NSFI GLOBAL AGRI CONNECT 2018

NABARD

GLOBAL AGRI CONNECT 2018

CLIMATE SMART AGRICULTURAL TECHNOLOGIES & INNOVATIONS: IMPACT & WAY FORWARD

PROCEEDINGS AND POLICY RECOMMENDATIONS

NSFI
Driving Change, Delivering Impact

NSFI Global Agri Connect 2018
Climate Smart Agricultural Technologies & Innovations: Impact & Way Forward
- Proceedings & Policy Recommendations

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LIST OF ABBREVIATIONS

CEO	Chief Executive Officer
CRIDA	Central Research Institute for Dryland Agriculture
CSA	Climate Smart Agriculture
CSR	Corporate Social Responsibility
DAC	Department of Agriculture and Cooperation
DFID	Department of International Development
EESL	Energy Efficiency Services Limited
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GoI	Government of India
IARI	Indian Agriculture research Institute
IAS	Indian Administrative Services
ICAR	Indian Council of Agricultural Research
IFPRI	International Food Policy Research Institute
KVK	Krishi Vigyan Kendra
MGNREGA	Mahatma Gandhi National Rural Employment Gurantee Act
NSFI	National Skills Foundation of India
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
UPNRM	Umbrella Programme on Natural Resource Management

SANJEEV ASTHANA
Chairman, NSFI

FOREWORD

Effective action is needed to address the climate risks to food security and livelihod of producers. There is a great deal of complexity and uncertainty around CSA as well as extensive interventions from diverse set of actors engaged in agriculture system. However, the need is for an effective transformation of agriculture system, to enable all farmers that includes women and marginalised groups to become food secure and resilient to climate change. Several commendable efforts by public, private and civil society are making an impact but still not of significant scale.

It is evident that the adaptation and mitigation measures are unable to match up to the negative effects of climate change. Integrated and holistic effort is the need of the hour and principal stakeholders must join hands to deal with impending risks of climate change. Meritorious efforts in isolation will not yield the desired results. Challenge of this magnitude and complexity require creative solutions from all stakeholders. It is time to go beyond "number of interventions" and "quantum of funds" as benchmarks in climate resilience measures.

It is time to rethink our approach as well as our understanding of the real issues and impact created.

Global Agri Connect(GAC) 2018 was a step in the direction. It took note of various efforts in South Asia and other parts of world towards addressing the challenges of climate change. The stakeholders deliberated on what is attempted, the learnings therefrom and how to scale the successful interventions. The conference generated unprecedented enthusiasm on the theme and it' s relevance and brought together serious agencies of repute and experts to discuss and identify solutions on the path to scaling up these technology interventions and innovations. Start ups shared their technologies and innovations and experts representing large agencies discussed their Institutional approach and investment focus of their interventions.

I am happy to share the synthesis of day long deliberations..the specific lessons drawn and recommendation for Policy makers in Public and Private sector. We hope that the emerging discourse on climate smart agriculture would learn and factor in the dimensions that emerged at the conference. Let us collectively strive to outpace the climate risk in agriculture and support the principal stakeholder, small and marginal producer, in handling it effectively. ■

SETTING THE CONTEXT

N. SAI KRISHNA
CEO, NSFI

GAC 2018 is the seventh edition of conference organised by NSFI. From a platform to exhibit success stories to being a medium of deliberations to bring forward various mechanisms and recommendations for scaling up the impact, GAC has evolved leaps and bounds with the support of partners and well wishers. In the current format, GAC strives to bring forward not only the successful examples of technologies and innovations that are path breaking, but also experts to deliberate on ways and means of scaling them up.

Institutions and organizations worldwide that have been working towards the climate change adaptation and mitigation advocates technological interventions in the agriculture sector to make it climate-resilient. Developing countries, such as India is at the forefront of adopting such climate-smart technologies that not only reduce the negative implications of climate change on agriculture, but also increase farmers' income. However, given the lack of sufficient data on the outcomes of climate-smart technologies, it is clearly evident that the adaptation and mitigation measures taken up are not able to match up with the pace of climate change.

Diffusion of technologies is not just a factor of technical aspects but also largely depends on the cross-cutting disciplines of economics, sociology and culture. Thus, an ecosystem-based approach is an urgent need to ensure scaling up. All stakeholders of the agriculture sector, be it Government, corporate, research institutions, civil society including farmers, need to work together and pave the way for the large-scale adoption of climate-smart technologies.

This is to document the deliberations and recommendations that emerged in GAC 2018. We hope that the recommendations and experience of success documented here will enable well-informed decisions for the larger cause.

This is to sincerely thank NABARD for supporting NSFI in bringing out this publication. ■

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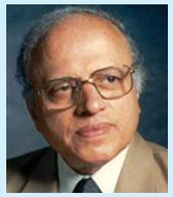

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EXECUTIVE SUMMARY

Climate Smart Agriculture (CSA) technologies has been touted as a method that will help farmers both adapt to a changing climate and to mitigate greenhouse gas emissions while boosting agriculture production

Agriculture both contributes to and is vulnerable to climate change. The extent of climate change impacts depend not only on the intensity and timing (periodicity) but also on their combination, which is more uncertain, and depend on local conditions. Climate Smart Agriculture (CSA) technologies has been touted as a method that will help farmers both adapt to a changing climate and to mitigate greenhouse gas emissions while boosting agriculture production. Importantly CSA technologies integrate the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges.

Cases of successful implementation of climate smart technologies for fruitful impact are observed across different parts of India. The Knowledge report 2018 supported by Yes Bank has documented 100 + Start up focussing on horizontal and vertical value chain, covering innovations from seed to storage. Irrespective of the benefits of CSA technologies, the current rate of adoption by farmers is reported to be low owing to the multiplicity of factors. Many factors influencing the adoption of CSA technologies include socio-economic characteristics of farmers, the bio-physical environment of a particular location and the attributes of new technologies. The identification, prioritization and promotion of available CSA technologies considering local climatic risks and demand for technology are also the factors of importance for adoption.

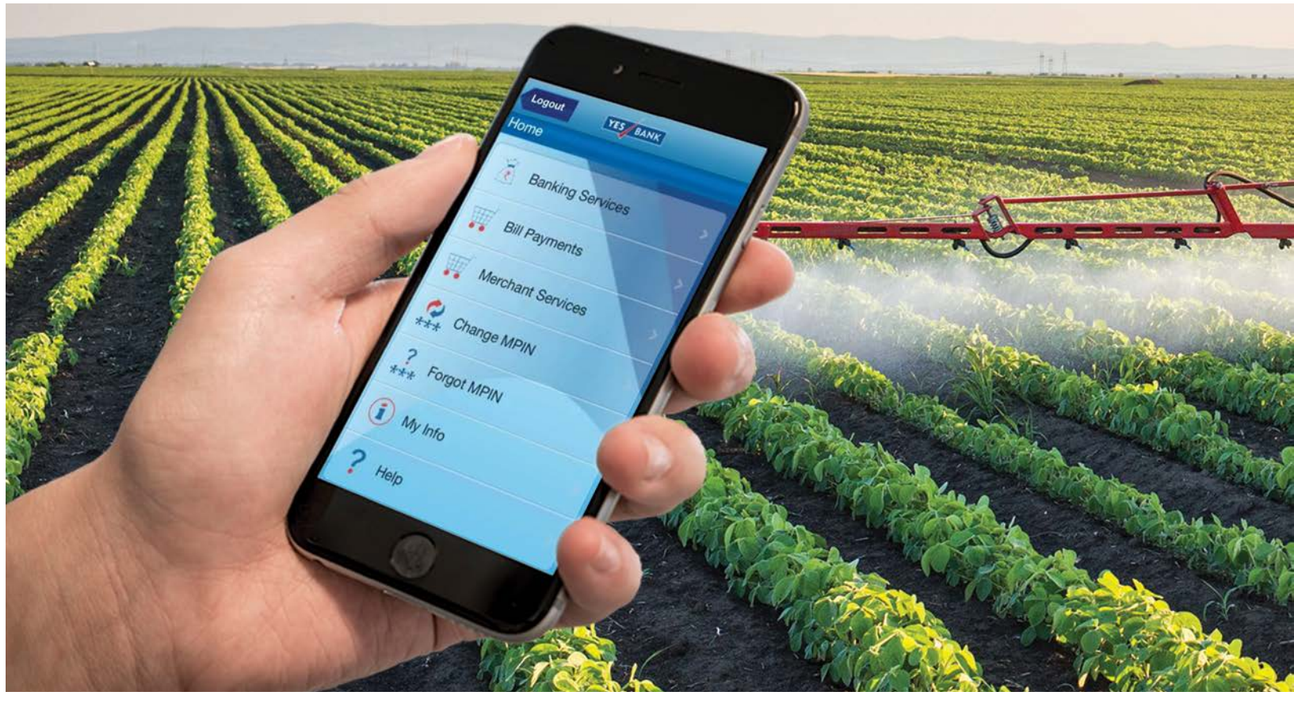
To deliberate on the challenges faced by successful technologies and innovations in the journey of adoption by the end user and scaling up their operations across geographies and contexts, Global Agri Connect 2018 is set out with the theme 'Climate Smart Agricultural Technologies and Innovations: Impact & Way Forward' . Four sessions comprising of technical presentation by start-ups and practitioners, followed by panel discussion with experienced members representing different stakeholders was done.

Speakers presented in the conference on various dimensions of Climate Smart Agriculture. The inaugural session of the Conference was kicked off by National Skill Foundation of India (NSFI) Chairman Sanjeev Asthana. The special address was delivered by Dr. Devesh Chaturvedi, IAS, Additional Secretary, Ministry of Agriculture and Farmer's Welfare, Government of India. The other members of the inaugural session panel were: Dr. Pramod Kumar Joshi, Director for South Asia, International Food Policy Research Institute (IFPRI); Shantanu Mitra, Senior Climate and Environment Advisor, DFID Asia and N. Sai Krishna, CEO, NSFI. Chief Guest of Valedictory Session was Dr. A. K. Singh, Deputy Director General (Agricultural Extension), Indian Council of Agriculture Research who shared his valuable insights on various dimensions of Climate Smart Agriculture. Sixteen representatives of CSA Technologies start ups presented the merits of their offerings, and the challenges they faced in scaling them up. Twenty distinguished panellists deliberated on the dimensions of Climate Smart Agriculture Technologies & Innovations, its impact and factors to consider for way forward.

