Communication Strategies for Building Climate-Smart Farming Communities

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1 Introduction: Need for Building Climate-Smart Farming Communities

Climate change is no longer some distant possibility. Its effects are already being felt, especially in the semi-arid tropics in Africa and Asia, where rising temperatures, recurrent droughts, extreme climate events, dry spells during rainy season on one hand and unseasonal rains on the other have negatively impacted farmers, especially smallholders. This shift in climate patterns has caught farmers unawares. Low crop yields, severe household food shortages, malnutrition among children and women, forced migration of farmers to cities for work due to the resultant poverty are some of the climate change issues that have to be addressed. Future climate predictions for these regions are also bleak. Predicted temperature increases range from 2 to 4.5 degrees centigrade and the geographies may experience unseasonal rains and floods or substantial decrease as much as up to 11% in rainfall (ICRISAT 2016).

Climate change needs urgent redressal because the agriculture sector will be hardest hit economically as it heavily relies on weather. Several studies have revealed the impact of global warming on crop yields and their nutritive value. By 2050 climate change could cause yields of irrigated wheat, rice and maize (the three cereal crops with high market demand, commonly known as the Big 3) to drop by 10–20% (Thornton 2012). **Not only will yields decrease but also the nutritive**

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W. Leal Filho et al. (eds.), *Handbook of Climate Change Communication: Vol. 2*, Climate Change Management, https://doi.org/10.1007/978-3-319-70066-3_24

value of crops are likely to decrease, says a study (Myers et al. 2014). To add to the problem, **new crop diseases and pests** are likely to emerge and need to be addressed (Luck et al. 2011; Sharma and Prabhakar 2014). Climate change will not only affect crops but also livestock, fisheries and, in fact, the entire ecosystem (FAO). Therefore a holistic **agroecosystem approach** gives the best results for climate adaptation and mitigation interventions.

For long, the issue of climate change had been on the backburner, but the UN global call for action on climate change (COP 21) in 2015 has resulted in many nations working towards zero net anthropogenic GHGs by 2030–50 in a bid to limit global warming to less than 2 degrees centigrade.

Agriculture contributes to a major share of GHGs. CGIAR research shows that the global food system, from fertilizer manufacture to food storage and packaging, is responsible for up to one-third of all human-caused greenhouse-gas emissions (Vermeulen et al. 2012).

2 Role of Development Communication in Building Climate Smart Farming Communities

A. **Motivation**: Preparing the community for change
B. **Mobilization**: Connecting communities to a wide network of experts
C. **Facilitation**: Setting up facilitating groups to build capacity of farmers and link stakeholders to farming community
D. **Sharing of knowledge and synchronization of activities**: Engaging all stakeholders by sharing of information and synchronizing activities to maximize efficiency of delivery
E. **Evaluation**: Having a built-in monitoring and evaluation system to identify barriers for technology adoption and rectifying procedures

A. **Motivation**: Preparing the community for climate change

- Awaken a community to a potential problem—get them thinking—raise awareness on the issue
- Involve the community by creating forums/groups for discussions on how to use existing knowledge and the need to adopt new technologies. Prepare a climate action plan
- Gain and establish trust within the community by starting off with interventions that deliver quick results
- Educate opinion leaders of a community for quicker adoption
- As trust builds introduce interventions that bring in medium-term and long-term benefits
- Train communities to sustain the interventions and modify them when the situation demands it.

