisory Services should support communities to adapt to the new situation. In this crisis it is most important to shorten the production and supply chain and bring it closer to the consumer. Farmers are facing problems with marketing their produce, especially perishables (milk, fruits and vegetables).

## OPPORTUNITIES

The coronavirus crisis has highlighted the drawbacks of globalization and it is likely to impact free flow of people and goods. In this situation, protectionism may prevail. Agricultural protectionism is a scheme of government measures to protect local agricultural and livestock production from international competition by depressing or hindering imports from the foreign country (Markovic & Markovic, 2014). The developed country-centered global supply chains on which so many companies in poor and rich countries have come to depend are principally under threat. The current supply chain (local, state, regional and global) will be disturbed and changed. International trade of agricultural and livestock products is likely to get limited. As a result the local food system of Nepal could discover emerging opportunities to develop itself. Nepalese farmers should be ready to change themselves according to changing conditions because factors of production (land, labor and capital) are being altered due to this pandemic. Some positive effects could evolve from the COVID-19 crisis if farmers can diversify agricultural and livestock production for meeting local necessities.



## FINAL WORDS

The COVID-19 crisis is not only a public health issue but also a major food systems issue. This crisis has clearly exposed once again the vulnerability of Nepalese farmers, family and farming communities to international economic shocks. To enhance the resilience of Nepalese farmers, a more inclusive food system has to emerge with the support of local, state and federal governments.

Extension and Advisory Services (EAS) can play a major role in supporting farmers in dealing with this crisis. These include:

1. Initiating a nation-wide survey for understanding people's food security situation – focusing on food production and access to food, and then develop a complete data set based on these;
2. Developing plans for enhancing recovery and strengthening future preparedness to crises like these by developing inclusive local food systems.

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# 108

## THE EFFECTS OF COVID-19 AND ITS PSYCHOLOGICAL IMPACT ON PEOPLE FROM DIFFERENT STRATA IN INDIA

Sooner or later the COVID-19 pandemic will come to an end. But the big question that will come up then is: "Will our life continue to be the same as before?" In this blog, **Neela Madhav Patnaik** discusses the impact of COVID-19 on different sections of people and the repercussions that are bound to follow in the agriculture sector.

Numerous studies have indicated that after a disaster – whether natural or manmade (viz. Super cyclone, 9/11 attack, Tsunami, Bhopal Gas tragedy, etc.) – people find it very difficult to come to terms with their post-disaster life due to the haunting memories that are embedded in their psyches draining them emotionally. The COVID-19 pandemic is such a disaster that has breached the innermost boundaries of our minds taking a mental toll on us. Considering the magnitude of the situation, the Union Health Ministry has launched a toll-free helpline (08046110007) to address the mental health issues of people in the wake of the countrywide lockdown. People waited anxiously at 10 am on 14 April 2020, for the Prime Minister's address to the nation.. This was an indication of the people's anxiety, panic, restlessness, and their looming sense of uncertainty in these testing times. Given the internet and social media, people are overloaded with news and fake messages/rumours which act like a virus in the brain, thereby compounding their fear and worries.

Health concerns, home quarantine, financial implications, change in lifestyles have also sent a mental shock to many people. Roy et al. (2020) conducted an online survey of 662 respondents across India on their knowledge, attitude, anxiety and perceived mental healthcare need during the COVID-19 pandemic. The study revealed high levels of anxiety with more than 80% of the people preoccupied with thoughts of COVID-19. Sleep difficulties, distress-related social media, and paranoia about acquiring COVID-19 infection were reported in 12.5%, 36.4% and 37.8% of participants, respectively. Interestingly mental healthcare need was found in more than 80% of the participants. Folks from different walks of life – academicians, farmers, students, healthcare professionals, private job holders, labourers, homemakers, etc., – are under severe psychological stress regarding both the current situation

and what the future could hold. Here, I will try to specifically address the issues of farmers, agricultural labourers and students with snippets from private sector employees and healthcare workers.

## IMPACT ON FARMERS

The impact of COVID-19 on farmers has been very well explained by Dr Mahesh Chander in AESA Blog no. 107 and by Maji et al. (2020). In his interview to News 18 published on April 12, eminent scientist Dr MS Swaminathan stated that the rural economy is not prepared for the pandemic, but he closed on a positive note by saying that the mobilization of institutional organizations such as Panchayats in partnership with technology and extension service providers like KVKs, NGOs, FPOs and line departments can bring relief. One remedial solution in the current situation comes from Kerala State where Panchayat-level interventions are feeding the poor – through community kitchens with help from volunteers (Kudumbashree members, Anganwadi members etc.) – along with provision of essential commodities like food grains, pulses and sugar. Readers can refer to AESA Blog 109 for more details on how the State machinery of Kerala is working to solve the agrarian crisis. Farmers are left without adequate labour to harvest their standing rabi crops in many parts of the country and at the same time do not have enough financial resources for purchasing critical inputs like seeds, fertilizers, pesticides, feed and fodder, etc. With disruption in the supply chain and market linkages, farmers who are already burdened with debts are hit hard.

The rise in farmer suicides every year is further intensified by COVID-19 now. Farmers, already stressed by numerous factors have been facing an unprecedented crisis which may last for a long time. Reports have indicated that farmer suicides occur due to poverty, alcoholism, depression and family disputes, etc. Rather than simply blaming the victim, this requires understanding the root cause of the problem in the first place. Though social research has been carried out on this there is a policy-practice gap. Punjab Agricultural University (PAU) has submitted a survey report to ICAR on 'Addressing farmers' distress through capacity

building of farming families', based on findings after interacting with farmers on their mental health. The report is based on findings from 16 of the worst farmer suicide affected districts of Punjab, Maharashtra and Telangana. "Only a vibrant farmer can do vibrant farming, which is the need of the hour," says Dr Sarajbeet Singh, principal investigator of the project (The Times of India, 25 Feb, 2020). ICAR, with the help of SAUs, should plan and implement a technical and culturally sound suicide prevention programme, both at the national and the State level on a priority basis considering the repercussions this pandemic would have on the mental health of farmers.

AESA Blog 111 highlights the importance of convergence of extension service providers (Maharashtra State Agriculture Department, ATMA-Pune, Maharashtra State Agricultural Marketing Board and Maharashtra Cooperative Development Corporation) as seen in Maharashtra State, to collectively fight the pandemic situation. Dr Wadkar also points out that maintaining the psychological balance of poor people, especially landless and migrant workers, has been a challenging task. The present situation is a litmus test for Extension and Advisory Services (EAS) providers in the area of e-Extension and at the same time provides an excellent opportunity to harness ICT technologies for farmers' benefit by providing timely information, supply chain linkages, and for creating awareness on various schemes at both State and Central level etc.

## IMPACT ON FARM LABOURERS

It pains our hearts when we hear many labourers saying "Hunger may kill us before corona". Daily wage labourers are mostly engaged in diverse activities in the organized and unorganized sector. But with the shutdown of industries and manufacturing sectors along with shops, their services get terminated by default leaving them without any financial support for shelter and food. Many Samaritans have come forward to help with food and shelter along with many initiatives by State and Central Governments and NGOs to address the plight of labourers.

*Let's pause a minute and think of the landless labourers in rural areas.*

With strict lockdown enforced and lack of movement, landless labourers are left in the lurch without any work for their livelihood. Without COVID-19 the present season would have been an ideal situation for landless labourers, especially those actively engaged in harvesting, grading and packaging operations of wheat, rice, pulses, onion, along with sowing of summer rice, pulses and cotton. This also happens to be peak season for many fruits such as mango, watermelon, muskmelon, apricots, plums, etc.

But in the present scenario, landless labourers are solely dependent on State and Central assistance to battle the crisis. Though the Central Government and governments of different States have initiated various schemes for the welfare of rural poor including cash transfer, PDS, food supply, etc., pinpointing and gauging their effectiveness so early would

be naive. The government under the Pradhan Mantri Garib Kalyan Yojana (PMGKY) has decided to deposit Rs 500/- into women's Jandhan accounts which is a welcome move. But this cash transfer promised to certain section of the poor is both small and narrowly targeted. Under PM-KISAN scheme, every farmer is entitled to Rs 6,000 annually in three installments, but landless agricultural workers, who are among the poorest of the poor, are not covered under this scheme. On one side we have witnessed farmers facing difficulty in harvesting their standing crop and on the other there are agricultural labourers unable to provide this service – and both sides suffering. This conundrum has left the agricultural sector reeling under severe problems which needs to be addressed at the earliest so that people do not fall into the debt traps of moneylenders to meet their basic needs.



