

## **Capacity Building in Extension: Key to Climate Smart Agriculture**

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### **1.1 Introduction**

Currently India is staring at an agrarian crisis with daunting challenge of producing adequate food from an already shrinking natural resource to feed increasing population in the country. The pressing need therefore is to address this issue by increasing food grain production using methods that enhance productivity with efficient resource use by intensifying agricultural activities and to produce under conditions of variable climate.

It is well established in recent years that apart from natural resources and manmade physical capital, the human capital i.e., capacity of people as effective and productive change agents are becoming important for agricultural and rural development. This is supported by several studies that the education and skills of agricultural extension functionaries and farmers are significant factors in explaining the inter-farm differences in agricultural productivity, along with the more conventional factors such as availabilities of land and water resources, inputs, credit etc. (FAO, 1995).

After green revolution, many farming systems that were developed to be highly productive, have also gradually become susceptible to significant shocks such as drought, and more gradual changes such as climate change. These have increased the interest of scientists, policy makers and farmers in resilient farming systems and viewed as a necessary attribute to assist agricultural development through proper addressing future

challenges and shocks. It may be noted that resilient farming systems are conceived as those which can cope with change and maintain productive capacity in the face of ongoing variability in factors such as commodity prices, climate, regulation and input availability (Chikaire et al., 2015).

Climate Smart agriculture (CSA) has emerged in recent years as a conceptual framework intended to align international efforts to increase agricultural productivity, mitigate greenhouse gas emissions, and reduce farmers' vulnerability to climate change. The FAO defines CSA as "agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes greenhouse gases (mitigation) while enhancing the achievement of national food security and development goals" (FAO 2010). The concept of CSA has received impetus by a number of international multi lateral agencies such as the World Bank, the International Fund for Agricultural Development (IFAD), and the Consultative Group for International Agricultural Research (CGIAR). Additionally, the continuing development is furthering an agenda for policy and practice (Scherr, Shames, and Friedman 2012).

There is growing consensus among academicians, researchers and policy makers that climate change and its variability are emerging as the major challenges influencing the performance of Indian agriculture. Climate change increases the vulnerabilities to agriculture due to variability in temperature and rainfall and in the reduction of rainfall. Climate change variability also results in the deterioration of fresh water sources and increase flooding which could in turn adversely affect agricultural yields. The case of India is especially significant with several climate extreme weather events being seen such as frequent droughts, floods, cyclones, hailstorm, frost etc. It also becomes significant given that more than 70% of India's rain requirements are dependent on changes in the climate and the excessive dependence of more than 75 million people on agriculture and allied livelihoods as this creates increased pressures on the available natural resources and coping mechanisms. Evidence already points to climate change based vulnerabilities in India leading to reduced economic growth

and an accompanying inflation of essential food commodities which severely threatens the food security of the country.

All this calls for a Climate Smart Agriculture (CSA) leading to sustainable food security through integrating innovations, technologies, efficient resource use, sound public policies, establishment of new institutions, and development of infrastructure. The development of new technologies and their diffusion and management of capabilities for more intensive agriculture and supporting services become imperative in climate smart agriculture. This can be achieved through agricultural extension in agriculture and allied sectors.

### **1.2 Preparedness of Extension for CSA**

Farmers need timely and location specific information on climatic risks but currently there are a number of gaps and challenges in providing climate information to the farmers. First amongst them is non-preparedness of extension functionaries in terms of climate change. Agriculture and allied departments and extension organisations in many states are completely unaware of climate change impacts on agriculture. Preparedness like documenting climate change scenarios at grassroots level, extent of adaptation (individual/farmer group level), mapping vulnerable regions, sustainable indicators, access to real time data, effective synthesis & interpreting, better decision making for a climate change scenario etc., are missing at present. The agriculture and allied departments and extension organisations consider climate change as seasonal aberrations. Integrating the multi-disciplinary and multi-sectoral information into a meaningful extension material is beyond the expectations of traditional extension systems. The agricultural extension systems also need to be geared up to take upon the challenge.

### **1.3 Capacity Building**

Hilderbrand (2008) described, capacity is the mean or the ability, to fulfil a task or meet an objective effectively. It refers to the skills of staff and strength of specific organization and thus, training staff and strengthening organization is called capacity building.