B. **Mobilization: Connecting farming communities to a wide network of agricultural experts, technology providers, policy makers and markets** such as

- Global research institutes focusing on crops, livestock, fisheries, water, land management, socio-economics (a consortium approach facilitates multidisciplinary interventions)
- Local government institutions and universities, especially for meteorological data
- NGOs
- Markets

C. **Organization**: Setting up facilitating groups linking stakeholders to farming community such as

- Innovation platforms
- Technology parks
- Farmer production groups/councils
- Climate warning committees
- Farmer field schools

D. **Synchronization**: Engaging all players to facilitate sharing of technological knowhow and synchronizing activities to maximize efficiency of delivery, for example

- Analyzing climate information, creating crop advisories and disseminating the information to farmers
- Research stations develop advisories using crop and climate modeling, these are communicated to farmers to help them make timely decisions in the wake of changing weather patterns
- Developing market demand for farm produce, synchronizing market operations
- Using the latest technology to share information quickly and on time

E. **Evaluation**: Having a built-in monitoring and evaluation system to identify barriers for technology adoption and rectifying procedures

- Identify and address social and cultural barriers
- Critical issues of marginalized population, women and youth.

3 The Communication Process

(A broad representation of the process)

1. **Raise awareness** on the urgency to address climate change among farmers, all actors along the agricultural value chain and policy makers
2. **Motivate and elicit farming community participation**. Involve them in planning, execution and monitoring of a climate change action plan

3. **Identify interventions through a participatory approach** to reduce carbon footprint of agriculture and identify climate-smart technologies needed to address immediate and long-term issues
4. **Build a network** of all agricultural stakeholders i.e. from weather information providers, crop and livelihood diversification experts from research institutes, National Agricultural Research Systems (NARS) and farm produce processors to markets and policy makers
5. **Connect farming communities to technology providers, policy makers and markets**
6. **Facilitate the creation of a customized plan** to build a climate smart community in line with the country strategy that has been developed for each region
7. **Catalyze the adoption of the plan** by building facilitating groups
8. **Aid implementation of the plan**, identify communication barriers and bottlenecks and resolve issues. Work towards gender inclusiveness and attracting youth to agriculture. Employ the latest digital technologies to simplify and speed up dissemination of information and on-farm techniques
9. **Communicate feedback** to team members for discussion on what needs to be modified
10. **Document the process** and lessons learnt.

The below illustration shows the various communication components involved and how climate information is used to build resilient agroecosystems (ICRISAT 2016) (see Diagram 1, *Source* ICRISAT, accessed on http://www.icrisat.org/wp-content/uploads/2016/11/Building-Climate-Smart-Villages.pdf).

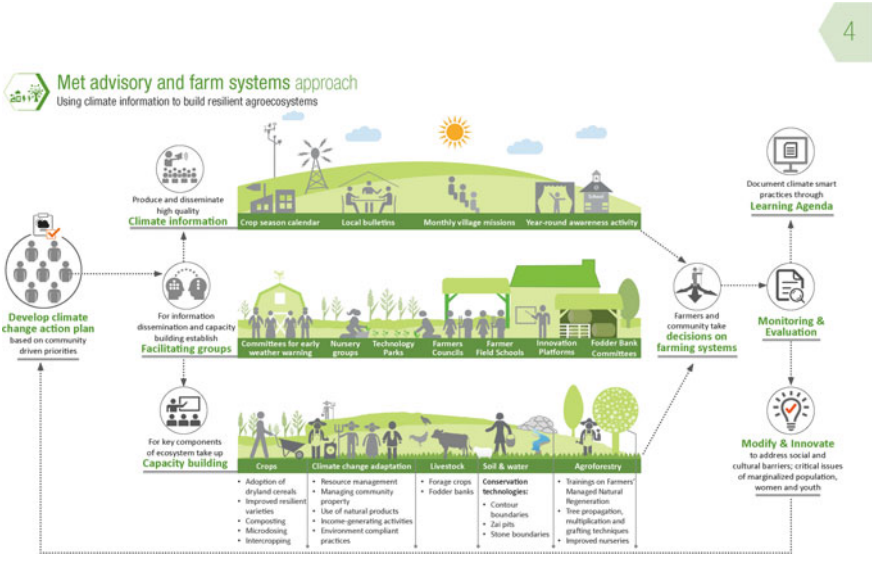

Diagram 1 The meteorological advisory and farm systems approach: using climate information to build resilient agroecosystems

4 The Overarching Communication Goal

This can be defined as follows:

Sharing of information, customized technical knowhow and building capacity of farmers to facilitate the adoption of holistic farm strategies that are environment friendly and at the same time make agriculture a viable business in the immediate and distant future in the face of threats posed by climate change.