**Plight of stressed-out farmers**

### **Box 1: Is excess grain a liability or an asset?**

In the current situation, many people have lost their livelihoods and are pushed into hunger and poverty. Disturbing news of people committing suicide due to starvation – in a food surplus nation – has surfaced. In one unfortunate case where a labourer committed suicide, the district administration chose the easier path of blaming the victim for being 'mentally disturbed'. On the contrary, FCI has 3.09 million tonnes of wheat, 2.75 million tonnes of rice and 2.87 million tonnes of paddy as of March, which is three times more than the amount of buffer stock India needs. With harvest of rabi crops and procurement round the corner the FCI may face serious storage issues. Though the central government has decided on free distribution of 5 kg food grains per person and one kg of pulses per household under PM Garib Kalyan Ann Yojana for the next three months in addition to the usual allowance of ration under PDS scheme, there seems to be something missing. Substantial numbers of the poor are excluded from the PDS due to various reasons such as pending applications and identification barriers for verification to get ration card. Eminent economists Amartya Sen, Raghuram Rajan, and Abhijit Banerjee have suggested issuing temporary ration cards to the poor for the next six months. This suggestion assumes importance since the lockdown may be lifted sooner or later but revival of economy will take some time (months). The initiative by Kerala govt. of providing 15 kg of free rice over and above their regular ration for one month, starting from April 1, to both BPL and APL holders is worth mentioning. Targeted initiatives ought to be formulated for utilizing the available surplus stocks which are bound to reduce the stress and tension of poor people, at least partially, and the resulting psychological problems.



## IMPACT ON STUDENTS

The COVID-19 crisis brought a unique dilemma to the student fraternity. With the colleges and universities closed, the students were left with no option but to move to their homes hastily. In most cases it was mandatory to leave the hostel while in some other cases the students were allowed to stay with requisite permissions. These sudden changes have brought immense agony to the students who are already burdened with their semester and competitive exams, research and academic activities. With the ever increasing unemployment rates every year, this pandemic brings a double whammy to the students. Moreover the economy being at the lowest point the IMF is echoing concerns of a global recession in the making. India is no different in the current scenario with constantly decreasing growth rates – presently projected at 1.9% by the IMF. Thus it is a no brainer to assume that the future regarding job prospects is uncertain and bleak, shattering the dreams and aspirations of young people all over the country. This is pushing them towards more stress.

With regard to the students of agriculture and allied subjects, different SAUs and ICAR institutes have devised different rules for their students following the guidelines provided by the respective State and Central governments. The change in JRF/SRF syllabus, along with a single exam to be conducted by NTSE, has been both boon and bane for the students. But in the present scenario the final year UG/PG students are worried whether they will be provided a

degree in time and how the whole process will be carried out; so there is a tense air of uncertainty surrounding them. Many studies have been carried out to understand the stress and mental illness found in PhD students and those in agriculture and allied streams are no different. This pandemic situation has thrown the research schedule and plans into deep water. Laboratory facilities closed, animal trials halted, plant treatments with no one to monitor, data collection schedules gone awry – these are some of the problems worth mentioning here from a larger pool of issues. Since PhD is not a time bound degree, many students fear that their term of study may get prolonged with no jobs in sight.

All the universities and colleges under the University Grants Commission (UGC) have been directed to set up mental health helplines for addressing the psycho-social concerns of student community during and after COVID-19 (The Economic Times, 6 April 2020). All universities should conduct motivational sessions for students when the pandemic gets over. Professors and student advisors should have regular communication with the students to know their progress and well-being which is much needed at this point, especially for devising a future course of action and also to keep the students calm. However, the silver lining has been the use of e-learning resources, online classes by professors, free data analytic courses, AGMOOCs and regular assignments utilizing the power of the internet to keep the students occupied.

### Box 2: Health Care Workers

They are the frontline soldiers who are fighting this contagious disease without proper ammunition, i.e., personal protective equipment (PPE) which is in short of supply. Numerous reports have surfaced where the health workers have been subjected to assaults and harassed while on duty. A study that surveyed 1,250 health care workers in China reported that the respondents have developed symptoms of depression (50.4%), anxiety (44.6%), insomnia (34.0%) and distress (71.5%). Guidelines and free online resources are made available for supporting healthcare workers to deal with their stress.

#### IT Professionals and Private Sector Employees

'Work from home' surely has more challenges as opposed to working from offices as there is no fixed working hours, regular conference calls (audio and video), indefinite virtual meetings, poor internet connectivity due to huge loads, etc. The work pressure and stiff deadlines in this scenario has pushed them towards depression. Several companies have roped in counsellors and psychiatrists through outsourcing for the emotional wellbeing of their stressed employees.

Unlike those working in the private sector or health care workers who have some stress related support, does the farming community have this sort of mechanism? Sorry to say "NO". Compared to other strata of people who have better education and awareness and can afford counselling services, farmers and agricultural labourers neither have the platform or necessary know-how to discuss their problems, forget about counselling services.

## CONCLUSION

The last two decades have witnessed five pandemics viz., SARS (2002), Swine flu (2009), MERS (2012), Ebola (2014), and COVID-19 (2019) which have had long lasting effects on the various strata of people in society. God forbid but technically speaking, a pandemic like situation in the near future cannot be rejected outright. In such scenarios of healthcare emergencies affecting entire countries, much of the attention is focused on scientific research with little or no concern towards addressing mental illness. Evidently the COVID-19 pandemic too has opened a number of research avenues in the scientific sector but social science research too can play a very crucial role. There has been a dearth of research on psychological stress and mental illness especially in situations like this. Priority for extension research in understanding the mental illness of farmers is also quite low which needs attention. A number of models in vogue in social-psychology, such as health belief model, theory of reasoned action, theory of planned behaviour, social cognitive theory, self determination theory etc., can be utilized by extension researchers to good effect so as to

identify and understand the factors influencing behaviour and behavioural change. This sort of research can help policy makers to perceive the importance of mental illness in the farming community in the first instance itself.

Extension service providers, though overburdened, may consider providing the farmers with trainings/discussions on the importance of life and how to tackle unforeseen situations. Peer support through the krushak saathi/kisan mitras found in every village, needs to be encouraged in order to identify the farmers at risk so that necessary action can be taken by the district administration/line departments. Feedback loop on constant monitoring and communication among farmers and stakeholders can go a long way in addressing the plight of farmers. Awareness ought to be created on the taboos associated with mental illness. Individuals should be encouraged and motivated to come forward in sharing their problems without any fear as the saying goes "Sharing is caring". Before the next pandemic-like situation arises in the country, let's be prepared to at least deal with the psychological problems of the common people.

# 109

## IMPACT OF COVID-19 ON NEPAL'S AGRICULTURE: THE ROAD AHEAD

The spread of COVID-19 and the resultant lockdown have already started to affect agriculture and food security in Nepal. In this blog, **Ram Hari Timilsina and Suray Kant Ghimire** discuss the impact of COVID-19 on different crops and agricultural enterprises in Nepal and suggest measure to overcome the crisis.

Due to the fear of COVID-19 transmission, the Government of Nepal enforced lockdown and social distancing, as a result of which the entire economy, including agricultural activities, have come to an abrupt halt. Despite the government's current decision to ease the flow of agricultural inputs the ground reality is quite different. Cooperative shops that sell agro-products at reasonable prices, agro- vet suppliers, agricultural markets, dairies, and vegetable markets are opening only sporadically. Though winter rain was beneficial to wheat cultivation, due to lack of farm machinery and the necessary human resources, the harvest of wheat and other winter crops is certain to be below par. Farmers feel devastated as they are unable to harvest the ripened crop. Poultry products, along with fruit and vegetables are hit hard by the pandemic. The current and future impact of COVID-19 on Nepal and some of the potential methods to overcome the emerging crisis are discussed in detail in this blog.