The salient recommendations that emerged from the deliberations of the conference include:

1. There is a discerning need to create a facilitative ecosystem with clearly defined roles, responsibilities and outcome for each stakeholder. Importantly farmers, policy makers and other stakeholders should work together to bring about the change.
2. A farmer-centred approach is to ensure that farmers have access to climate information and products. Information and access to services will ensure effective adoption of CSA technologies in field.
3. Policies that remove barriers in adopting CSAT at farmers level and create synergies with alternative technologies and practises is important.
4. Training, education and empowerment of women farmers should be given a key priority by all stakeholders to ensure women farmers get informed on the CSA technologies and adopt it in practise.
5. For effective implementation of CSAT in field it is important to build innovative mechanisms to connect existing agricultural finance, crop insurance initiatives with the investments from public and private sectors.
6. Provision of regular training, exposure visit and small-scale demonstration on CSAT is important to the farmers for better adoption of practises in field.
7. In Indian context, use of CSA-T in post-harvest management of technologies will enhance income for farmers besides benefitting the other value chain actors
8. Research focussing on understanding the barriers to adoption of CSAT in different regions and building evidence of the benefits of adoption of technologies will help in convincing the small farm holders.
9. It is important to develop a more influencing and responsive technologies like climate informed agro-advisory services with use of mobile application and customised digital technologies in local languages.
10. The CSR programs and resources can drive social changes in a mission mode if they are adequately motivated by policy framework and directed for focus and action. ■

The CSR programs and resources can drive social changes in a mission mode if they are adequately motivated by policy framework and directed for focus and action



CLIMATE SMART AGRICULTURAL TECHNOLOGIES & INNOVATIONS:
IMPACT & WAY FORWARD

Climate-smart agriculture (CSA) contributes to the achievement of sustainable development goals

Introduction

Agriculture both contributes to and is vulnerable to climate change. Recent trend in agricultural production highlight the impact of climate change. The extent of these impacts depend not only on the intensity and timing (periodicity) but also on their combination, which is more uncertain, and depend on local conditions. Climate variability, more frequent and intense weather events continue to challenge farmers' ability to sustain and increase food production especially among smallholder farmers. Above scenario makes the already precarious global food security situation even more unpredictable. Policy makers and various stakeholders involved recognise the importance and need for immediate actions and efforts to improve the sustainable performance of the agricultural sector.

Multi country studies recognise that the traditional response/technology to address the climate change challenges will not be adequate enough. Climate Smart Agriculture (CSA) practises has been touted as a method that will help farmers both adapt to a changing climate and to mitigate greenhouse gas emissions while boosting agriculture production. Climate-smart agriculture (CSA) contributes to the achievement of sustainable development goals. It integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges. It is composed of three main pillars:

1. Sustainably increasing agricultural productivity and incomes;
2. Adapting and building resilience to climate change;
3. Reducing and/or removing greenhouse gases emissions, where possible.

Building on the learnings of Global Agri Connect 2017, that the current ecosystem of agriculture research and praxis do offer several technologies and innovations, however, they either do not get adopted or face the challenge of scaling up. Cases of successful implementation of climate smart technologies for fruitful impact are observed across different parts of India. The Knowledge report 2018 supported by Yes Bank has documented 100 + Start up focussing on Horizontal and vertical value chain, covering innovations from seed to storage. It is observed that out of box technologies addressing climate change challenges exists but require support for scaling up.

Addressing the gap, the 'Global Agri Connect 2018' has organized the conference to deliberate on pertinent issues relating to adoption and scaling up of climate smart agriculture technologies. Technical presentation, experience sharing and discussions of the event focus mainly on means and making of renewable energy, innovative solutions and climate smart technologies available for women farmers, government policies and practices in building resilient agriculture. In addition, the deliberations also focussed on the role and contribution of corporate in developing climate resilient sustainable solutions. ■

INAUGURAL SESSION

Welcome Address by:

Mr Sanjeev Asthana
Chairman, NSFI

Special Address by:

Dr Devesh Chaturvedi, IAS
Additional Secretary, Ministry of Agriculture & Farmers' Welfare, Government of India

Dr Pramod Kumar Joshi
Director for South Asia, International Food Policy Research Institute (IFPRI)

Mr Shantanu Mitra
Senior Climate & Environment Advisor, DFID Asia

Introduction to Knowledge Report by:

Mr Nitin Puri
Senior President & Global Head – FASAR, YES Bank

Vote of Thanks by:

Mr N Sai Krishna
CEO, NSFI

Sanjeev Asthana

The Inaugural Session of the Conference commenced with the Welcome Address by Sanjeev Asthana, Chairman, National Skills Foundation of India (NSFI). The special address was delivered by Devesh Chaturvedi, IAS, Additional Secretary, Ministry of Agriculture and Farmers' Welfare, Government of India. The other members of the inaugural session panel were: Dr. Pramod Kumar Joshi, Director for South Asia, International Food Policy Research Institute (IFPRI); Shantanu Mitra, Senior Climate and Environment Advisor, DFID Asia and N. Sai Krishna, CEO, NSFI. The session also saw the launch of the NSFI-YES Bank Knowledge report, which is a compilation of 100 + start ups focussing on climate smart Agriculture technologies.

Major Highlights from Inaugural Session

Welcome address by Sanjeev Asthana: Global Agri Connect event brought together principal stakeholders to deliberate on emerging technologies and innovations in agriculture thus increasing their outreach through positive solutions. Studies and general observation of things highlight climate change is happening and its effects are being felt across the world. The changes are becoming more inevitable and the challenge to address the issue is gaining momentum at all levels. Importantly farmers, policy makers, private sector players, value chain players engaged in building resilient Climate Smart Agriculture Technology (CSAT) should work together to bring about the change. Ensuring food security to the raising population and government policy of doubling farmers' income by 2022 add to the existing challenge of developing CSAT that is adoptable and scalable in diverse agro climatic situations.

Context of present conference is identifying and documenting innovative business models of CSAT. Emergence and evolution of different Start-ups focussing on CSA technologies is a growing body of knowledge to learn from each other. Main challenge in current context is focus on research' to understand how to scale up the CSAT to larger level, how it is impacting the community / sector at large, understand the willingness to pay for it, practicality of the solution and the struggles / challenges to scale up or is it localised and regional in nature. Large level scaling up of CSAT remains the main challenge to focus and address on. Sub Themes of current GAC 2018 include:

- *Renewable Energy in Climate Smart Agriculture:* Means and Making
- *Women at the short end of the Climate Change:* Discourse & Action
- *Enabling Climate Resilient Agriculture:* From Policy to Practice
- Corporate Sustainability and Contribution to Climate Resilience

Broadly the expected discussion points and learnings from GAC 2018 focus on how to scale up the CSAT that is profitable as well as work for the benefit of the farmers. How the double burden of Climate Change influence in ensuring food security and technologies influence and affects the women to take up the technology within the existing social norms. How it enables global investors to access and manage climate-related risks and opportunities in their portfolios.

Broadly the expected discussions points and learnings from GAC 2018 focus on how to scale up the CSAT that is profitable as well as work for the benefit of the farmers

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Dr. PRAMOD KUMAR JOSHI

Director for South Asia, International Food Policy Research Institute (IFPRI)

Climate Change is emerging as an important obstacle of economic transformation particularly in the field of agriculture development. Facts highlight that globally 800 million people are affected by Climate Change. It impacts agriculture production very severely and result in economic losses. Globally the estimated economic loss is 90 billion dollars. Policy analysts note that climate change obstructs the development agenda of many countries. Climate Smart Agriculture (CSA) technologies should focus on:

1. Improving Productivity of land and labour
2. Reducing risk mitigation
3. Reducing Greenhouse emissions

CSA is a blend of various components and it' s a process. Multi stage sequential adoption is done and definite mechanism is used to upscale CSAT. For instance many of the existing watershed or micro-irrigation projects of Government of India are example of CSAT. To build resilience of farmers, crop insurance was introduced. The major constraints of CSA are:

- Location specific CSAT: One technology cannot be replicated for multiple situations / Locations.
- Awareness about CSAT – not available. Commitment of resources is absent in state level programs
- Access to CSAT to Small and marginal farmers is poor
- Affordability to use various components of CSAT remains a challenge.

In Bihar, the shift from electric pump to solar pump has resulted in increased profit to the farmers. Number of crops per year and labour productivity increased in farms where solar pumps were introduced. The adoption of CSA technologies and conservation agriculture practises are found to be important and need to be promoted in states like Punjab and Haryana. For instance burning of farm residue is an issue where private cost of burning is very low but social benefit / cost is high. In above context it is important to educate the farmers, ensure effective regulating mechanism is in place and capacity building of different stakeholders becomes important. Existing schemes/ programs addressing CSA need to be converged and used. The agenda of social welfare linked with agriculture production will help in financing these activities.

Supportive institution policy is important in promoting CSAT coupled with commercial viability of the technology for easy adoption and scaling up. With above factors Private sector engagement will flow in and in cases the combination of Public Private Association to promote CSAT can be attempted.

Supportive institution policy is important in promoting CSAT coupled with commercial viability of the technology for easy adoption and scaling up

Dr. Pramod Kumar Joshi

Shatanu Mitra

SHANTANU MITRA

Senior Climate & Environment Advisor, DFID Asia

Climate change is very serious issue and the vulnerability and impact will largely affect the community in South Asian region. About 5.8 million was spent by UK government in last five year period to address and mainly create awareness about the issues. In recent years, investment in green growth technologies is emerging across region to check-out the challenges and to mitigate the effects. Multiple partnership and interventions are important and required to address the issue of climate change. For instance UK Met offices, Indian Met Dept, World Bank came together to share information on weather. The information is made available at policy level, community level, both in rural and urban context.