This is implemented through:

1. Both short-term and long-term strategies that equip farmers with climate change **adaptation and mitigation technology knowhow**.
2. Connecting the farming community to a network of stakeholders, especially **weather information and knowledge providers, policy influencers and markets**.
3. Joining hands with partners and drawing on the strength of the global movement to address climate change and contribute to the UN Sustainable Goals.

5 Key Messages for Addressing Climate Change

1. **Adopt crops with low carbon footprint and high nutritive value**
2. **Use technologies that increase yields and facilitate optimum use of water**
3. **Reduce chemical fertilizer usage**
4. **Support agroforestry**
5. **Find alternatives to fossil fuels**
6. **Diversify livelihoods**
7. **Conserve the agroecosystem**

Message 1: Adopt crops with low carbon footprint and high nutritive value

Why: To ensure food security, farmers across the globe will probably have to switch to cultivating more climate-hardy crops and climate-smart farming practices (Nelson et al. 2009). The study shows that by 2050 climate change could cause irrigated wheat yields in developing countries to drop by 13%, and irrigated rice could fall by 15%. In Africa, maize yields could drop by 10–20% over the same time frame.

How: ICRISAT's mandate crops—sorghum, millets, groundnut, pigeonpea and chickpea—are inherently climate smart, they have close to the lowest water and carbon footprints of all the crops and are nutrient dense. In addition to this ICRISAT is working with partners on biofortification projects. The **Smart Food initiative** focuses on promoting millets, including sorghum and pulses. The campaign enumerates the nutritional superiority of these crops over the Big 3 (rice, wheat and maize) in terms of micronutrient availability and overall nutrition.

Introducing dryland cereals and legumes to farming communities is the core objective of all of the organizations climate-smart projects. The Smart Food initiative messaging emphasizes on three key aspects:

- **good for you** (i.e. highly nutritious);
- **good for the environment** (e.g. they have a lower water or carbon footprint); and
- **good for the smallholder farmer** (e.g. they are hardier, less prone to crop failures; have greater potential to increase yields; and multiple uses and untapped demand).

Case study: Recently, the critical need for **creating a market pull** for millets was recognized, so that farmers find a ready market for their produce. In India, in partnership with the Government of Karnataka state, efforts are being made for branding *ragi* (finger millet) and popularizing it among food processors targeting mainly urban consumers. The branding efforts also aims at changing the common notion that millets are old fashioned and meant for the rural poor.

In Kenya, **social behavior change communication** approaches are being used to improve the nutritional status of women in the reproductive age and children below five years, an awareness drive under the Smart Food initiative. The aim is to promote increased consumption of nutrient dense, drought tolerant crops (sorghum, millets, pigeonpea, groundnut, cowpea and green gram) and appropriate dietary practices in the project areas.

Message 2: Use technologies that increase yields and facilitate optimum use of water

Why: Climate change has caused receding glaciers, reduced stream and river flow, and shrinking lakes and ponds. Many aquifers have been over-pumped and are not recharging quickly. Although the total fresh water supply is not used up, much has become polluted, salted, unsuitable or otherwise unavailable for drinking, industry and agriculture. To avoid a global water crisis, farmers will have to strive to increase productivity to meet growing demands for food, while industry and cities find ways to use water more efficiently (Chartres and Varma 2010).

How: ICRISAT has developed a pool of climate-smart agri-technologies (see Diagram 2) from which stakeholders can select technologies best suited to their region. **Training and dissemination of knowhow** on the use of these technologies is done through various capacity building programs that include demonstrations, trial plots, farmers field schools, technology parks, innovation platforms, trainings on use of the latest digital technology available, such as farmer to farmer videos, use of sowing apps and apps for disease detection (still in development), etc.