Capacity building means a new build-up of capabilities (Kogut, 1992) and refers to activities that improve an organization's ability to achieve its mission or a person's ability to define and realize his/her goals or to do his/her job more effectively. Capacity building is as important as capital investment and infrastructure (Mati, 2008) since it also increases the abilities and resources of persons, communities and organizations to manage change (Coutts et. al., 2005).

UNESCO (2006), reports that capacity building focuses on increasing an individual and organization's abilities to perform core functions, solve problems, and objectively deal with developmental needs. Furthermore, capacity building is understood to be resulting in improving or upgrading the ability of the person, team and institutions to implement their functions and achieve goals over time and important for all levels, from individuals to national organizations (Horton, 2002). In addition to improving individuals and teams, capacity building also refers to enhancing the organizational capacities of communities, and is crucial for formation of non-profit organizations (Paul and Thomas, 2002).

#### **1.4    Importance of Capacity Building in Climate Smart Agriculture**

Capacity building is essential because it improves knowledge and skills to keep pace with the rapidly changing technological developments and also helps improve the feedback mechanisms from the field to the extension staff and researchers (Dwarakinath, 2006). Capacity building is needed as it helps in not just farmer training and strengthening the innovation process but also in building linkages between farmers and the various stakeholders involved in helping farmers (Sulaiman, 2006). It is generally reported that public extension services often have some weaknesses such as lack of timely information and input supply, less accountability of public extension personnel, the blanket nature of recommendations, and the absence of extension personnel during office hours, which make them less committed to the service.

The extension capacity building is often overlooked in the rush to push the results of research and development products to farmers. Building the capacity of agricultural extension staff is central to success of climate smart agriculture initiatives. Farmers in many developing countries including in India are resource constraint, poor and still have weaknesses in their development. Agriculture and allied departments are already pressurized with their regular set of activities and do not focus much on the emerging challenge of climate change. Therefore, improving the capacity building of agriculture extension is necessary for climate smart agriculture, poverty alleviation and environment protection. Implementing climate smart agriculture projects alone cannot lead to the desired level of development in agriculture without building the capacity of farmers, groups and organizations because they must have the ability and responsibility to resolve their problems and develop their communities.

The small and marginal farmers must be encouraged for participation and giving opportunities. Along with men, women play an important role in contributing to all activities in agricultural operations such as livestock production, fisheries, cropping, forestry, irrigation and horticulture. The extension staff working closely with farmers should explain how climate change affects their lives and incomes not only from agriculture but from livestock etc. The extension workers should be in a position to introduce appropriate technologies or information relevant to specific farmer situation like livestock, horticulture etc. There are four main tools for the development of capacities; information dissemination, training, facilitation and mentoring, networking and feedback to promote learning from experience with each having advantages and disadvantages (Horton, 2002).

Chikaire et al (2015) described that training is often used as the main capacity building method for agricultural extension in developing countries including on-the-job training and workshops etc that can be applied to climate smart agriculture as well. He also reported that of central importance to most capacity building is “learning-by-doing” . The learning-by-doing approach has been an important part of education to develop capacity and insights in a wide range of settings. Learning-by-doing is one of the most

commonly quoted processes through which partners' capacities are understood to develop, and it is a good way for people to learn. Individuals, groups, and some organizations can learn-by-doing (Gillespie, 2004). Learning-by-doing or experiential learning is at the heart of capacity development.

Experiential learning is an excellent way to develop good insights into the ways groups work (Banjarmin et al., 1997) and can be a very powerful method and appropriate in extension for climate smart agriculture particularly who work with groups. Demonstration plots, cross visits, study tours and Farmer Field School are useful methods to transfer information and technology to staff and farmers, particularly in remote areas. The advantages of farmer field schools (FFS) are that both farmers and staff are able to gain knowledge, skills, good relationships, facilitator skills, communication skills and experiences.

Mentoring is an important method for capacity building in extension and should be wisely used for climate smart agriculture. Mentors are senior research and extension staff who are experienced persons. Mentors are people who have more experience in indigenous technical knowledge (ITK) and extension methodology. Mentoring involves passing on skills, attitudes and knowledge from experienced staff to newer extension workers. Millar & Connell (2005) stated that building the technical and extension skills of staff using experienced people as mentors is a key element of scaling out impacts. They can provide the support trainees need in order to become responsible as they acquire new skills and adapt to change. Mentors should be highly skilled in communicating, listening, analyzing, providing feedback and negotiating with less experienced persons.