### IMPACT ON AGRICULTURE AND FOOD SECURITY

One of the major effects of lockdown is visible among the farmers growing highly perishable products due to constrained transportation and market unavailability. For instance, in this peak harvesting season, banana growers in Chitwan, are panicked that if the condition persists, the fruit would ripen and rot on the plant, which could mean zero payback on their initial investment. Moreover, the recent repetitive windstorm and hail in the third week of April has fanned the flame of the farmers' woes that have already been suffering by the forced lockdown. Standing crops like banana and maize have been severely affected. The early report suggests that a loss worth 10 million Nepali Rupees has been incurred. Also, winter maize-one of the important cereals as well as a critical component of the diet of Nepalese livestock-faced heavy damage at the same time.



**Ripened tomato left in field during lockdown**



**Banana damaged by wind Chainpur, Chitwan, Nepal**

While the rainfall at this time implies hope for the new season, the complications that arose from the lockdown have put on pause any preparatory agricultural work for the upcoming season. The shortage of raw materials for the agro-based industries suggest that thousands of people could lose their jobs. Such an immense impact on the agricultural sector, on which more than 60 percent of people depend, and which contributes to more than 25 percent of the country's gross domestic product (GDP), would aggravate poverty-related problems and lead to the collapse of the entire economy.

The prolonged effect of COVID-19 could force agricultural powerhouse countries like China, USA, and India, to impose a ban on

food exports. As a result, in countries like Nepal, continuous food shortages resulting in countrywide starvation is imminent. Even at present where low supply is causing market imbalance, market prices are expected to skyrocket as soon as the economy resumes. Moreover, the rise in every cent of the dollar would correspondingly mean a rise in the challenges of imports.

Therefore, COVID-19 has taught the world that every nation should have its own food security strategy at the local level so as to be resilient to outbreaks like these, and the scarcity that would accompany it. The Ministry of Agriculture in Nepal has come out with some measures to address some of these issues (see Box 1).

### **Box 1: Government Initiatives (Ministry of Agriculture and Livestock Development, MoALD)**

MoALD, Nepal, has declared five notable policies to combat the adversities brought about by COVID-19. These include:

- Equal distribution of relief packages for production;
- Easy loan for farmers;
- Agriculture Extension Advisory Services for farmers;
- Government support on insurance of crops and livestock; and
- Minimum support prices for agricultural products.

However, implementing this declaration calls for combined and honest efforts from the Government of Nepal, private sectors, commodity associations, and the farmers themselves.

The distribution of relief packages is not going as expected, thereby raising another critical issue for the needy. The imposed lockdown has caused a severe setback in the daily life of the vulnerable who already have a hand-to-mouth existence. The relief package, on the other hand, is misused by those who are faking their need. This scenario could re-appear while agriculture relief packages are distributed. Hence, a database built on certain criteria that can distinguish the really needy farmers is the first thing to be done. Given that this is a critical time, Nepal is presently focusing on the battle against COVID-19, so the correlated agricultural strategy has been delayed in its implementation. However, these strategies are not enough to minimize the risks brought about by the pandemic.

### **NEED FOR COVID-19 IMPACT ASSESSMENT**

Assessment of the impact on food security, livelihood and agricultural economy is the immediate need as it can assess the potential food crisis and lay the groundwork for sustainable solutions. The impact assessment report should become the base document for formulating relief programmes.

When the pandemic subsides, millions of Nepalese might return from abroad which would further escalate the food demand. If, around three million migrant Nepalese workers and job holders lose their jobs and are forced to return to the country, it would aggravate the already critical unemployment problem. When

the country's agricultural production fails to meet demand and this is further compounded by a shortage of agricultural inputs and restricted import, the food crisis would take on catastrophic proportions.

The breakdown of forward and backward linkages of commercial agricultural firms has led to financial imbalances in the firms which could result in the collapse of commercial agriculture. The banking system is also likely to be affected as farmers are unable to repay loans. As the risk of investment recovery in agriculture and the tourism business grows, financial institutions that are less flexible to such risks and uncertainty may even go bankrupt. Some of the potential impacts we are currently witnessing in the country are discussed below:

## Cereal crops

COVID-19 is affecting the availability of inputs such as chemical fertilizers, irrigation, pesticides, and manual labour for weeding, necessary for crops like maize and spring rice. Wheat harvesting faces complications, as most of the combine harvesters and their operators used in the past were from India. But for harvested wheat, mobility restrictions amid the lockdown means a lack of access to any potential market. The aftermath surrounding the lockdown suggests seed and fertilizer scarcity for the upcoming season. The prevailing scenario urges the government to facilitate the wheat sale at a reasonable price along with other cereals that can be stored longer so as to limit the looming food shortage.

Most of the paddy produced in the country is exported across the southern border to India, which then is processed and re-imported in the form of refined rice packets. In this crisis, the government needs to cut off any paddy export.

## Livestock

Shortage of feed and treatment facilities during the lockdown has severely reduced milk production. There has been a sharp decline in milk purchases by the dairies. Furthermore, farmers are unable to market their dairy products which has led to a movement to dump the milk on the roads. The quick fix is to coordinate and facilitate the transportation and marketing of milk by the local government. Besides, to protect the dairy business, grants based on per unit production should be given to farmers.

There are complaints about delayed payments by the Dairy Development Corporation (DDC) of Nepal scheduled every 15 days. In this dire situation, farmers should be promptly paid. Veterinary service providers, agricultural transporters, etc., must be smoothly facilitated. It is important to help set up micro-enterprises immediately, which would prioritize the production of dry meat, frozen meat, cheese, ghee, etc., from surplus.

## Fruits and vegetables

Where the country's domestic production is being left to rot on the farmers' field, vegetable import hasn't stopped, though the government has imposed import restrictions amid the

COVID-19 lockdown. Door-to-door sales of local vegetables and fruits (like bananas) along with transport provision should be facilitated. The recent initiative of the agriculture-ambulance brought in by Province-5 of Nepal can prove to be a real lifesaver in this dire situation. Due to the history of excessive pesticide use and the fear of COVID-19 transmission, vegetable imports from India need to be discouraged.



**Vegetables thrown on road**

## Poultry business

The self-reliant poultry business has been hit hard, time and again due to calamities such as bird flu. Chickens are being disposed of in this troubled period due to scarcity of feed. There has been news of farmers destroying eggs on the road due to lack of a market. The collapse of this enterprise would brutally affect agricultural gross domestic production (AGDP) along with the employment of tens of thousands of labour.

A reasonable grant program would help to contain this enterprise which is on the verge of bankruptcy. Furthermore, the interest and instalment payment schedule of banks should be revised. Farmers are demanding refinancing from banks in order to resume their business. Also, customs tariffs should be limited to one percent on imports of feed supplement and its raw materials; and measures to discount electricity bills are also needed.

## Beekeeping

Currently, farmers are unable to move bees for grazing and the government seems to be clueless. Due to the high cost of production, domestic honey is unable to compete with foreign ones. Therefore, the current 17 percent customs tariff should be increased to safeguard the local honey market. Arrangements can be made to provide wood for beehives to the farmers on subsidy.

### **Emphasis on consumption of local products**

Once the crisis ends, youths are more likely to return from abroad. This would be an enormous opportunity to create an environment for the youth to stay in the country. To energize youths to be agri-entrepreneurs, loan packages at subsidized rates should be provided on easy terms. Both in villages and cities, campaigns like home gardening and roof farming should be expanded as a campaign to ensure food self-sufficiency. The food scarcity can be minimized by consumption of underutilized native crops (locally known as *Geetha, Chino, Kauno, Kathe Sama, Vagur, Sisno, etc.*).

## **DEALING WITH THE IMPACT**

To address the immediate, short term, and long term impact of COVID-19 on agriculture and food security, we suggest some of the following measures – to be taken by a range of stakeholders.

### **Utilization of local seeds**

Due to the imbalance in the supply system, there will be a shortage of seeds and fertilizers for use in the coming season. Local governments should immediately bring incentive programmes that encourage farmers to use improved seeds. If the State can ensure marketing even by investing in farmers' seed production, the current seed dependency on multinational companies would be reduced.

### **Bio-pesticides and fertilizers**

The use of local plants to produce organic pesticides and manure from municipal waste are ways to reduce import dependency. The government has to provide subsidy in terms of seeds, fertilizers, pesticides, and fuel to the farmers for the upcoming season.