ICRISAT scientists have developed new climate-smart varieties based on farmers' requirements. Varieties with enhanced nutrition (biofortified), drought and heat tolerance, pest resistance, machine-harvestability, and early maturity are a few examples. The release of every new variety and the impacts of new technologies introduced in each region is publicized through ICRISAT's **newsletter** and through the **mass media** of the region for wider awareness and subsequent adoption.

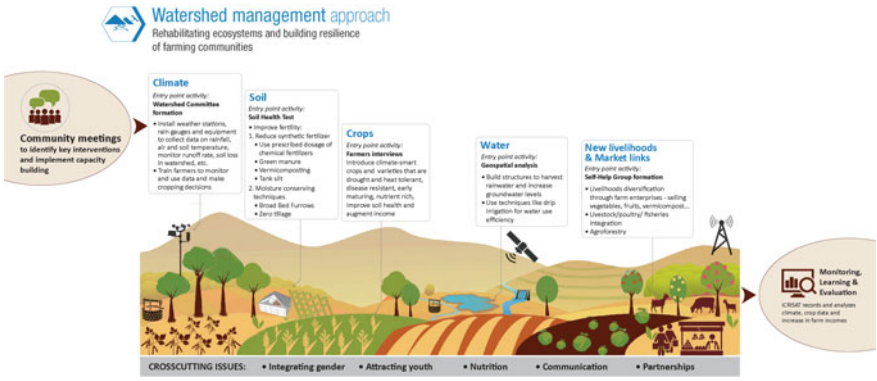

Diagram 2 The watershed management approach: rehabilitating ecosystems and building resilience of farming communities

Watershed management approach illustration (see Diagram 2, *Source* ICRISAT, accessed on http://www.icrisat.org/wp-content/uploads/2016/11/Building-Climate-Smart-Villages.pdf).

Message 3: Reduce synthetic fertilizer usage

Why: According to an FAO (2014) article, GHG emissions generated during the application of synthetic fertilizers accounted for 13% of agricultural emissions (725 Mt CO_2 eq.) in 2011, and are the fastest growing emissions source in agriculture, having increased some 37% since 2001.

How: For reducing chemical fertilizer usage ICRISAT recommends soil chemical analysis to identify limiting concentrations of plant available nutrients and prescribe precise dosages of required fertilizer, intercropping cereals with nitrogen-fixing legumes or growing legumes in the period when lands are usually left fallow, vermicomposting, growing gliricidia for green manure and using tank silt. Soil health tests have been devised as an **entry point activity** in the watershed management approach to reinforce the initial contacts that were made with the farming community in the region. The success of this initiative has led to its replication on a large scale.

Case study:

Upscaling a successful pilot project: The increase in yields after using the prescribed fertilizer dosage in watershed projects in the pilot Bhoochetana project in the Indian state of Karnataka has prompted the state government to upscale the project in all its districts and it also caught the attention of the neighboring Telangana and Andhra Pradesh states. With technical backstopping from ICRISAT

the system of issuing **soil health cards** to farmers was initiated. In the states of Telangana and Andhra Pradesh where overuse of fertilizer is a major issue, the cards help educate and inform farmers on the deficiencies in their fields and to apply just the required amount of prescribed fertilizers. Successful experiments from the Indian watershed projects is being replicated in projects in Africa.

Message 4: Support agroforestry

Why: According to an FAO (2014) report, net GHG emissions due to land use *change and deforestation* registered a nearly 10% decrease over the 2001–2010 period, averaging some 3 billion tonnes CO_2 eq/yr over the decade. This was the result of reduced levels of deforestation and increases in the amount of atmospheric carbon being sequestered in many countries.

How: Aligning with country policies is an important aspect of ICRISAT's work. Joining hands with local governments some projects are promoting agroforestry, reclaiming degraded lands and laying special emphasis on growing trees that have biofuel potential.