### **1.5 Need for Capacity Building in CSA**

Capacity-building in agriculture and allied sectors primarily addresses the establishment or strengthening of formal (government) and informal (NGOs, farmer groups, etc.) institutions, the private sector and individuals. The aim is to enable them to be better able to face their responsibilities in policy and decision-making and in implementing agricultural

development programmes more efficiently. This also implies decentralization down to local level, and providing incentives for local community initiatives and people's participation. It is necessary that voluntary organizations and those representing the interests of the various farmer interest groups should be involved to have a capacity to train farmers, cooperatives and other rural organizations to assist in consolidating grassroots organizations. In-service training of extension functionaries of agriculture and allied departments in participatory techniques is an essential complement to the involvement of local groups.

Climate smart agriculture places the capacity building challenge for the extension profession in to the domains of multi and inter-disciplinary work (Chikaire et al., 2015). The question that emerges from such challenges is: how can the capacity of extension match the challenge of supporting learning and resilience in climate smart agriculture across these domains?

The agricultural and allied departments generally lack the full range of in-house expertise to respond to the changes required for sustainable agriculture and climate smart agriculture. Ongoing capacity building and training programmes to extension functionaries should include modules to enhance knowledge and skills in climate smart technologies. There are several sectors and actors are involved in climate smart agriculture and in planning for climate smart agriculture, the capacities of actors involved in different sectors need to be enhanced, particularly at local level, where actions are needed. Agriculture officers and extension field functionaries are a vital link in the translation of knowledge obtained from research into on field adoption. The extension field functionaries are fundamental in agriculture development at field level. These people need to fully understand problems, needs and possible ways to promote climate smart agriculture, so that they can communicate to farmers. Hence, agriculture department officials and extension field functionaries, more than, ever will be the catalysts of a climate smart agriculture. Change at local levels can bring a marked improvement in the amelioration of undesirable effects of climate change. It is vital that capacities of these staff are built on a topic that has a global effect and each small effort is crucial. Middle and senior level Agriculture

Extension officials with their experience and expertise are ideally suited for this Capacity Development Programme as training of trainers.

Ozor and Nnaji (2011) proposed four key roles for extension in agricultural adaptation to climate change, namely;

- Training and re-training of extension staff to acquire new capacity in climate change management
- Setting up of emergency management units in extension agencies
- Dissemination of innovations on best adaptation practice
- Improving feedback to government and interested agencies on climate change issues

Essentially, the knowledge base of extension functionaries on climate change should be expanded, so that they in turn will be able to train farmers. Despite the existence of several adaptation strategies that have been proven, little to no attempts have been made to develop appropriate training curriculum that incorporates the various adaptation strategies. Hence, there is a need to enhance the capacity of extension functionaries on climate change issues such as causes of climate change, its effects and adaptation strategies (Singh and Grover 2013).

### **1.6 Areas of Competence for Extension Functionary in CSA**

Chikaire et al., (2015) reported that extension functionaries must demonstrate sufficient competence that includes:

- **Communication:** The extension functionaries must be able to convey agricultural information to all categories of farmers rich and poor, learned and illiterate, as well as possess the disposition to mildly persuade them to adopt innovations.
- **Farming:** The change agent must be able to demonstrate new technologies to the farmers even if involves physical work and practice.



- **Science:** The ability to read and understand professional literature as well as the ability to carry out field experiments is needful assets for the extension functionary.
- **Economics:** The change agent must be able to analyze and recommend cost-benefit strategies based on knowledge of prevailing market situations, agricultural policies, availability of credit, cost-benefit ratio, interests, etc.
- **Social:** The extension functionary must be familiar with the customs, values and ways of thinking of the farmers as to work in tandem with the realities of the people and thus avoid socio-cultural conflict.

The extension functionaries in climate smart agriculture must also possess basic competencies such as congruency, empathy and appreciation along with necessary technical and methodological competencies. These include being credible and knowledgeable in the subject matter along with being able to use specific communication techniques, appropriate media and communication aids. Managerial and organizational competencies such as being able to work within the framework of facilitation and guidance are also imperative.