The information is used as a tool to make decisions in terms of crop selection, area to be cultivated and season, help in water management by increasing cooperation among different players and help mitigate flood. At village community level, infrastructure development through soil water conservation program, micro irrigation structures is facilitated.

Study carried out in India (6 States), Bangladesh, Pakistan highlight that innovation not only in technology development is good but required at policy level, planning and budgeting of the intervention to build greater resilience. Above coupled with right financial services / models to reach out the farmers along with insurance against risks will result in positive outcomes. In Kerala through National Adaptation Fund, saline tolerant crops are promoted for coastal farmers. Green Climate Fund focus on providing research support to promote and document CSAT in and around India.

Climate change is a highly complex and multi dimensional problem to address. In above context, it is important to get different stakeholders (Private sector/ Innovators/ Policy makers) perspectives and views of the emerging state of knowledge in CSAT adoption and promotion. NSFI role in creating a platform to discuss the issue is appreciable and we look forward to work together in future.

NSFI role in creating a platform to discuss the issue is appreciable and we look forward to work together in future

Dr. DEVESH CHATURVEDI, IAS

Additional Secretary, Ministry of Agriculture & Farmers' Welfare, Government of India

"जान है तो जहान है!"

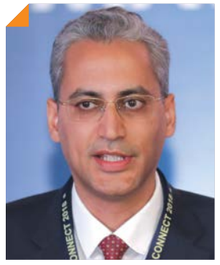
If environment is not conducive for human life then we cannot survive – Dr. Devesh Chaturvedi has started his speech with the meaningful Hindi proverb. Importantly air pollution, water pollution and food pollution (due to use of inorganic fertilisers) is increasing across the globe. With focus on increasing contribution of agriculture towards National GDP (Gross Domestic Product) farmers are really stressed and bear the maximum brunt of Climate Change. Main challenge is to increase production / productivity and to double the farmer' s income by 2022. Reducing the cost of inputs used in agriculture, findings ways to market the produce (issues of perishability) and minimizing post harvest losses are the other dimension that need attention.

In the recent years, Government of India has taken various steps to address the above challenges:

- Technical input is provided to promote organic farming in India. Main challenge is convincing farmers from fertiliser usage. Private sector need to play an important role in aggregating the small and marginal farmers and marketing of agriculture produce.
- Promotion of Micro Irrigation facilities across region. As of now about 24 lakh hectare of land is under micro irrigation and the government

Dr. Devesh Chaturvedi

Various steps were taken by Government of India to tackle climate change are challenged, due to the large number of Small farmers and Marginal farmers in the country



Nitin Puri

intend to reach to 200 lakh hectare in next 5-6 year period. Private sector should help reduce the cost of structure and promote effective low cost models.

- Soil Health Card Scheme was initiated by Government of India to promote optimum use of fertilisers. Farmers awareness and capacitation is important to help farmers understand the findings of the card.
- Agriculture extension department play important role in educating and changing the cropping pattern and in establishment of small level soil testing labs functioning at micro level.

Various steps were taken by Government of India to tackle climate change are challenged, due to the large number of Small farmers and Marginal farmers in the country. Indian agriculture is characterised by tenancy farming, in absence of land rights they are not able to avail any subsidy / schemes. In above scenario, model land leasing and aggregation of farmers into group becomes very important. Keeping these dimensions in view, innovation and development of CSAT is the need of the hour.

It is observed that out of box technologies exists in the CSAT space and require support for scaling up. Start-ups require not only regular hand holding support but favourable policy supporting start-ups from Government institutions

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NITIN PURI
Senior President & Global Head - FASAR, YES Bank

YES bank is associating with National Skills Foundation of India as Knowledge Partner for seventh consecutive year. 100 + Start ups was documented for this year report focussing on Horizontal and vertical value chain, covering innovations from seed to storage. It is observed that out of box technologies exists in the CSAT space and require support for scaling up. Start-ups require not only regular hand holding support but favourable policy supporting start-ups from Government institutions. YES Bank SCALE – Accelerated program helps in identifying and supporting the start-ups. GAC 2018 sets a perfect setup to associate with each other and take up forward the start-ups. ■

SESSION - I

Renewable Energy in Climate Smart Agriculture: Means & Making

Technical Presentation

Ms Nidhi Pant
Co-Founder, S4S Technologies

Ms Sonal Adlakha
Claro Energy Private Limited

Mr Tauseef Shahidi
Research Analyst
Council of Eneregy, Environment & Water (CEEW)

Mr Suyog Patel
Product Design Manager
Sangam Ventures

Panel Discussion

Mr Bhawanjeet Singh
Chief General Manager (Technical)
Energy Efficiency Services Limited(EESL)

Mr Arpit Srivastava
Head – Business Development Products
Tata Power

Ms Sangita Ladha
Vice President – Marketing & Business Development
Jain Irrigation Systems

Mr Hemendra Mathur
Venture Capitalist, Bharat Innovation Fund

Bhawanjeet Singh

Arpit Srivastava

BHAWANJEET SINGH
Chief General Manager (Technical), Energy Efficiency Services Limited (EESL)

Climate Smart Agriculture technologies are important in current changing context. The innovations should have value proposition for all the stakeholders involved. In reality various bottlenecks prevent innovations to scale up. For instance renewable energy is largely seasonal in nature and their availability across region is an issue.

In India about 20 million agricultural pumps are in operation which are diesel based and are grid connected. With increasing cost and issues related to environment, solar system offers immense opportunity to replace the conventional pumps. Though subsidised heavily, the pumps are unaffordable to small farmers due to their high upfront cost compared to electric pumps.

EESL through solar mini grids aim to provide reliable source of energy – where farmers can mobilise revenue by selling excess power back to the grid and contribute to society by water conservation. In addition to subsidy provision, many other ways are identified to engage farmers in using solar pumps:

- Demonstrate the CSAT and pilot test the technology for others to see and believe.
- Awareness creation among farmers about government schemes and programs highlighting the benefits.
- 'Pay as you Save' mode is used to repay loan.
- Convincing the farmers to replace the traditional pumps with solar by highlighting the needs and importance of use.

ARPIT SRIVASTAVA
Moderator, Head -Business Development Products, Tata Power

The concerns and growing awareness among stakeholders about climate change debate poses serious challenges in recent years. Tata power is committed in combating climate change and leads the way in generation of non-emitting sources of energy that provides low cost electricity and helps reduce carbon emissions. By involving different stakeholders across the value chain the agency helps address the uncertainties, build positions in growth markets, secure access to needed resources and move towards a sustainable and inclusive development path.

Tata Power has developed innovative solar solutions for both rural and urban markers – that include off-grid and on-grid rooftop solutions and saawan solar water pumps. Main benefits include reduction of electricity bill and low maintenance cost of the unit. With customised solutions for sectors ranging from education, health, banking and telecommunication Tata power solar is the leading player in the solar EPC (Engineering, Procurement and Construction) industry.

HEMENDRA MATHUR
Venture Capitalist, Bharat Innovation Fund

In the recent times, Indian start-ups are successfully producing globally competitive solutions across themes like energy, agriculture, healthcare technology enabled by cutting edge research and use of Artificial Intelligence and Digital tech driven technologies. Bharat Innovation Fund supports the start-ups by providing the capital, access to the market, strategic inputs and partnership connect.

Using real time digital technology driven data, the start-ups are able to build potential models to predict and address the uncertainties of climate change and its challenges. The farm tech driven innovations help predict how much of the farm produce is available and suitable for cold storage. It is important that the venture capitalist should understand and give minimum three years of time to realise the investment success. Farmer will be interested to pay for the technology by comparing and seeing the positive farm economics of adoption and way of 'pay per use model' method.

Importantly the Bharat innovation fund through their early-stage capital, unparalleled networks, strategic insights and operational hand-holding, significantly helps de-risk the process of conversion of innovative ideas into companies of positive success.

SANGITA LADHA
Vice President -Marketing & Business Development, Jain Irrigation Systems

About 20% of all the electricity used in India is for agriculture, mostly for irrigation purpose. In few states, with free farm electricity the percentage is as much as 30-50%. Addressing the electricity challenges, Jain irrigation plays a significant role by providing low cost technologies and promotion of solar based agriculture pumping systems.

Solar powered community micro irrigation system in Punjab, solarisation of lift irrigation pumping station in Himachal, individual solar agri pumping system in Karnataka and Rajasthan are some of the CSAT innovations across regions. In India Solar pump are always supported by subsidy (subsidy driven) and is less effective in rice based cropping zone where flood irrigation is mandatory. Further the availability of free electricity and availability of canal system of farm irrigation as in Rajasthan pose challenge for adoption of solar pumps in Indian context. ■

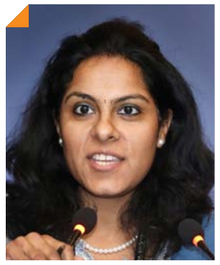
> Using real time digital technology driven data, the start-ups are able to build potential models to predict and address the uncertainties of climate change and its challenges

Hemendra Mathur

Sangita Ladha

TECHNICAL SESSION - I

Nidhi Pant



Sonal Adlakha

NIDHI PANT

Co-Founder, S4S Technologies

Global estimate highlight that annually about 1.3 billion tonnes of food produced are lost or wasted due to post harvest losses. The estimated loss accounts about $990 billion USD annually. Importantly the existing food dehydration industry spends 40 per cent of their Cost of Goods Sold (COGS) on fuel which is mostly coal.

To address the above challenges S4S Technologies design climate smart innovations that provide single window solution at farm and food processing company level to convert post harvest losses into value added dehydrated products. The S4S Solar Conduction Dryer (SCD) is a solar powered food dryer that help reduce moisture content in agro marine produce and increase shelf life upto one year without using any chemicals. The technology uses all modes of heat transfer together (conduction, convection, radiation) to achieve the best drying efficiency maintaining 85-95% nutrition intact.