### **E-Extension advisory services**

Even though most of the farmers are computer illiterate they are social media literate. Therefore, farmers and agriculture experts should be brought together in one place through Information and Communication Technology. In a shortage of agricultural experts, professors and students of agriculture universities can also be involved. The newly established Agriculture and Forestry University (AFU) in Nepal mandated for teaching, research

and extension should be instrumental in establishing linkage among its stakeholders.

### **Use of barren lands**

With the increase in out-migration, the abandonment of arable land in Nepal is increasing. The fertile lands of the Terai and hills are left uncultivated because of the nefarious scheming of real estate agents. With the looming food crisis, the local government should make arrangements to use the concept of land banks to provide land to landless farmers. Currently, to overcome the food crisis, early maturing crop varieties should be identified and recommended by the agriculture offices.

### **Prime Minister's Agriculture Modernization Project (PM-AMP)**

Various agricultural initiatives, such as the Agricultural Perspective Plan (APP) and Project for Agriculture Commercialization and Trade (PACT), were interrupted due to different reasons. Some became entangled in corruption, partisanship, commission system, political turmoil, and bureaucracy. Schemes in the past benefitted various sectoral people except the real farmers. The ongoing PM-AMP project too isn't untouched by controversy. However, the pandemic brings unique opportunities along with bitter challenges. The project should assist the agricultural production programmes of various super zones, zones, and blocks under the project, and the marketing of the product should also be ensured. The subsidy programme should be practical, transparent, and arrangements need to be made to increase the agricultural subsidy based on per unit production.

### **Increase in customs tariffs and quota on imports**

To balance domestic products, the government should execute strategies to ban imports within a few years, and impose a partial quota system on commodities such as paddy, readymade packets of rice, maize, millet, mustard, tea, coffee, cardamom, ginger, wheat, barley, garlic, onion, chili, betelnut, herbs, fish, flowers, fruits, dairy products, goats, frozen meat, eggs, honey, and pulses.

## CONCLUSION

Nepal has already worked through various long-term and short-term strategies, but an immediate strategy is required to overcome this dire situation and its consequences.

Implementation of plans, policies and work on relief packages on such a great level will necessarily call for a strong will and high morale together with strict monitoring and discipline.

If all three strata of government work in an integrated manner, bring agricultural education, research, and technology dissemination under one umbrella, and also adopt a pluralistic agricultural extension and development strategy, the famine that the pandemic threatens to deliver can be avoided. In this

hour of great need there is no excuse for any negligence, excuse, or procrastination because earlier calamities like floods, cold waves, drought, earthquake, hurricane, heatwave, and blockade are nowhere like COVID-19.

Thus, sustainable agricultural production, food storage, food security, and subsidies are more important than ever. Regulations on imports and exports along with the food banking system are required to protect people in this crisis. If the natural agricultural process is interrupted there will be consequences more disastrous than the virus itself. We need to act and we need to act fast – because if there's one thing that needs continuance, its agriculture. It must never stop.



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## Impact of COVID-19 on Farmers Livelihood in Khordha district, Odisha

Rapid assessment of the impact of COVID-19 lockdown on farmers in Khordha District helped in identifying the nature and extent of losses faced by farmers in different crop and enterprises. Krishi Vigyan Kendras (KVKs) and ICAR institutes conducting this type of quick analysis will help every organisation in identifying strategies to support farmers in each district during the lockdown, and also in refining their plans for the next season, **P N Ananth and B R Pillai** argue in this blog.

That Odisha has shown how to live up to the challenge of frequent disasters that visit the state in the form of cyclones, floods, dry spells, erratic rainfalls, delayed monsoons and many others. The people of Odisha and the government have been highly accustomed (in comparison to any other state of India) to face and cope with climate extremes. The year 2019 was a bad start for Odisha with the cyclone Fani that hit the state on 3 May, 2019, making life miserable for the people, especially farmers in 14 districts of the state. It took four months to return to normalcy. But within less than a year, in February 2020, COVID-19 began to spread in the state.

The first positive case of COVID-19 was reported in the state on 16 March, 2020. To contain the pandemic, the state also observed and joined the first "Janata curfew" declared by the central government on 22 March, 2020. Since 25 March, like other parts of India, Odisha has been under strict lockdown. On observing increasing number of positive cases, the government declared a 48-hour shutdown in Odisha, mainly in Khordha and Cuttack districts, on 3 April, 2020. The Government of Odisha was the first state to publicly announce extension of the lockdown from 14 April to 30 April. However, like other states in the country Odisha gave relaxations to certain activities especially in agriculture, dairy and fisheries during the lockdown. Though these relaxations exist, many small and marginal farmers are not able to undertake farm management practices or market their produce.

In this context, to understand the impact of COVID-19 on agriculture and allied sectors, a Rapid Appraisal study was undertaken by KVK-Khordha (farm science centre) under ICAR-Central Institute for Freshwater Aquaculture, Bhubaneswar, Odisha, during 6-11 April. This blog is based on the information collected from 50 small and marginal farmers who are active in farming from the adopted villages of KVK.



**Harvested Pumpkin waiting for market agents to pick and transport**

## RAPID APPRAISAL STUDY

The study was undertaken by KVK for assessing the impact of both lockdown and two shutdown periods due to COVID-19 in Khordha district of Odisha. Khordha is one of the 30 districts of the state with abundant natural resources to support livelihood of rural and urban population. Agriculture and allied sectors like animal husbandry (dairy and poultry) and fisheries (aquaculture) play a vital role in the economic development of the district. A telephonic survey was conducted with 50 farmers representing all the 10 blocks of Khordha district with a set objective. The 50 farmers selected for the study have a good profile in agriculture and allied sectors, and had standing crops ready to harvest during this period.

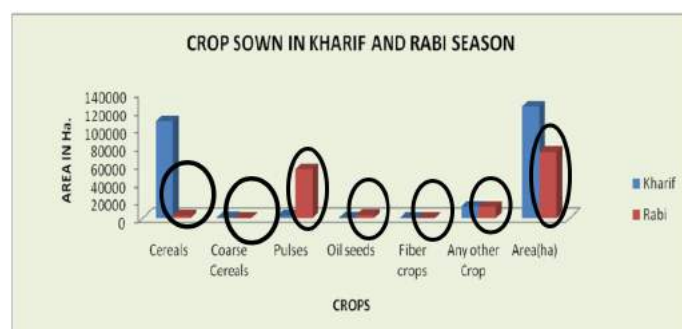
## FINDINGS

### Status of agriculture during this period

It is a general practice by farmers in the district to cultivate pulses, oil seeds and vegetables after harvest of paddy. During this period, few farmers cultivate paddy (areas with assured irrigation). In the district, during Kharif season 1,07,788 ha is allocated for paddy cultivation followed by a meagre area of 2,835 ha during

rabi season. Hence, the area under paddy during the lockdown period was negligible. In addition, farmers of few blocks cultivate oil seeds. That apart, vegetables and fruits are also cultivated. During lockdown and shutdown periods, there were standing crops in large area under pulses, oil seeds, vegetables and fruits. Animal resources including milk, chicken, goat and sheep were also available without being affected significantly during the period. Fish from freshwater resources were also being harvested on a daily basis. Hence, it can be concluded that standing crops, milk, meat and fish were all available during the lockdown period.

The representation in the bar chart above indicates the area under crops to be harvested during the lockdown and shutdown period. The constraints faced by farmers during this period in different sectors are discussed below.



## Challenges faced by farmers

### Field crops, vegetables and fruits

- Management practices like weed eradication, control of insects and pests were not performed due to non-availability of inputs and in turn, this affected the yield of paddy with a reduction of 0.5t/ha. All input shops were closed, which hindered farmers to adopt proper management practices. It was observed that in certain places shops were open only for a limited period. Few farmers suffered as they have not completed threshing of the paddy harvested during the Kharif season due to scarcity of labour.
- Due to unavailability of labour, many farmers were not able to harvest green gram, black gram and sunflower, which incurred losses to them. Though labour was available, it was prohibitively expensive (Rs.300/men/day and Rs 200/women/day). Farmers were not able to transport harvested products to nearby and distant markets.
- Farmers are hampered in collection of good variety paddy seeds for the coming Kharif season from society or seed growers due to lack of transportation facilities. This is expected to have an impact during the season.
- Farmers in some areas rued the lack of regular irrigation from the Lift Irrigation (LI) points. The farmers informed that it was due to the continuous absence of staff from the electricity board. The same was true with certain farmers who depend on LI points for irrigating crops.
- Few farmers who depend on wholesale markets for selling vegetables faced difficulties. For instance, in Chandapur Village of Chilika Block, farmers were depending on the wholesale market at Nayagarh district. During the lockdown period, the market has been functional during 2 am - 6 am only. The farmers faced difficulty to approach and dispose their produce.
- While few farmers tried to sell vegetables in nearby villages, neighbouring villagers blocked approach roads fearing spread of the virus from outsiders.