Information Communication Technologies (ICTs) is improving and changing how extension work is carried out in agriculture and allied sectors. The use of electronic media for agricultural extension for climate smart agriculture can assist extension agents reach the farmers across different location with location specific information. Entrepreneur extension agents can record and produce videos in local dialects with local farmers featuring in the videos thereby making it easier for farmers to understand. Capacity building is needed in the area of agricultural information so that farmers are able to identify and replicate best practices without any external interventions. Specifically, it is needed in computer multimedia production, video production, E-journalism, photo journalism, etc. Gender mainstreaming in extension, entertainment education for extension work, climate change, among other evolving issues in extension also offer need dimensions to capacity building in extension (Chikaire et al., 2015) for climate smart agriculture.

Farmers on their own can identify the practices as authentic and replicable in their context and package same in Double Video/Compact Disc (DVDs/CDs) or uploaded online for farmers and other users of agricultural information achieve these and other uses of ICTs. Capacity is therefore needed in computer multimedia production, video production, E-journalism, photo journalism, etc, in order to bring the earlier barriers of research information dissemination through electronic media collapsing.

### **1.7 Objectives of the Capacity Building for CSA**

Capacity building in climate smart agriculture should incorporate practices that increase productivity, efficiency, resilience, adaptive capacity, and mitigation potential of production systems. The capacity building will have to address how to integrate climate change, water, and natural resources management into existing and proposed agricultural and food security programs to increase productivity, sustainability of investments, and climate resilience.

Improving knowledge of key factors in climate smart agriculture is critical for initiating field interventions and the success of agriculture because it is a broad and multi faceted issue (Bogdanski, 2012). There are many barriers for the development and implementation of climate smart agriculture initiatives at field. Some examples include the slow adoption of technological innovations, regulatory and policy issues, lack of demand or the unequal distribution of benefits and costs across supply chains (Blok et al., 2015).

The challenges associated with climate smart agriculture will require, among other aspects, integrated multi-disciplinary approaches, which build upon social, natural and technological sciences. The modules in capacity building programmes should address the following issues:

- What are the best methods for promoting climate smart agriculture and what strategies exist for expanding or up scaling successful examples of climate smart agriculture?
- How can socio-economic, political, ecological and technological approaches be combined and integrated to help overcome key barriers to climate smart agriculture?

- What concepts, approaches or actions are available for advancement of climate smart agriculture?
- How can costs and benefits of climate smart agriculture be spread in agricultural production?
- What successful examples exist of climate smart agriculture innovation, adoption and diffusion?
- What role should policy play in furthering climate smart agriculture?
- What are the key topics and priorities for a successful near and long-term future research agenda for climate smart agriculture?

### **Conclusions and Recommendations**

Capacity building initiatives in Climate Smart Agriculture have begun in the past few years, mostly on separate basis. Time has come to draw lessons from initial initiatives and to build on them to strengthen our knowledge basis about the learning objectives to be defined, about the methods of learning that can address these objectives and about the curricula and training tools that can be associated to them. Addressing adaptation or mitigation as a training objective cannot be fulfilled in isolated disciplines but has to be integrated with ongoing extension activities.

Consequently, there is an urgent need to pass right message about climate change by the extension agents to farmers. This will help farmers;

- To understand why climate change issues are so important in their daily activities
- Put together adjustment mechanisms to cope with this climate change phenomenon
- Reduce agricultural production losses related to climate change and in return become less vulnerable to climate change
- Put together clear adaptation strategies aimed at enhancing adaptive capacity, generate income and improve livelihoods.

As the climate change is emerging as new challenge for agriculture, the needs of farmers are changing and warrants for extension needs to periodically upgrade in knowledge, skills and attitudes in order to keep pace with the emerging challenges and dynamics of extension work in climate smart agriculture. Capacity building is essential in ensuring that the initial job training is provided in technologies available for coping climate change in agriculture and allied sectors and as well as ensuring coping to the job changes and the varied needs of the farming community. The capacity building programmes in CSA should explore location specific natural resources and water management issues critical to agriculture, identify challenges of climate variability and change, and examine practices that build improved resilient and productive agricultural systems. The extension functionaries in agriculture and allied departments are the agents of change in fostering development in agriculture, animal husbandry, horticulture, fisheries etc. Therefore, the sooner extension and other service providers become familiar with climate change, the earlier the integration of climate change into agricultural developmental goals.

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