About 1500 SCD are installed across eight countries covering about 15000 women farmers resulting in 20-30 per cent increase in annual farm income. Based on field experience to address the capital investment cost the 'rent plus model' and 'pay per go model' are used to reach particularly onion and ginger farmers in India. S4S climate smart technologies are successful in targeting eight out of seventeen UN Global Goals for Sustainable Development.

SONAL ADLAKHA

Head, Institutional Sales, Claro Energy Private Limited

For small and marginal farmers in India, timely irrigation remains a challenge mainly due to the fragmented and scattered land, access to electricity and increasing cost of diesel. Field observation note that cost of irrigation and profit obtained from farm are inversely proportional due to huge cost involved.

Addressing the challenge, Claro Energy has come up with an innovative solution to provide Irrigation as a Service (IaaS) that bring solar irrigation for marginal farmers at low cost and in a environment friendly way. The Claro Agro centric minigrid is referred as the economic centre of the village that provides agri inputs, crop and loan advisory and market linkage of farm produce.

The mobile solar panel vehicle / mini rickshaw reaches the farm lands in remote locations to provide irrigation services and also used in oil expellers, rice hullers. Mobile App and toll free number are used by the farmers to schedule the services for their farm based on need and crop stage. Option of payment through various models are available to access the service that include cash deposits, Pay Go Card, Mobile Payment system and through microfinance institutions. In addition to saving huge investment cost for diesel irrigation, the technology help small land holders to save about 50 per cent of the traditional irrigation cost. Claro propriety, IOT and Power electronics technology allow remote monitoring of remote grids and mobile trolleys. Combination of affordable smart technology not only help address the climate change challenges but also help improve the socio economic development of farmers at grassroots level.

TAUSEEF SHAHIDI

Research Analyst, Council on Energy, Environment & Water (CEEW)

Policy makers and stakeholders are adopting various approaches to promote solar based irrigation among farmers in India. High initial investment cost and availability of limited subsidy for scaling up are challenges identified in wide scale adoption. Also study conducted by Council on Energy, Environment & Water (CEEW) note that only about 27 per cent of farmers have heard about Solar Powered Irrigation System coupled with limited awareness among bank field staff about its benefits are constraining adoption in reality.

Addressing the challenge CEEW has developed comprehensive web-based analytical tool to assist stakeholders in taking decisions for prioritizing target districts based on their relative conditions and overall suitability of various approaches to deploy solar for irrigation. The Solar Pumps Tool was developed by aggregating and analyzing district-wise data for more than 600 districts across India using 20 parameters. The tool also helps stakeholders to understand district specific impetus factors and bottlenecks affecting the suitability of solar for irrigation.

SUYOG PATEL

Product Design Manager, Sangam Ventures

Leveraging experience as a Venture Capitalist Sangam Ventures help create an ecosystem for Cleantech entrepreneurship to thrive in India. Sangam 'Atal Incubation Centre' (AIC) and 'acceleration' program help Cleantech start-ups to achieve the product - market fit and scale high impact solutions to larger level. The Startup Evolution Framework developed by sangam ventures help address the following - Customer Discovery (Who will buy); Product Market Fit (why to buy); Financial Management and Business strategy (What is the profit) and Investor (Who and Where to get).

Sangam venture has worked with KHETHWORK to build reliable, solar-powered irrigation systems that enable vegetable farmers to cultivate through all three seasons. The challenge of inconsistent monsoon rains and costly fuel based pumping are addressed through the innovation.

The B2B cold storage partnerships with Infic Id help provide milk storage and collection across 6.5 million villages. The low cost, clean solution - thermal energy storage for refrigeration applications has helped to reduce post production, preventing green house emission and energy efficiency.

Carbon Masters startup has developed a business model for bottling and sale of biogas for kitchens, automobiles and agro-industries reducing harmful Methane and CO2 emissions. Above product provides an alternate to Indian consumers in place of LPG. Taking forward the idea of farming as service EMB Agro services is help solving the problems and needs of marginal farmers by providing quality services (pay as you go). ■

Tauseef Shahidi

Suyog Patel

Combination of affordable smart technology not only help address the climate change challenges but also help improve the socio economic development of farmers at grassroots level

SESSION - II

Women at the short end of the Climate Change: Discourse & Action

Technical Presentation

Mr Rizwan Uz Zaman
State Team Leader (Assam)
Action on Climate Today (ACT)

Ms Ruchi Jain
Founder/CEO, Taru Naturals

Mr Vishwas Gupta
Founder, Farms2Families

Mr Pradip Kumar Mohapatra
Project Manager, CARE India Solutions for Sustainable Development

Panel Discussion

Ms Suhela Khan
Program Coordinator, UN Women

Ms Bharati Joshi
Technical Director, CARE-India Solutions for Sustainable Development

Mr D K Manavalan
Executive Director, Action for Food Production (AFPRO)

Dr K S Muirali
Senior Program Officer, International Development Research Centre (IDRC)

BHARATI JOSHI

Technical Director, CARE India Solutions for Sustainable Development

Developing and scaling-up gender sensitive CSAT remains a challenge and we need to move a long way to make it women inclusive. Currently the efforts observed during development phase and at policy level remains more of a tokenism with no / minimum efforts to integrate all aspects of development and program implementation. With evolving CSAT across spectrum it is important to recognise the role of women both in planning and implementation of CSAT.

Skilling and capacitation of women should be coupled with sensitisation of different stakeholders involved in the value chain process. Globally gender mainstreaming is accepted as strategy to promote gender equality. It involves ensuring that gender perspectives and equality are central to all activities – policy development, research, legislation, resource allocation, planning, implementation and monitoring of programs and projects. Above help facilitate women as well as men to influence, participate in and benefit from development efforts taken to address climate change challenges.

SUHELA KHAN

Program Coordinator, United Nations Women

Men migrate outside their villages in search of income and women contribute the most in agriculture production and management of farm. But in a patriarchal setup, women identity as farmers' is still a question as land rights are owned by the male members of the family. In last two decades, various initiatives, schemes were implemented by Government of India to address the gaps and facilitate inclusion of women in the value chain process. In Kerala, Kudumbashree program members who are part of the Self Help Group initiative jointly lease in agriculture lands for farming, which is not possible when they approach independently. The initiative has helped these agriculture labourers to become producers.Similar instances are observed in case of Andhra Pradesh and Tamil Nadu initiatives. Importantly many of this SHG focus is on savings and credit perspectives and need to be upgraded to help women realise their own potential in establishing and utilising technologies for development of self and nation. Potential Community resource person are to be identified, trained and effectively used to reach the women in remote areas. It is important and required that women are capacitated about the CSAT that is available in the sector and encouraged to use in daily life to bring about the change at family and community level.

Indian society particularly women are equipped with traditional knowledge passed on through generations and have great understanding of ways to face the adversities, risks associated with challenges of climate change. It is important to document the knowledge for scaling up and adoption by all.

D. K. MANAVALAN

Executive Director, Action for Food Production (AFPRO)

About 80 % of the farm labour is contributed by women in India and is increasing over last two decades. The feminisation of agriculture farming should be the focus for the policy makers and approaches need to be structured accordingly.

Under Article 243, Panchayat are conferred with power and authorities to self govern and manage about 29 items e.g., land improvement, minor irrigation, animal husbandry, fisheries, education, women and child development. Awareness and capacity of women need to be increased to realise the potential and use it for manage-

Bharati Joshi

Suhela Khan

D. K. Manavalan

Dr. K. S. Murali

ment of resources for instance, ensure drinking water security, avoid wastage of excess use of water in agriculture farm, minimum use of pesticides in farms.

Local person from within the community are to be trained and capacitated regularly, who inturn will learn and share proper agronomic practises of crops, management and execution of initiatives to take care of Common Property Resources with other members of the community. Enough time and resources are to be invested to ensure women are capacitated and skills are improved in the area of water management, seed and disease management. Provision for demonstration of best practises (learn by observation) and regular follow-up of technology adoption will help address the issues and challenges of climate change.

Many of the CSAT technologies available are location specific and face the issue of scaling up due to its cost and adaptability across regions

Dr. K. S. MURALI

Senior Program Officer, International Development Research Centre (IDRC)

With men moving out in search of employment, Indian agriculture is run and managed by women in recent decades. But ironically the involvement of women in designing and development of CSA technologies is low or absent. To reduce the drudgery and health risks associated with traditional firewood cooking – cook stoves were designed and promoted but with minimum involvement of women in designing process resulted in final product having low acceptance among the community. On other hand mobile solar pumps were used to improve irrigation efficiency and overall crop yield of farmers but faced the problem of scaling up due to its cost & availability of groundwater resources. In general many of the CSAT technologies available are location specific and face the issue of scaling up due to its cost and adaptability across regions. ■

TECHNICAL SESSION - II

PRADIP KUMAR MOHAPATRA

Project Manager, CARE India Solutions for Sustainable Development

Where the Rain Falls' is CARE India project implemented in Chhattisgarh State with focus on women farmers. The project covers 40 villages of Jashpur district in Bagicha and Pathalgaon blocks (20 villages in each block) and 10 villages of Buldhana district in Jalgaon Jamod block with objective to scale-up of climate smart agriculture practices. Main objective of the project is to enhance the resilience of marginalized population towards climate risks by building their adaptive capacities and climate-resilient livelihoods. Further integration of change in policies and practices of stakeholders is required to help address climate change challenges.

The project key interventions include promotion of women' s Self Help Groups and strengthening of savings and credit activities for increased resilience. Formation and strengthening of Village Development Committees to prepare Community Action Plans and advocate with relevant stakeholders is important.

Uniqueness of the project include development of Gender Integrated Detailed Implementation Plan (DIP) in consultation with stakeholders and regular organsiation of Gender Transformative Change (GTC) training to different partners in addition to community members. Male champion/ women champion in project villages were identified and experience sharing was organsied in different villages that help convince the farmers and community the importance and role of women in adoption of climate resilient livelihoods.