- Considering these constraints in marketing the produce, many farmers hesitated to harvest the produce and allowed it to get wasted. Even high-value crops like capsicum were left unplucked.

### Dairy, poultry and fish

- Though cattle feed was available in the market, many farmers did not purchase it as there was no market for milk and milk products. Even milk cooperative societies and the gualas are reluctant to collect milk from the framers as it was done earlier. So, farmers are distributing milk to neighbours, converting to paneer, chenna etc. for home consumption and throwing away surplus milk.
- Commercial poultry farming, especially broiler farming, is seriously affected due to non- availability of chicks (day-old), feed and marketing of adult birds. Even the companies under contractual farming system are not in a position to support their farmers under contract. Grown birds are being sold/distributed at very low prices and the farms are lying idle. Few farmers are bound to cull the matured birds due to lack of marketing.
- The situation of goat and sheep is in a somewhat better situation due to open grazing/browsing system of farming in the locality. However, sale of the marketable livestock has reduced due to less consumption of meat by consumers in view of COVID-19 fears.
- Critical inputs like fish feed, medicines and drugs were not available that affected farmers to adopt management practices for sustained growth of fish.
- Farms dependent on external labour suffered to perform pond and feed management activities including harvesting fish from large ponds.
- As transportation was halted, fish were not sold in distant markets. The catch was also not being sold in usual disposal ways (few farmers used to sell live fish which has better profits).
- Majority of the farmers perceived that fish were sold at low price. Few farmers

informed that procurement of fish seeds of Indian Major Carps (catla, rohu and mrigal) are available. The fish farmers felt they can procure even after the lockdown is lifted. However, certain farmers procure non IMC seeds from West Bengal, which has been constrained due to the halt in transportation facilities.

- There were fewer buyers of fish seeds. Many of the hatchery owners explained that

managing the brood stock has to be done professionally. To maintain them, labour was found to be short and unavailable during this period.

- Preparatory activities for the forthcoming breeding season were affected due to shortage of labour. However, certain hatchery owners said family labour was fully involved to meet the demand.



**Disruptions in fish seed supply chain caused heavy losses to fish farmers**



**A good harvest of ground nut waiting for buyers**

### **Quantification of losses due to COVID-19**

The above survey has made it evident that there has been loss to agriculture and allied sectors due to lockdowns and shutdowns following COVID-19 pandemic due to four reasons. It can be concluded that the losses have resulted from non-adoption of management practices for the standing crops due to inadequate input supply of fertilizers and agro chemicals. The next constraint that caused losses was shortage of labour on the farm. Above all, the shutdown of markets and low price has been the prime reasons for the farmers to incur losses.

### **Extent of loss at farm level**

The extent of loss at the farm level has to be calculated for providing an impact figure of the lowdown due to COVID-19 pandemic. From the survey, loss was estimated taking into different type of crops and farming systems (Table 1)

**Table 1: Loss incurred in different enterprises due to COVID-19**

Sl.no	Type of farm	Area/ animals	Income before COVID-19 (in Rs)	Expected income after COVID-19 (in Rs)	Difference in income	Extent of losses (Qualitative)
<b>1.</b>	<b>Cereals</b>					
	Paddy	1 ha	69,375	61,875	7,500	Low**
<b>2.</b>	<b>Pulses</b>					
	Black gram	1 ha	35,000	26,500	8,500	Low**
	Green gram	1 ha	37,200	29,700	7,500	Low**
<b>3.</b>	<b>Oil seeds</b>					
	Ground nut	1ha	90,000	79,500	10,500	Low**
	Sesame	1 ha	28,000	12,500	15,500	Low**
<b>4.</b>	<b>Major vegetables</b>					
	Hybrid Okra	1 ha	5,00,000	3,50,000	1,50,000	High
	Bitter gourd	1 ha	5,09,000	2,16,300	2,92,700	High
	Brinjal	1ha	5,62,000	4,21,875	1,40,125	High
	Pointed gourd	1 ha	3,00,000	2,46,000	54,000	Medium
<b>5.</b>	<b>Fruits</b>					
	Banana	1 ha	6,87,000	5,50,000	1,37,000	High
<b>6.</b>	<b>Animal Husbandry</b>					
	Dairy (Cross bred)	10 nos	4,39,200	4,00,000	39,200	Medium
	Poultry	50 nos	25,000	18,000	7,000	Low
	Goat/sheep	10 nos	25,000	23,000	2,000	Low
<b>7.</b>	<b>Fisheries</b>					
	Grow out Culture	1 ha	2,65,000	2,45,000	20,000	Low
	Nursery growers	1ha	3,42,000	2,72,000	70,000	High
<b>8.</b>	<b>Mushroom</b>					
		25 beds	80,000	40,000	40,000	High

\* Rabi paddy

\*\* May be switched to medium and high loss if not sold at right time within 30-40 days as quality may deteriorate

Source: Compilation from the present survey

It is evident that perishable products (vegetables, fruits and dairy) have been affected more than other farm produce. The loss has been highest for brinjal, okra, pointed gourd, bitter gourd followed by fruits like banana. However, in the case of cereals it has been observed that the loss in terms of income may be less as they are not perishable. The harvested cereals and pulses like rice, green gram, black gram, green gram, ground nut and sesame did not result in much loss in terms of income as they are not perishable and can be stored and sold later. Farmers perceive these products can be sold on a larger scale but quality and the

time of the sale matters. However, there may be losses later as the quality of product may deteriorate. In the case of sesame, the crop is not much of a commercial type, hence the price may still be low while farmers try to sell in market. In the case of vegetables, it has been observed that there will be an income loss of 40-45% on bitter gourd followed by 30% in hybrid okra, 25% in brinjal, 15-18% in pointed gourd and 20% in the case of fruits like banana.

Milk is one of the most affected products in the animal husbandry sector with a loss of Rs. 39,200 with 10 dairy cows, followed by Rs.7,000

in poultry. In the case of goats and sheep, farmers are in safe hands as they can sell the products after lockdown. Farmers fatten goats and sheep by allowing them to graze rather depending on commercial feed. Hence, the feed requirement was less in goats and sheep though feed was not available with input dealers.

One of the sectors assumed to have been much affected is aquaculture as the breeding season is set to start by June-July, 2020. However, fish seed production depends on hatchery operations and few preparatory activities on brood stock management have been halted due to shortage of labour. Hatchery owners who depend on family labours for operation would have been in safe hands. In the case of grow-out fish farmers, harvested fish has fetched low price but they can plan to sell fish after

the lockdown is lifted. In the case of nursery growers, there were few buyers of seeds. Compared to other field crops, vegetables, fruits, dairy, poultry and related cropping systems, aquaculture has not been much affected in the case of small scale fish farmers.

### High hopes on a successful South West Monsoon during Post COVID session

Now, all eyes are on the South-West Monsoon. A successful monsoon can influence the recouping of losses incurred with ease and relief.

Leading met agencies, including IMD, agree that the El Nino and DMI (Dipole Mode Index) are quite favourable for the monsoon onset over India. Summer in Odisha will not be a blistering one this year (Excerpt from Odishatv.in).



### PLANS ENVISAGED BY ICAR-CIFA AND KVK FOR SUPPORTING FARMERS POST COVID-19

Though organisations like KVK and ICAR-CIFA have their mandates, there are certain situations like climate extremes and pandemics like COVID where they can respond by providing additional relevant services. In this regard, an action plan has been envisaged by ICAR-CIFA and KVK to serve the farmers by providing extension and advisory services. KVKs act as a semi-extension agency, playing a key role in providing advisory services using information and communication tools, personal home and farm visits and through other ways (Ananth et al., 2018). KVKs

being semi-extension agencies, their role and performance may not be on a larger scale to satisfy large producers in the whole district. Within set mandates, KVKs have a role to play in production of few critical inputs that are not largely available in the market. Hence, in these situations KVK can work on production of such valuable critical inputs to support the farmers. For an example, the KVKs of Andaman and Nicobar, West Bengal and Odisha under ATARI, Zone V, during 2018-19 produced 17921.04 q seeds, 51,13,450 planting materials, 1,49,447.62 kg bio-agents, 4,24,1662 livestock and fishery products (ATARI, 2019). Within the limits and capability of ICAR-CIFA and KVK, an action plan has been worked out for pre and post lockdown periods to support farmers (Table 2).