RIZWAN UZ ZAMAN

State Team Leader (Assam), Action on Climate Today (ACT)

Climate Change Innovation Programme is implemented by Action on Climate Today (ACT) in different states of India. All projects aim to relook development actions from gender perspectives and use gender budgeting as a tool to include women in all the socio economic interventions. The motto of 'Leave NO one behind' and adoption of gender mainstreaming activities help to reverse the affect of climate change on women.

In Assam, ACT has carried out detailed value-chain analysis of tea crop to map risks due to Climate Change and arrive at strategies to improve income of farming communities with focus on women who play a major role in plucking of leaves and working on production line. Grain banks initiatives in Uttar Pradesh, Madhya Pradesh and West Bengal help ensure food security for both men and women during lean periods, as also during and after disasters. Managing grain bank empower women to make decisions and earn respect from the men folk. Also within home the women' s negotiation power has increased.

Field observation reveals increased participation of women to become active participants in envisaging the future of their village, community and self as a result of their access to resources and finances. Women' s involvement in agriculture has enabled them to increase their mobility, ensure better health care which resulted in improvement in their productivity. Strengthening the role of women also contribute positively towards climate resilient agriculture.

Pradip Kumar Mohapatra

Rizwan Uz Zaman

Women's involvement in agriculture has enabled them to increase their mobility, ensure better health care which resulted in improvement in their productivity

Ruchi Jain

Vishwas Gupta

RUCHI JAIN

Founder/CEO, Social Entrepreneur and Environmentalist, Taru Naturals

Taru Naturals have reached about 3000 small scale farmers across country. By aggregating small farmers into network the intervention focus on marketing organic, natural, forgotten superfoods products, fair-trade and artisanal products from small scale farms to consumers directly.

Solution to address future challenge is to provide training on climate resilient agriculture technologies, identification and access to technology that help reduce post harvest losses and creating market for products with assured buy back mechanisms. Access to common packaging services and quality knowhow coupled with market for produce that includes B2B (Restaurants) and B2C (online and home entrepreneurs) are the other services offered as part of the intervention.

Main challenge faced include access to government schemes, absent of small scale food processing techniques, expenses involved in organic certification system and lack of industry connects for market linkages.

Intervention impact include average farm income improvement, development of community level infrastructure for food processing, assured market linkages for small farmers, increased land restoration to organic resulting in better productivity and drought proofing in areas traditionally affected by climate change.

VISHWAS GUPTA

Founder, Farm2Families

Farm2Families is innovative agri start-up that provides a piece of farm land on rent basis to potential customer where chemical free organic vegetables are grown. Based on preference & taste of the customer, vegetables are grown in the allotted farm. The harvested produce or vegetables are delivered at customer door step on every 4th day of the week. Customer can monitor their farm through mobile app to check activities carried out in the farm. The start-up can breakeven of the initial investment or make profit by serving 22 customers per acre.

Main challenge faced by urban consumer is access to chemical free fresh vegetables and differentiating between products labelled as organic and non organic vegetables that are available in the market. The innovation helps ensure zero wastage of produce harvested from farm and provide financial stability to the growers with assured market. ■

SESSION - III

Enabling Climate Resilient Agriculture: From Policy to Practice

Technical Presentation

Mr Manoj Yadav
Project Advisor, GIZ

Mr Pankaj Pipariya
India Sales & Alliances Leader
The Weather Company, IBM

Mr Simon Croxton
Lead Technical Advisor
Action on Climate Today (ACT)

Mr Amardeep Sibia
CEO, Satsure

Panel Discussion

Ms Alka Bhargava, IPS
Joint Secretary, NRM & IC
Ministry of Agriculture & Farmers Welfare

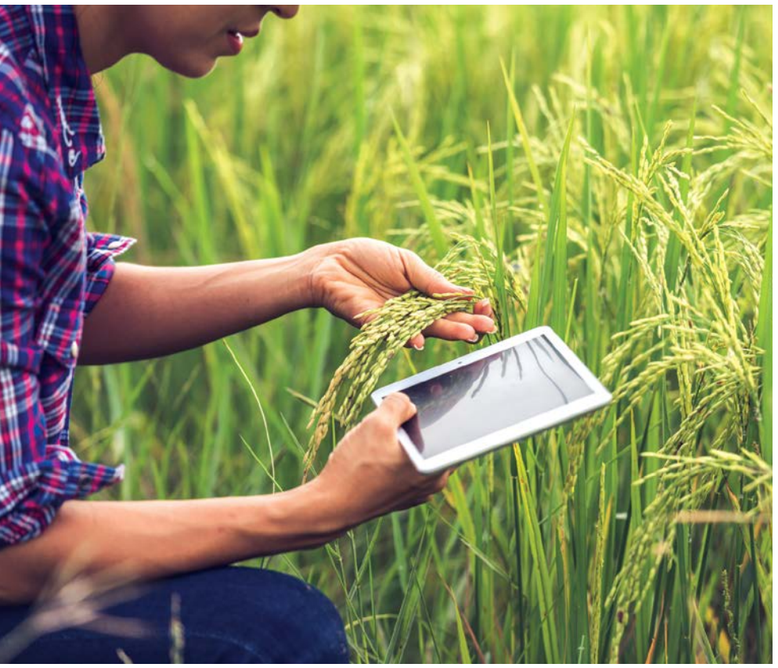
Mr Prathemesh Barar
Director – Business Development, Equicap Asia

Ms Vidya Soundarajan
Program Head – India
Action on Climate Today (ACT)

Mr Rajeev Ahal
Director, GIZ

Prathemesh Barar

Rajeev Ahal



PRATHEMESH BARAR

Director, Business Development, Equicap Asia

Mobilisation and attracting private investment to promote and scale up CSA technologies is a challenge and equicap Asia play an important role in addressing the gap. Help in proper identification and facilitation of venture capitalists to invest on the start-ups[l] and technologies. CSA technology like Hydroponic farming has emerged as a way to grow vegetables in controlled environment and is being taken up in Himachal Pradesh.

In the coming years, policy guidelines supporting hand holding support for start-ups will be important till the technology intervention become more sustainable. Training farmers and sensitisation of the benefits of CSA usage needs to be part of the handholding support. With proper guidance and market linkages the farmer will realise better value for the produce.

RAJEEV AHAL

Director, GIZ

In the changing climatic situations, addressing vulnerability at farm level is important and developing technologies addressing the issues become more significant. Focus on developing weather resilience products like crop insurance, livestock insurance is important. At initial stages subsidisation is important and required to take the technology to small and marginal farmers. With realisation of positive benefits through use of technology the farmers will be ready and start paying for the services. Every state in India need to work and develop state action plan to meet out the climate change challenges. At next level, linking action plan with financial institutions that include climate financing becomes important.

GIZ supported Umbrella Programme on Natural Resource Management (UPNRM) focussing on two aspects namely community participation and Natural Resource Management mainly to address climatic aberrations. Of those bank linked across 22 states in India about 93 % of the loan was repaid[m]. Further it is important to link and integrate existing government schemes like MGNREGA, PMKVY in addressing the climate changes.

ALKA BHARGAVA, IFS

Joint Secretary, NRM & IC, Program Head, India, Ministry of Agriculture and Farmers' Welfare

Moderator

Recent agriculture statistics highlight reduction of farming area, size of land that is challenged with increasing productivity to ensure food security and doubling of farmers' income. Various policy initiatives are taken by Government of India to build resilience of farmers against climatic aberrations. Changing cropping pattern and impoverished irrigation structures are the focus for CSA Technologies. District Contingency Plan is prepared with focus on agriculture, livestock and fisheries by the Department of Agriculture and Cooperation (DAC) with the able support of Central Research Institute for Dryland Agriculture (CRIDA) in coordination with state agriculture universities and KVKs[n]. The contingency plans help the states to focus on preparedness for inputs, energy requirements and to dovetail budgetary support from various ongoing schemes of Government.

The contingency plan documents present information about the district like soil, temperature, average rainfall received and crops grown and strategies / instructions on what to do in case there is delay in monsoon onset, incidence of drought, delayed or limited issue of water for irrigation and extreme weather events like heat wave, cold wave, frost, hailstorm and cyclone.

To address the issue of climate change Government of India is promoting organic agriculture, shift to millet based cropping, aggregation of farmers and ways to address post harvest losses. In above context, GoI has approved 2018 as National Year of Millets to boost production of the nutrient rich millets and the sunrise agriculture industry involved in it. Observation of 'Year of Millets' will help in promotion of production and consumption of millets which will substantially contribute to the fight against hunger and mitigate effects of climate change in long run.

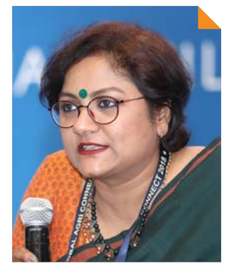
Soil health report and online data dashboard is available that needs to be effectively used by the farmers to ensure optimum / correct use of fertilisers.

Alka Bhargava

VIDYA SOUNDARAJAN

Program Head, India, Action on Climate Today (ACT)

Action on Climate Today (ACT) works closely with government institutions, community based institutions in India to develop strategies and build resilience to the impact of climate change. To promote adaptable Climate Smart Agriculture technology involvement of all stakeholders in the process is important and integration of policies, plan and budget is important. Technology should be effectively used in developing products that help build resilience against climate change like insurance for crop, livestock and produce. The role and contribution of private sector is important. At larger policy level changes influencing climate change aberrations by Government of India is indispensable like water resource allocation, soil conservation and micro irrigation structures. ■



Vidya Soundarajan

TECHNICAL SESSION - III

Simon Croxton

Amardeep Sibia

SIMON CROXTON

Lead Technical Adviser, Adaptation, Action on Climate Today

Climate change aberrations are influenced by different external factors like Globalisation, Social and civil insecurity, Trans-boundary issues, Population increase, changing consumption pattern and Natural Resource degradation of the region. A Climate change vulnerability assessment should match with suitable response or technology that mainly Priortise 'Resilience' Over 'Production' .