**Table 2: Proposed action plan ICAR-CIFA and KVK**

S. No.	Activity	Justification for intervention (why for post COVID-19 strategy?)	Support required from KVK and ICAR-CIFA	Benefits to farmers	Expected area /farmers to be benefitted
1.	Use of rice transplanter for mechanical transplanting of rice	Labour shortage is considered one of the major constraint for farmers. Rice transplanters can reduce labour requirement	To provide rice transplanter on custom hiring basis	Less labour is required for transplanting	20 ha/60
2.	Mat nursery for rice	Group of farmers can have nursery in one place which reduces effort and uniformly can start operating their farms	Technical guidance along with IRRI, India	Less labour is required for preparing the nursery	20 ha/60
3.	Vegetable seedlings	The present period is very important for farmers to prepare vegetable nursery. Farmers are not able to prepare due to labour and non availability of seeds. They have to transplant these nursery seedlings to main field within another 30 days	Preparation of seedlings at KVK farm	Farmers can directly plant as they don't need to prepare nursery	50000/30
4.	Use of Solar Bubble Dryer(SBD) for drying paddy upon harvest	SBD can dry paddy seeds of 0.5 tonnes/1 hour/turn with an average moisture 12%. SBD can sharply reduce the requirement of labour and can be done at the community level	To provide SBD to the identified cluster and support with the funds of IRRI, Bhubaneswar	Drying of paddy for large communities and quick drying with minimum labour	20 ha/60
5.	Extension Advisory Services through Mkisan portal, WhatsApp group of KVKs	Experts of KVK will have restrictions to visit farmers' fields. Mkisan and other platforms will connect farmers in blocks further away from the KVK	Content creation for extension advisory services and connecting farmers with other IT platforms	Quick information delivery and alerts	6,20,000 registered farmers in 650 WhatsApp groups. Skill development groups-80
6.	Audio and video conferencing for farm advisory services	Experts of KVK will have restrictions to visit farmers' fields. Mkisan and other platforms will connect distant farmers.	Preparatory measures for post COVID-19 on rice cultivation	Location specific farm advisory services	600 farmers
7.	Provision of Leaf Colour Chart (LCC) in maize	Shortage in fertilizers can be expected. Best practices to reduce use of N fertilizers have to be given importance post-COVID.	Minimising the use of nitrogen fertilizer using LCC	Reduce the use of nitrogen fertilizers	15 ha/20
8.	Stocking of community ponds with improved varieties Jayanti rohu Amur carp and Tilapia	Farmers will require seeds of fast growing fish to meet the demand	Support to community ponds with quality fingerling (mandatory programmes of KVK)	Provision of quality fish seeds with adoption of scientific management practices	5ha/40 ( for groups)

## CONCLUSION

With the above information, KVKs will have to keep informed other organisations at the district level to support farmers with relevant interventions. That apart, KVK has discussed with other organisations like ATMA, Department of Agriculture, Coconut Development Board, Reliance Foundation and National Fisheries Development Board to support each other in their relief works. A few workable activities of KVK to support farmers during and post-COVID-19 will be:

### During lockdown

1. Providing physical resources like space of KVK to market farm produce of farmers from villages adopted by KVK
2. Working with IT partners to disseminate information on COVID prevention measures and audio and video conferencing to provide extension advisory services
3. Preparation of planting materials for farmers (specially vegetables), providing other inputs like seeds, bio-fertilizers, base materials for enterprises and other possible specialised inputs.

### Post lockdown

1. Provision of planting materials, seeds, chicks, fish seeds of improved varieties and others (prepared during the lockdown period by the KVK)
2. Leasing out farm machineries and implements to certain clusters to reduce labour and its associated cost
3. Disseminating best practices for efficient farming (by reducing external inputs)
4. Providing space to SHGs to work on value addition and processing with available equipment
5. Demonstration of activities in cluster mode rather than individually
6. Again, no doubt convergence with similar organisations will prove effective delivery of the intended relief measures.

Preparation to support farmers post COVID-19 to face Kharif season will be crucial. Sufficient planting materials, quality inputs and advisory services can change the situation. In the case of Odisha, these situations happen twice a year.

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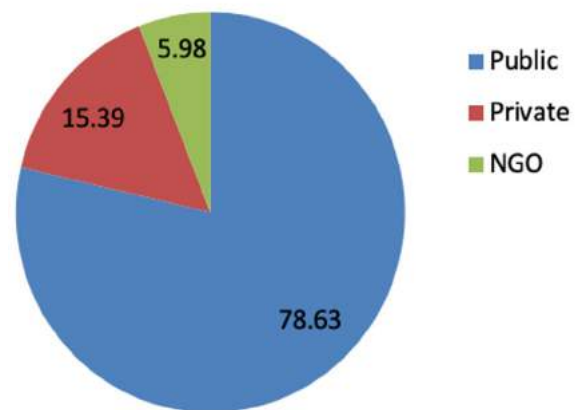


# 111

## COVID-19 IMPACT ON FARMERS IN BANGLADESH: FINDINGS FROM THE BAEN SURVEY

The Society for Bangladesh Agricultural Extension Network (BAEN) recently organized a survey among Extension and Advisory service providers in Bangladesh to understand the challenges faced by farmers due to COVID-19 and the effectiveness of the measures aimed at addressing them. In this blog, **Sekender Ali** presents findings from this survey.

COVID-19 has impacted all sub-sectors of agriculture (crop, livestock and fisheries) in Bangladesh. The nationwide lockdown strategy included several protective measures that resulted in restricted access to agricultural products, inputs, markets and Extension and Advisory Services (EAS). These restrictions, which were in place till 30 May 2020, significantly affected farming, including food supply and demand. Agricultural Extension in South Asia previously published two blogs on the impact of COVID-19 and the role of EAS in addressing some of these issues. In April 2020, the Society for Bangladesh Agricultural Extension Network (BAEN) decided to conduct an online survey to assess the effects of COVID-19 on Bangladesh's agriculture and the effectiveness of interventions. The online survey link was mailed to EAS professionals (representing the public, private and NGO sector). As many as 117 EAS professional responded to the survey. A breakup of respondents by sector of representation has been presented in Figure 1.



**Figure 1: Percentage of respondents from public, private and NGO**

### MAJOR FINDINGS OF THE STUDY

The findings of the online survey to assess the effects of COVID-19 on Bangladesh Agriculture and the effectiveness of interventions are discussed below:

## Problems faced by farmers of Bangladesh due to COVID-19

Due to COVID-19, farmers of Bangladesh are facing different types of problems in varying degrees. BAEN members made an exhaustive list of these problems from different media sources (print and television) and through consultations with relevant EAS experts. This list was further modified and validated by BAEN's

Executive Committee and finally 28 items were included in this study.

Respondents were asked to mention their opinion on the extent of difficulty experienced by farmers due to a select problem as a result of the pandemic. They highlighted their response ('severe problem', 'moderate problem', 'low problem' and 'no problem'). Out of these 28 items, the respondents felt 22 problems were very severe (Box 1).