Lessons learnt from ACT projects implemented across region highlight that it is important to integrate climate smart technologies with government priorities. Above process help achieve sustainable and institutionalised climate resilient agricultural (CRA) practises to scale up across region.

Sustainable Climate Smart Agriculture technology developed should work across the value chain during pre production, production and Post harvest stages. To add at market level it is important to promote policies that encourage climate resilient food choices.

AMARDEEP SIBIA

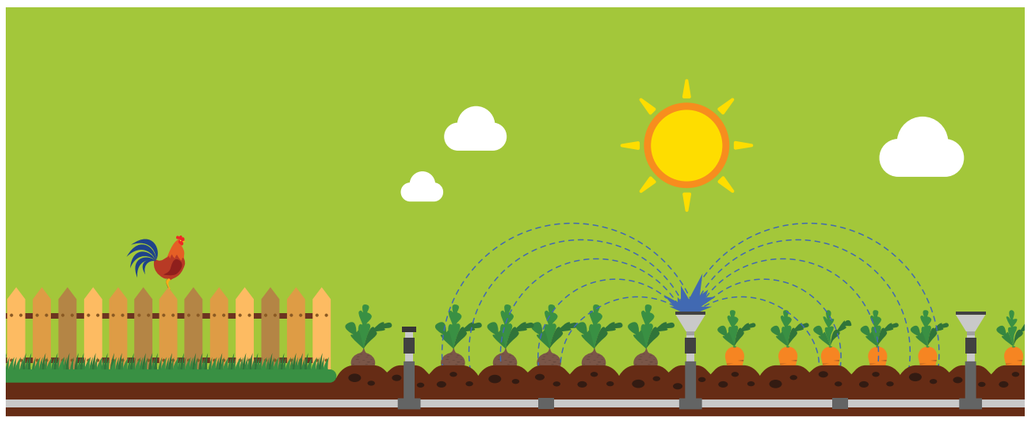
Chief Executive Officer, Satsure

SatSure leverages advances in satellite remote sensing, machine learning and big data analytics to provide answers to large area questions across multiple domains including agriculture, infrastructure and renewables. The bespoke geospatial big data platform combines satellite imagery, propertary algorithms, drone imagery, social and economic datasets help generate near real time, location specific insights to make decisions and avoid business risk.

The Satellite Enabled Agriculture Risk Management tool provide critical insights across domains like agriculture, crop sowing, harvesting intelligence, crop insurance, irrigation and environment management.

SatSure covers about 72 districts across India and outside India about eight countries including Ivory Coast, Tanzania, Nigeria, Bolivia, Australia, Japan, UAE and Ghana.

In banking sector the tool help provide complete financial product for credit policy decisions, risk underwriting, customer acquisition, portfolio monitoring and loan account closures. In agriculture sector SatSure is used in Preventive and Reactive Risk Management (crop insurance), Production acreage and estimates (Trading), Portfolio Management (Agri Banking), Resource optimisation (Farm mechanisation), sales and supply chain intelligence (Agri inputs and Food Processing).



MANOJ K. YADAV

Project Advisor, RIICE Program, GIZ

Project RIICE - Remote Sensing based Information and Insurance for Crops in Emerging Economies is implemented in Tamil Nadu State. The project use digital crop information to enhance the national crop insurance programme for smallholder farmers. Main objective of the project is to help Governments to plan for food crises through better crop monitoring and increase efficiency and effectiveness of crop insurance solutions. The program is implemented in partnership with multiple stakeholders with clearly defined roles and outcomes to achieve. Project partner includes Tamil Nadu Agriculture University (TNAU), Swiss Re, International Rice Research Institute (IRRI), Satellite Data Procurement and Processing (SARMAP) and GIZ. Remote sensing data is used in the project help monitor 1.6 million hectare of rice with 90 per cent accuracy. Further the technology was used in 2015 flood by Government of Tamil Nadu to provide disaster relief in affected regions.

In terms of impact the project information improve risk exposure management for insurers mainly through regular crop portfolio monitoring in target areas that allows early identification of losses, adjustment of loss reserves and to establish scope of damage. In case of smallholder farmers the information helps in more timely payouts and higher transparency on loss and yield assessment of the crop.

PANKAJ PIPARIYA

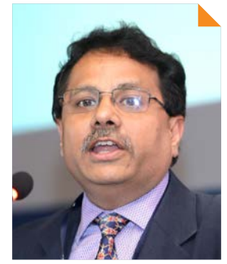
India Sales & Alliances Leader, The Weather Company, IBM

Weather impacts every sector of the economy and is the largest external swing factor that affects the business performance. IBM supported Weather Company provide Agri Decisions Platform where broad array of dynamic data points are captured and used to generate hyper-local views for actionable insights.

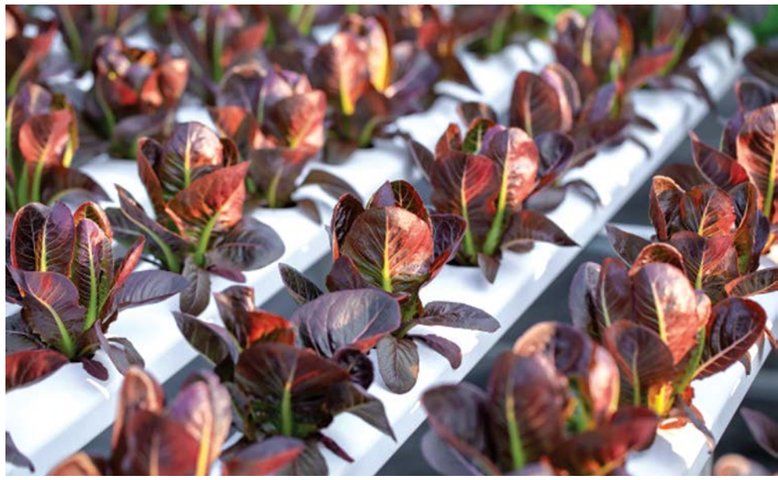
Cognitive Computing and Advanced Analytics are used in Agriculture sector to provide solutions. By leveraging the massive amounts of data available on crops, weather, soil, seeds, crop protection, regions, products and markets the agribusinesses are able to access a clear, informed view of the dynamics, potential, and volatility in the marketplace and in the fields.

Weather data help inform farmers throughout the growing season like suitable sowing time, fertiliser application, Pest and Disease Management and Harvest / yield prediction over the season. In addition, the smart irrigation method help improve crop yield and quality while reducing water consumption in the field. ■

Manoj K. Yadav



Pankaj Pipariya



SESSION - IV

Corporate Sustainability and Contribution to Climate Resilience

Technical Presentation

Ms Naman Gupta
Team Leader (Maharashtra)
Action on Climate Today (ACT)

Ms Bianca Kummer
Co-Founder, PEAT

Mr Girish Aivalli
Group Executive Director, Intello Labs

Mr Prasanna Rao
Managing Director
Arya Collateral Warehousing Services Pvt Ltd

Panel Discussion

Dr Shalini Sarin
Chair, Signify Foundation (Philips)

Mr Roshan Lal Tamak
Executive Director
DCM Shriram Ltd

Ms Shubha Sekhar
Director & Head – CSR & Sustainability
Coca-Cola India Pvt Ltd

Mr Sanjay Sacheti
Country Head – India Region
Olam Agro India Ltd

Dr. SHALINI SARIN
Chair, Signify Foundation (Philips)

By 2050, globally the food requirement will be 70 % more than the current production. Same instance the production is challenged by climate change abnormality like rising temperature and groundwater depletion. The seriousness of situation is shocking and efforts from different stakeholders and corporate players are important to make a difference in coming years. Corporate should imbibe from the social sector to work along with competitive players / stakeholders in the ecosystem to help create a positive outcome that is important in creating a sustainable impact.

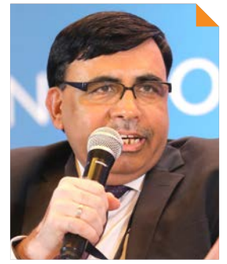
Awareness and knowledge gap of small holding farmers are very significant in India and they are not able to present a commercial business case of their activities to tap existing available resources and schemes, programs. To sustain their business, corporates need to play an active role in training and capacity building of farmers by addressing the gap and help improve the productivity. Involving stakeholders over a period of intervention remain a challenge. The momentum of partnership sustainability can be achieved by clearly defining the responsibilities, physical targets to be achieved during a period, governance mechanism from field to corporate level, frequency of review meetings and interface discussion to share the learnings.

Experiences highlight Share benefit model through partnership approach help create market circularity and 'win win' situation to all stakeholders involved. By that way the intervention becomes not like a philanthropic CSR intervention of the corporate but a sustainable change for all.

ROSHAN LAL TAMAK
Executive Director, DCM Shriram Limited

DCM Shriram has developed a multi stakeholder' s partnership of different agencies with clear responsibilities, deliverables and committed financial and human resource. Main objective is to create a facilitative ecosystem impacting about 2 Lakh sugar cane farmers in Uttar Pradesh for sustainable impact through adoption of climate smart agriculture practises. Partner includes International Finance Corporation, Solidaridad, CocaC]ola and companies providing technical and customised mechanical equipments. Also the government institutions like Indian Institute of Sugarcane Research are part of the initiative. Six pillars of climate smart agriculture is to facilitate increasing productivity, improving water use efficiency, improving soil health, propagating improved mechanisation, Integrated pest management and certification. Soil health program through promotion of 15000 compost pits with guidance of trained agriculture professionals are happeni[u]ng in the field. As part of the initiative, 4 soil testing labs, structured training modules and 16 video films on sugar cane cultivation addressing CSA are created. Mobile vans are used to create awareness and regular interface meeting with growers are taken up for scaling the learnings to larger audience.

Dr. Shalini Sarin



Roshan Lal Tamak

> Corporate should imbibe from the social sector to work along with competitive players / stakeholders in the ecosystem to help create a positive outcome that is important in creating a sustainable impact

Shubha Sekhar

Changing the mindset of farmers through training and introduction of right varieties for cultivation coupled with technology investment (drip irrigation) remains the main learning for future scaling up

SHUBHA SEKHAR

Director and Head, CSR & Sustainability, Coca-Cola India Pvt. Ltd.

To achieve a sustainable CSR impact it is important to build a ecosystem and adopt multi stakeholder partnership approach. Coco Cola has endeavoured to develop a positive change in the fruit ecosystem of India through partnership with different public and private sector stakeholders. For instance in Mango Value chain partnership intervention at different stages was done to improve production and productivity of farmers through adoption of precision farming technology, ultra high density planting mechanisms and adoption of drip irrigation. Scaling up the learning, presently we are working with orange farmers in Maharashtra and apple farmers in Uttaranchal mainly to diversify the portfolio and impact. The intervention has made a clear impact on Indian agriculture by adoption of progressive horticulture and value addition of processing. It is important to note that though India ranks 2nd in terms of production of many of the fruits the overall productivity is low and about 25 % is lost through post harvest wastage.

Coco cola partnership approach helps break the vicious cycle of smallholder farmers to turn farming into viable enterprise. It is done by addressing the issue of financial and market linkages, replacing poor yielding varieties, adopting global best practises and modernisation of poor warehousing and processing facilities. Overall the intervention helps build linkages and double farm income as a whole. At forward level the company juice based beverage portfolio act as 'ready market' to procure products for local and international requirements creating a market circularity and 'win win' situation for the corporate, market and the consumer. Changing the mindset of farmers through training and introduction of right varieties for cultivation (well suited for Indian environment) coupled with technology investment (drip irrigation) remains the main learning for future scaling up.

SANJAY SACHETI

Country Head, India Region, Olam Agro India Ltd.

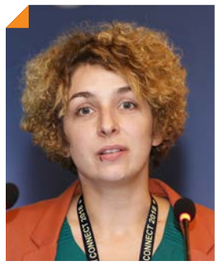
Issues affecting farmers livelihood is recognised by Government and trade related steps are taken in recent years. Initial regulatory steps include opening up of the market, focus on post harvest mechanism, market modernisation and linkage at different levels, reworking government procurement program like minimum support price. All above initiatives are stimulus that focus on improving, doubling of farm income in India. More efforts and steps are important and required with reference to regulation of commodity exchange, liberalisation of farm export and modernisation and strengthening of agriculture lending framework and insurance sector. Small holding farmers though aware about the issue and challenges need formal training like Kisan [w]MBA. Farmer producer organisations can be a platform for collectivisation of farmers, change ho[x]w they approach input market and steps to market the produce. Private Equity players, Commercial Banks, Developmental Financial Institutions, commercial banks are involved in investment framework of co engaging with farmers. Focus on sustainability of the agri business start-ups should be the focal points for these investment institutions but largely missing in current situation. Progressive corporate and CSR should try to play a role in sensitisation and capacity building of financial institutions that will help them to take financial decision to minimise risk. Corporate should play a key role not only in financial investment of the agri start-ups but collaborate and support them to communicate help reach o[y]ut the larger ecosystem the benefits of the innovation / idea. ■

Sanjay Sacheti

TECHNICAL SESSION - IV

Naman Gupta

Girish Aivalli



Bianca Kummer

NAMAN GUPTA

Team leader (Maharashtra), Action on Climate Today (ACT)

Private sector should invest on Climate Adaptation Technologies mainly to sustain the existing business investments (to cover from climate change risks) and explore the huge business opportunity (to build resilience of vulnerable communities to the effects of climate change).

Opportunities arising from the changing climate change include designing financial instruments to support CSA (climate finance), enable climate resilient businesses (value chain risk management), promote corporate community partnership for natural resource management, provide solutions to build climate resilience of communities and inform an effective response to climate change.

ACT is part of various investment models across different states of India. In Odisha the SWAT based Hydrology Model for real time flood forecasting using Numerical Weather Prediction to provide flood warning, is adopted in the Mahanadi Basin. In Assam the Climate risk insurance model uses Public-private mechanism to finance urban disaster risk reduction and management. In Bihar Sediment Management as a way of tackling catastrophic flooding is adopted. ACT is partnering with Nepal Academy of Tourism and Hotel Management, Trekking Agencies' Association of Nepal and the Nepal Mountaineering Association to develop training programmes in climate resilient tourism.

Government need to play an important and decisive role in scaling up private sector actions through Technical support, financial support, Regulatory Amendments and Performance Monitoring at regular intervals.

GIRISH AIVALLI

Group Executive Director, Intello Labs Pvt Ltd

Intello Labs is an agritech venture that work across globe covering India, United States of America, Africa and Europe. It uses Artificial Intelligence (AI) based quality testing models for agricultural products grading. Main benefits of using AI include reduction of human interface to considerable extent, help bring positive impact on cost, bring all stakeholders on same page and standardise quality results for the industry globally. Also the app identifies the commodity, the different types of defects in the commodity sample, their count and approximate weight. The technique help standardize grading of agri-commodities by reading images using computer vision. Further the algorithm uses cutting edge Convulational Neural Networks for image recognition. In addition to grading, the AI technique is used in agriculture covering all stages of crop production like field preparation, sowing, pest and disease management, Yield assessment and Harvest.

BIANCA KUMMER

Co-founder, PEAT

Food and Agriculture Organisation (FAO) report note that about 15-30 per cent of the worldwide annual yield is lost due to plant diseases and pests. Addressing the challenge, PEAT has developed Plantix, a smart mobile decision tool for farmers. Based on automated image recognition technique, Plantix identify the plant type and the incidence of a disease, pest or nutrient deficiency. The App takes advantage of deep learning technology which involves neural networks reviewing the large image data base to come up with instant diagnosis. Based on image symptoms the app provides information on treatments and preventive measures to farmers.

Plantix's fast growing data base is the biggest of its kind with more than 6.5 million images covering different crops from across region. On an average everyday about twenty thousand images are added in the data base. Huge data base help detect more than 300 diseases and provide solution with 90 per cent accuracy for the main 110 diseases. Plantix techniques help monitor the spread of disease and pest in the region and develop early warning systems using prediction models.

PRASANNA RAO

Managing Director, Arya Collateral Warehousing Services Pvt Ltd

Small and marginal farmers own about 85 per cent of the total cultivable land in India. Though they form a significant portion, their value realization in the agriculture value chain is extremely limited and is also affected by post harvest losses. To address the above challenge, Arya Collateral Warehousing Services Private Limited (ARYA) provide quality warehousing solutions with an effective blend of technology and business systems. The initiative is driven by the business rationale of cutting costs, reducing risks and achieving growth for all stakeholders involved. Arya works extensively with Farmers, Farmer Producer Organisations (FPO), Financial Institutions, Agriculture Corporations, Development organisations and International players in its endeavour to integrate the entire agriculture value chain. At present ARYA initiative is associated with more than 400 Farmer Producer Organisations (FPO), Manage 1.0 Million Metric Tonnes of commodities for Corporate with presence across eighteen States.

The Company today extends its expertise to various constituents of the agriculture supply chain with innovations like storage cocoons, flexible silos and Price risk tool. ■

Prasanna Rao

Corporate should imbibe from the social sector to work along with competitive players / stakeholders in the ecosystem to help create a positive outcome that is important in creating a sustainable impact

VALEDICTORY SESSION

Dr A K Singh

Deputy Director General (Horticultural Science)
Indian Council of Agricultural Research

Summing up

Mr Sai Krishna Nanduri
CEO, NSFI

Delivering Thanks Address

Dr Kshemendra Kumar Upadhyay
Advisor, NSFI

Dr. A. K. SINGH

Deputy Director General (Horticultural Science), Indian Council of Agricultural Research

With reference to vegetable (180 Metric Tonnes) and fruit production (95 Metric Tonnes), Indian agriculture has successfully achieved the proposed target set as part of Vision 2030. The production of Tomato, Potato and Onion using innovative techniques and method has gained momentum and exceeded target in recent years. Irrespective of above achievement it is important to note that agriculture in general is facing challenge at all levels with different effect.

Globally temperature rise and climate change affect the production and productivity of agriculture and horticulture crops. To add the loss during harvest of product and estimated post harvest lost of wheat and rice about 400 gm per quintal. The challenge of high presence of small and marginal farmers and average land holding less than 2 hectare influence and impact the subsistence of farmers in India. Government of India and ICAR are vigilant and are prepared to take action to address the above challenge based on lessons learnt from its diverse experiences. It is important to identify the technology, innovation, document the learnings and replicate / adopt the same in different agro climatic zones.

Learnings from different experiences, models of engagements from across India promoted by start-ups and private sector investments are to be documented. It is important that the learnings are shared with ICAR and other relevant stakeholders involved in this discussion for further action.

Out of total 142 million hectare, 26 M Ha are under horticulture crop. Importantly as compared to agriculture/ cereal crop, horticulture provides more employment. On other hand with increased migration and urbanisation the farm sector is facing acute shortage of trained, skilled manpower. Proper skill learning will help execute technology that address post harvest loses, quality grading and information

Dr A.K. Singh

N. Sai Krishna

Dr. Kshemendra Kumar Upadhyay

on treatments and preventive measures. In above context, skill development through institutional mechanism is important and required to address above challenges emerging out of climate change.

N. SAI KRISHNA
CEO, National Skills Foundation of India

N Sai Krishna has put on record of the improvements in the quality of deliberations in Global Agri Connect year after year. The current theme of the conference 'Climate Smart Agricultural Technologies and Innovations: Impact and Way Forward' received an excellent response from several of the stakeholders including government, international and national funding agencies, innovative start-ups and practitioners. The technical presentations covering innovations from field followed by the expert panel discussions in all four sessions were informative since they were commendably innovative.

Indian Agriculture research Institute (IARI) and YES Bank have been partners in the journey to bring out relevant, innovative knowledge materials for wider dissemination and deliberations on the emerging themes of agriculture. N. Sai Krishna took the opportunity to thank all the partners of Global Agri Connect 2018 and several other individuals and institutions that have been contributing to the successful organization of the conference.