### Box 1: Problems perceived as severe by the respondents

1. Wastage and low price of vegetables and fruits (at farm gate or local market due to disconnect with the customer, absence of traders (middlemen as collectors, transporters wholesalers, etc.) and vehicles for transport
2. Low price of egg, milk, meat, etc. at farm and local markets due to reduced customer footfall, traders and vehicles
3. Losses from export quality vegetables due to closure of borders and airports
4. Wastage of flowers in farmers' fields as there are no customers, traders, collectors, transporters and vehicles
5. Losses from shrimp to farmers and exporters due to closure of borders and airports
6. Losses from crab and mud eel to producers, and dry and frozen fish to exporters owing to closure of borders and airports
7. Reduced income due to dampened marketing of farmers products
8. Food shortage in agricultural labour households due to lack of work and stay at home
9. Losses for mango and litchi farmers and traders (due to marketing constraints)
10. Low price of fish products at farm and local markets due to reduced customer footfall, traders and vehicles
11. Inability of farmers to pay loan instalments and unavailability of new loan for cultivation and farms
12. Shortage of skilled manpower and labour for vegetables and fruits transporting and marketing
13. Shortage of labour for harvesting and post-harvest practices of Boro rice
14. Complex bank procedures to avail loans for agricultural activities
15. Inadequate supply of inputs for livestock production like days-old chicks, poultry feed, veterinary medicine and vaccine, etc. due to restricted transport and quarantine measures
16. Shortage of labour for post-harvest practices of vegetables and fruits (sorting, grading, packaging, handling, etc.)
17. Farmers have to pay more for buying inputs and food which increases their family expenses
18. Shortage of labour for livestock (poultry, cow, goat, milk, meat, egg, etc.) production
19. Inadequate supply of fisheries production inputs like fish seed, feed, medicine, vaccine, equipment, etc. due to restricted transport and quarantine measures
20. Shortage of food grain, vegetables, fruits, egg, milk, fish, etc. in big cities due to short supply of agricultural products from fields and local markets
21. Shortage of harvesters for Boro rice harvesting
22. Inadequate supply of crop production inputs like seeds, fertilizers, pesticides, etc. due to restricted transport and quarantine measures

Problems related to "wastage and low price of farmers' products (vegetables, fruits, egg, milk, meat, flower, shrimp, crab, etc.) at farm gate or local market due to disconnect with the customer, absence of traders (middle men as

collectors, transporters wholesalers, etc.) and vehicles for transport" were the top ranked problems. Severity of top ranked five problems is presented diagrammatically in Figure 2.



**Figure 2: Top five problems that are assessed as severe**

### Initiatives taken by different organizations to minimize problems faced by the farmers of Bangladesh due to COVID-19 Pandemic

Different organizations of Bangladesh have taken several initiatives to mitigate problems faced by the farmers of Bangladesh due to COVID-19. Perception on effectiveness of these initiatives vary considerably. BAEN members made an exhaustive list of these initiatives to

include in the study. Respondents were asked to mention their perception on the degree of effectiveness of these initiatives by highlighting the correct response - 'highly effective', 'moderately effective', 'low effective', and 'not effective'. The initiatives organized on the basis of rank order for effectiveness are presented in Box 2.

### Box 2. Rank order of initiatives to minimize COVID related problems faced by the farmers

#### Highly effective Initiatives

1. Cultivate every inch of land for more crop production (as directed by the Prime Minister).
2. Implement continuous agricultural activities for ensuring food security (also directed by the Prime Minister).
3. Ensuring all time presence of DAE staff (24 hours every day of each week in respective work areas).
4. Arrange weekly haat (makeshift market) in open field in every area to help farmers sell their produce by maintaining social distance (as instructed by the Prime Minister).
5. Allocation of BDT. 9,000 crore as fertilizer subsidy.

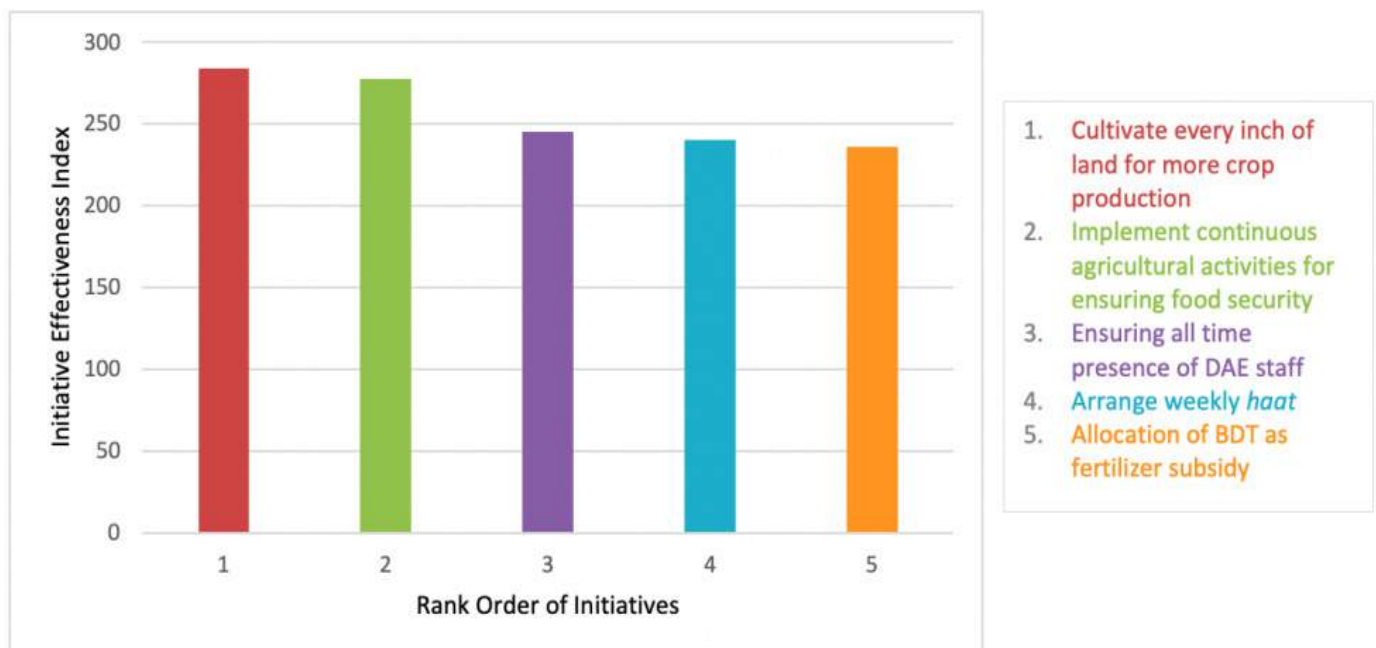
#### Moderately effective Initiatives

1. Ensure hassle-free movement of farm workers travelling from one district to another, especially for Boro rice harvesting.
2. Purchase 8 lakh ton Boro paddy @Tk26 per kg and 10 lakh ton boiled Boro rice @Tk36 per kg from farmers directly.
3. Excluding vehicles transporting agricultural producer and agro inputs (fertilizers, pesticides, diesel, etc.) from lockdown.
4. Distributing seed of BINA-19 rice variety by Bangladesh Institute of Nuclear Agriculture (BINA) for kharif season and providing suggestions for its cultivation.
5. Setting up a control room by the Department of Livestock Services (DLS) to advise farmers.
7. Agri. digital apps support for agricultural advisory services by government/private organizations/mobile company/various projects.
8. Allowing movement of people engaged in crop harvesting and facilitating food and agricultural input supply chain.
9. Upazilla-wise distribution and allocation of farm machinery (Combined Harvester, Reaper and Rice Trans planter with subsidy).
10. Executing necessary measures to enhance Kharif-1 production.

1. Stimulus package of BDT. 5,000 crore for the farmers to boost agricultural production in the backdrop of COVID-19 fallout.
12. Initiating monitoring cell by BADC for emergency situation to preserve Boro seed and distribution of Aus seeds across the country.
13. Allocation of BDT. 200 crore as incentive for purchasing agricultural machinery (especially rice harvesters).
14. Irrigation incentive for farmers provided by BADC.
15. Allocation of BDT. 150 crore as incentive subsidy for purchasing seeds.
16. Continuation of existing disbursement of loans at 4% interest for producing spices like onions, garlic, zinger and chili, etc.
17. Providing food aid and relief to daily wage earners.
18. Credit support by NGOs for farming activities.
19. Setting up of control room by DOF to provide suggestions to farmers.
20. Broadcasting nutrition related audio clips by DOF to create awareness.

Findings revealed that among the 25 initiatives, five were highly effective and 20 were moderately effective. It was also found that initiatives related to the Prime Minister's directions – to cultivate every inch of land for more crop production, implement continuous agricultural activities for ensuring food security, arrange weekly haat (makeshift market) in open field in every area to help farmers for

selling their produce by maintaining social distance, ensuring all time presence of DAE staff in respective working areas and allocation of BDT. 9,000 crore as fertilizer subsidy – were identified as the top ranked initiatives i.e. the highly competent initiatives. Effectiveness of top ranked five initiatives is presented diagrammatically in Figure 3.



**Figure 3: Top five initiatives ranked as effective**

## RECOMMENDATIONS TO MINIMIZE THE IMPACT OF COVID 19

- Based on the above findings, a few suggestions to minimize the problems being faced by farmers of Bangladesh are mentioned below:
- Strictly follow the Prime Minister's directions that have been shown as highly effective.
- All time presence of Extension and Advisory Service (EAS) providers at local working areas for technical support to crop, livestock and fisheries sectors to minimize their problems.
- Effective collaboration and coordination among public and private Extension & Advisory Services (EAS) providers, with BAEN responding to immediate threats to Bangladesh's agriculture.

- Strengthen digital advisory services and provide information on output prices, availability of inputs, etc.
- Arrange proper marketing system to sell farmers' produce (vegetables, fruits, egg, milk, meat, flower, shrimp, crab, etc.), so that they can benefit by getting fair price with minimum wastage.
- Arrange e-marketing system to help farmers buy inputs and sell agro-products in collaboration with BAEN, government's extension organizations (DAE, DLS, DOF, etc.), NGOs (SDI, BASA, iDE, OXFAM, Practical Action, HELVETUS, etc.) and private organizations (One Bangladesh, Matrix, ABC Start-up Ltd. Etc.).
- Organize proper transport system for marketing farmers' products by taking subsidy or aid from donor and development organizations.
- Organize proper transporting and distribution system to transport agricultural inputs from manufacturing and marketing companies to local dealers and farmers.
- Proper monitoring and distribution of government subsidies, grants, incentives, credit, etc. for betterment of farmers.
- Strengthen cooperative farming and marketing systems.
- Ensure migration of agricultural labour from surplus areas to the deficit areas of the country while ensuring proper healthcare for them.
- Increase agricultural mechanization facilities for farmers.
- Providing low interest credit to farmers' groups (common interest groups formed by DAE, farmer groups of NGOs) to buy large agricultural equipment like rice harvesters with matching government subsidy so that small and marginal farmers can harvest their rice and also earn money by cutting other farmers' rice.
- Providing incentives to crab, mud eel and flower farmers as their products are not

saleable due to lockdown of airport and lack of customers; temporally, these areas may be used for producing other crops with incentives.

- Educate farmers about hygiene measures such as handwashing, wearing masks, staying home if sick and maintaining social distancing.
- Ensure vehicle, insurance, incentive, PPE, sanitizer products, etc. for EAS personnel.
- Ensure grants from development partners (FAO, IFAD, other donors, development banks, etc.) for:

- Increasing the capacity of EAS providers
- Increasing capacity of small and marginal farmers to buy agricultural implements
- Establish low cost cold storage facilities at farmers areas



## CONCLUSION

BRAC Survey (2020) reported that the agriculture sector took a major hit as farmers across the country suffered a steep loss of approximately BDT 565.36 billion (56,536.68 crore) during the public holiday (March to May 2020) announced to contain COVID-19. Nationwide lockdown was continued in Bangladesh up to 30 May 2020.

Presently, the country is divided into Red, Yellow and Green Zones based on the severity of pandemic. The lockdown continues in Red Zones. Due to this, agricultural sectors are suffering. Severity of problems faced by the farmers of Bangladesh are mentioned in Box

1 and Figure 2. To minimize the problems faced by farmers, several organisations and the Government of Bangladesh have taken several initiatives. Effectiveness of these initiatives is presented in Box 2 and Figure 3. After conducting this survey, at the time of Eid-ul Fitr, the government provided BDT. 2500.00 to each of the 50 lakh low income population directly by using cell phone account which was very effective in minimising people's problems which were not included in the initial list of the survey.

Bangladesh Army played a major role by collecting vegetables and fruits from farmers at legally prescribed prices and distributing it among low income people, which was also beneficial for both the producing farmers and the needy. A private organization is trying

to introduce online marketing for farmers' products, while another organization, Matrix, started online shop for farmers' products. As per suggestion of BAEN, Matrix is producing quality agricultural food through their contact farmers and those are being marketed by this online shop.

SDI (an NGO) is trying to collect their beneficiary farmers' products to market in Dhaka city. SDI is facing transport problems, as the transport workforce is not willing to work during the pandemic. The transport costs are also very high. SDI is trying to arrange a subsidy from IFAD for transporting farmers' produce. All these organizations have committed to work with BAEN for the welfare of the farmers of Bangladesh.

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# Final Remarks: Beyond Conversations on Extension

When AESA started extension blogs back in 2013, we faced challenges in encouraging EAS professionals to contribute. In the initial days, many found it to be a new experience, and some struggled to adapt their writing style to meet the blog's requirements. However, over the last few years, our contributors have increasingly mastered the art of blogging, and we've been receiving excellent drafts from EAS professionals who want to share their thoughts, ideas, and experiences related to reinventing and reforming EAS to meet evolving challenges.

We, at AESA, are convinced of the need for conversations on EAS, whether in the form of blogs, good practices, meeting notes, face-to-face interviews, or book reviews. Like many of you, we love discussing new ideas and revisiting old ones. Writing for AESA has provided our contributors with opportunities to interact with peers and receive feedback. For young scholars and faculty in the extension discipline, these blogs have offered references and additional reading materials to further explore and learn from. During the COVID-19 induced lockdown period, the online AESA portal helped us maintain professional conversations within our fraternity. During that period, many reflected on the role of EAS in supporting farmers to adapt to the pandemic.

Over the years, we've realized that there is a broader readership for AESA knowledge products beyond South Asia. Many fellow extensionists who are part of the GFRAS Regional and sub-regional networks globally read, share, and comment on our blogs and good practices. We thank all our readers and well-wishers for the feedback and appreciation for our efforts that keep us going.

While online conversations are necessary, we believe that changing the narrative about EAS and enhancing its capacities to deal with emerging challenges will be successful only when such conversations are normalized as part of the work culture in EAS organizations.

As a profession, while we are trying to develop new training modules and courses for our current and future professionals, there are also fellow EAS professionals keen on maintaining the status quo in the way we have been teaching, training, and practicing extension over the last several decades. Although there is a lot of excitement about the renewed policy focus on EAS and the development of new capacities, we also observe a lot of inertia within the EAS community that hinders it from embracing change. As the context has changed, maintaining the status quo will only make EAS increasingly irrelevant. Of course, change is difficult, but change we must, and there is no better time to change than now.

We sincerely hope that these blog conversations will help us move forward faster to embrace change within EAS at different levels.

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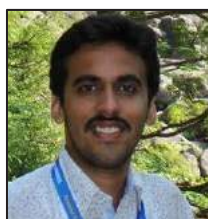
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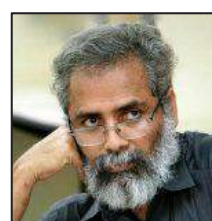
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# BEYOND CONVERSATIONS ON EXTENSION:

## Enhancing capacities to address emerging challenges

During the past decade (2013-2023), the Agricultural Extension in South Asia (AESAs) Network ([www.aesanetwork.org](http://www.aesanetwork.org)) has functioned as a platform for those passionate about Extension and Advisory Services (EAS). It serves as a space to share experiences and perspectives related to strengthening the contribution of EAS to agrifood systems transformation and to learn from these insights. We have consistently published the experiences and insights of our contributors in various formats, including blogs, good practices, meeting notes, face-to-face interviews, and book reviews.

In 2019, we released our inaugural blog book, "Conversations on Extension: Taking Stock and Shaping the Future," organizing the first 100 AESAs blogs under 11 different themes. This publication was a response to the demand from our readers to consolidate these blogs into a single volume, making them available as a comprehensive reference document for a diverse audience involved in EAS. This second volume represents our ongoing effort to compile the next 100 blogs (101-200) published between 2019 and 2023. Notably, this period coincided with the global struggle against the COVID-19 pandemic and its adverse impact on agrifood systems. During this challenging time, we invited EAS professionals to share their experiences on how EAS are aiding farmers in coping with the pandemic. We are also incorporating these COVID-19 Field Notes in this volume, recognizing the valuable lessons they offer for organizing EAS more effectively in similar challenging situations.



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