He assured to bring together stakeholders from different background and create a platform to take forward the discussion on the technologies and innovations in agriculture, in Global Agri Connect 2019.

Dr. KSHEMENDRA KUMAR UPADHYAY
Advisor, National Skills Foundation of India

On behalf of National Skills Foundation of India, Dr. Kshemendra Kumar Upadhyay extended thanks to the speakers, panellists, technical presenters of start-up ventures and delegates who all have contributed immensely to make the conference a grand success. He has also expressed his thanks to organizations such as NABARD, ACT, GIZ, YES Bank, Philips, INFRACO etc. in extending their valuable support in making the Conference a grand success. ■

POLICY RECOMMENDATIONS - GAC 2018

Impact on agriculture production and productivity due to climate change threatens both food security and individual income from farm, thereby raising queries on agriculture' s crucial role in rural economic development. At national and international level various climate smart agriculture technologies (CSAT) have been identified that play a major role in improving crop yields, increasing input use efficiency and overall income of the farm and reducing greenhouse gas emissions. The major challenge is scaling up the CSA technologies in diverse agro- ecological zones addressing adaptability and location specific issues. In addition, access to information, technologies and affordability to use various components of CSAT remains a challenge, particularly for small land holders.

Addressing the above challenge will help in ensuring food security to the growing population and achieving the government of India policy target of doubling farmers' income by 2022. The 'Global Agri Connect 2018' conference has enabled the participation of stakeholders from all walks of life including the academia, research institutions, corporate, Governments and Non-Government Organisations (NGOs), who deliberated on the subject and have put forth the following recommendations as way forward.

1. Create a Facilitative Ecosystem

There is a discerning need to create a facilitative ecosystem with clearly defined roles, responsibilities and outcome for each stakeholder / partner to address the gaps and challenges in forward and backward linkages involved in increasing the production and productivity of the crops. At present, there exists some kind of a disjoint amongst the various stakeholders, which poses challenges in building synergies. Importantly farmers, policy makers, technical institutions, corporate / private sector players and value chain stakeholders engaged in building resilient climate smart agriculture technology (CSA - T) should work together to bring about the change. The ecosystem should be cognizant of this need and initiate actions and mechanisms to facilitate the process of coming together of the stakeholders.

It is important to involve farmers as partners in development of appropriate climate smart agricultural practises and technologies that address their production challenges

Policies that remove barriers in adopting CSAT at farmers level and create synergies with alternative technologies and practises is important

Use demonstration and audio visual techniques to create awareness and capacitate farmers on CSAT by using trained professional human resources.

2. Farmer Centered Approach

It is important to involve farmers as partners in development of appropriate climate smart agricultural practises and technologies that address their production challenges. A farmer-centered approach is to ensure that farmers have access to climate information and products such as the best adapted crop seed varieties, input and output market access, insurance and credit. Information and access to above will ensure effective adoption of CSA technologies in field. In above situation Farmer Producer Organsiation (FPO) plays a vital role in aggregation of small land holders, sensitatistion and adoption of CSAT in field. Use of demonstrations and audio-visual techniques to enhance awareness of farmers on CSAT and build their capabilities with the support of trained human resources should be the focus of our agricultural extension efforts. Policies that remove barriers in adopting CSAT at farmers level and create synergies with alternative technologies and practises is important.

3. Developing and Adopting Gender Responsive CSA Technologies

It is widely documented that climate change vulnerability is differentiated by gender, size of land holding and income level. Climate related aberrations disproportionately impact women due to lack of economic empowerment and participation in decision making. Women play a major role in agriculture. Recognizing their role in agriculture & ensuring that women receive equal access to information & technology support is important for adoption of CSAT in field. It can be achieved through gender sensitivity training for extension workers & by integrating inclusion at policy and implementation level. Training, education & empowerment should be given a key priority by the policy makers, government institutions and other stakeholders to ensure women farmers get informed on the CSA technologies and adopt it in practise. Adoption of CSAT by women can be accelerated by incentivizing as well.

4. Building Synergy of climate smart agriculture investments

For effective implementation of CSAT in field it is important to build innovative mechanisms to connect existing agricultural finance, crop insurance initiatives with the investments from public and private sectors. Innovations in CSAT can be fostered only through access to adequate funding by the stakeholders. Financing instruments like 'Green Climate Fund' can be built to encourage adoption and application of CSAT and practises among farmers. Initiating a National Climate Fund (NCF) will help pool the resources from various sources and account for them through targeted activities that deliver results in field. Mobilizing private sector finance for climate action in agriculture, impact investment funds, and mainstreaming climate-resilient practices into financial institutions and investors' operations are approaches to scale up financing for the sector.

5. Farmers Capacitation-Building Skill and Access to Information on CSAT

Lack of awareness on the causes, high vulnerability to climate variation and poor adaptive capacity against climate change along with small land holdings that act as a barrier to adopt CSAT is common and prevalent among farmers in different agro climatic regions of India. Use of innovative and proactive strategies for awareness creation will empower the farming community to cope up with the increasing livelihood vulnerabilities. Provision of regular training, exposure visit and small-scale demonstration on CSAT is important to the farmers for better adoption of practises in field. Public websites and digital tools need to be effectively used where farmers can receive information about the technology. Mass communication through the effective use of media, including the use of community radios can be explored. Developing appropriate mechanisms to engage and share experiences on regular basis by farmers, stakeholders and value chain players will help create awareness, identify challenges and enhance adoption of CSAT in field.

6. CSAT in addressing Post-Harvest Losses

In Indian context, it is important to focus on ways to decrease post-harvest losses of agricultural and horticultural products. Studies highlight losses after harvest, losses during storage in godowns, losses during transport to other locations is significant highlighting the weak supply chain mechanisms. An FAO report notes that post-harvest losses in developing countries can range from 15 percent up to 50 percent. The losses occur within the whole supply chain due to limited resources such as infrastructure, poor knowledge and access to post-harvest technologies. High priority should be given to

Use of innovative and proactive strategies for awareness creation will empower the farming community to cope up with the increasing livelihood vulnerabilities

The advancement in post-harvest technologies can enhance income for farmers besides benefitting the other value chain actors

closing the knowledge and resource gaps, which could enhance the efforts of all the stakeholders to address and reduce post-harvest losses and improve market access. The advancement in post-harvest technologies can enhance income for farmers besides benefitting the other value chain actors.

7. Documentation & Research on CSA Technologies

There is a need to enhance our focus on 'research' to understand how to scale up the CSAT to larger level, how it is impacting the community or sector at large, understand the willingness of farmers to pay for the technology and services, practicality of the solution and understand the challenges to adopt the technology mainly by addressing the local and regional level scenarios. Research focussing on understanding the barriers to adoption of CSAT in different regions and building evidence of the benefits of adoption of technologies will help in convincing the small farm holders. There can be space for more participatory research involving the small farmers, which will help in accelerating the adoption of CSATs. Research facilitating effective co-application of traditional knowledge with identified scientific knowledge is important in improving the local agriculture ecosystem, enhancing the socio-environmental sustainability and resilience of the region.

Developing decision support tools, data bases and knowledge products (for use of farmers, stakeholders and policy makers) mainly to evaluate the cost effectiveness of CSAT will help understand the investment requirements, set priorities and select best available choices for delivering impact.

8. Use of Mobile Application and ICT

It is important to develop a more influencing and responsive technologies like climate informed agro-advisory services with use of mobile application and customised digital technologies in local languages (such as Short Messaging Services (SMS), Interactive Voice Response (IVR), low-cost video clips) providing early warning will help manage and reduce the risks and improve preparedness to climate-related issues.

Computer modelling using satellite-based weather information specific to local / region / national level will help in priority setting of different interventions by different stakeholders that includes Government, farmers and private corporate. Use of digital communication channels to enhance farmers' & other stakeholders' connectivity along the value chain is critical for climate change adaptation and mitigation. Continued research to develop appropriate low-cost climate smart agriculture technologies to address the challenges coupled with continued capacity building among the farmers especially small land holders and the state department staffs will ensure the technologies adoption in field.

9. Corporate Social Responsibility

The CSR landscape is fast changing in the recent years. The CSR programs and resources can drive social changes in a mission mode if they are adequately motivated by policy framework and directed for focus and action. For example, the Swachh Bharat policy and program of the Government invited and encouraged a larger attention of the CSR programs and resources.

In the similar way, there can be a policy push for the CSR programs and resources towards supporting and accelerating the innovations, scaling up and adoption of CSATs. There can be more and more public-private partnerships in agricultural sector that can attract investments from the private sector. The start-up eco-system in agriculture can be strengthened through effective public-private partnerships. Where possible, the farmers' organizations can also be encouraged to play an active role in such partnerships. ■

Use of digital communication channels to enhance farmers' and other stakeholders' connectivity along the value chain is critical for climate change adaptation and mitigation

GLOBAL AGRI CONNECT 2018

The seventh edition of the Global Agri Connect 2018 was held at Hotel Le Meridian, New Delhi on 12 October, 2018. The theme of the 2018 Conference was "Climate Smart Agricultural Technologies and Innovations: Impact & Way Forward". Global Agri Connect is the flagship programme of the National Skills Foundation of India (NSFI), which is being organised since 2011.

The earlier themes were: Technologies and Innovations in Climate Smart Agriculture (CSA): Practice or Perish (2017); Technologies and Innovations in Agriculture: Precision, Mechanisation and Communication: Three pillars of Agricultural Growth (2016); Technologies and Innovations in Agriculture: Pushing the Frontiers (2015); Evolving Skill Dimensions: The Lever to Agricultural Growth (2013); Hi-Value Agriculture: A Gateway to Farm Prosperity (2012); Transformational Changes in Indian Agriculture: The Next Decade (2011).

Every year, NSFI brings various stakeholders in agriculture such as government bodies, corporate bodies, research and financial institutions, departments of agriculture at the state and central levels, experts and scientists to discuss and deliberate on various perspectives of agriculture that can protect the country from the trends of declining production & productivity of small farms.

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