Use of multimedia for agroforestry promotion: Shamba Shape Up, the Kenyan reality TV show for farmers, has teamed up with World Agroforestry Centre **(ICRAF)** and **ICRISAT** in a Series 6 episode dedicated to highly nutritious **trees** and crops that you can grow on your *shamba* (farm).

Case studies: In Ghana, a sustainable agroforestry system of intercropping jatropha with cowpea has been taken up. In India, successful experiments have been carried on intercropping jatropha and pongamia with pearl millet, pigeonpea and chickpea among other crops. Studies show that an additional income of INR5000 to INR16,000 per ha can be obtained even on low-quality (but reasonably able to support crop growth) soil (Wani et al. 2009).

Message 5: Find alternatives to fossil fuels

Why: Greenhouse gas (GHG) emissions from fossil fuels grew 1.4% in 2011, reaching a record 31.6 $GtCO_2$ eq yr^{-1} in 2012, the highest level in history—as documented by the International Energy Agency (IEA 2013). Also scarce fossil fuel deposits have resulted in a search for other sources of fuel, mainly biofuels that have a low carbon footprint.

How: Communicating research impacts to partners, investors and policy makers is an important component of corporate communication. This is done through presenting conference papers, participation in major workshops, contributions to newsletters both in-house and external and use of the ICRISAT website. At a recent conference, ICRISAT's presentation on two of the mandate crops, sorghum and pearl millet, showing potential for use as biofuel feedstock caught the attention of Government of India officials, who followed it up.

Case study: At a recent workshop conducted by the Department of Biotechnology, India, the advantages of newly developed high biomass sorghum and pearl millet developed by ICRISAT and the Indian Institute of Millets Research (IIMR) for use as feedstock in second generation or lignocellulosic (2G) biofuel

production in India was highlighted. It was suggested that 2G biofuel commercial plants proposed to be set up can take the learnings from the organization's sweet sorghum improvement, crop production, supply chain management and commercialization in exclusive distilleries and in sugar mills for ethanol production.

Message 6: Diversify livelihoods

Why: In Africa, IPCC (2007: 13) projected that climate variability and change would severely compromise agricultural production and access to food. This projection was assigned "high confidence." In East and Southeast Asia, IPCC (2007: 13) projected that crop yields could increase up to 20% by the mid-21st century. In Central and South Asia, projections suggested that yields might decrease by up to 30%, over the same time period. These projections were assigned "medium confidence." Taken together, the risk of hunger was projected to remain very high in several developing countries.

How: To provide farmers a buffer against climate shocks, livelihood diversity is being advocated. Horticulture, floriculture and agroforestry are an important component and so is crop-livestock integration. Other avenues include making and selling goods like baskets and other handicrafts from locally available produce and running small farm enterprises such as *dal* and flour mills. **Farmer interviews and baseline surveys** conducted before projects are initiated provide valuable information on what new livelihoods are best suited for the region.

Message 7: Conserve the agroecosystem

Why: It is estimated that up to 40% of the world's agricultural land is seriously degraded (Ian Sample 2007). High population density is not always related to land degradation. Rather, it is the practices of the human population that can cause a landscape to become degraded. Populations can be a benefit to the land and make it more productive than it is in its natural state. Land degradation is an important factor of internal displacement in many African and Asian countries (Bogumil 2011).

How: An activity like this calls for a **community action plan** that taps into local knowledge, emphasizes on strong community linkages to take collective action and generate internal answers to common issues. Formation of facilitating groups like innovation platforms, self-help groups and farmers' councils and committees play a key role. An excellent example is that of the Indian watershed committees which emphasizes on 50% participation of women which aligns with the organization's goal of gender equity,

Case study: In eastern Niger, 241 ha of degraded land was converted into productive farms for 10,770 women through the Bio-reclamation of Degraded Lands (BDL) system. This has resulted in a 50% increase in agri-income over non-BDL participants. The BDL system has an agroforestry component that incorporates high-value trees and vegetables in a holistic system, with the aim of reversing damage to soils caused by overgrazing and intensive farming. It is a climate-smart technology that helps regenerate the landscape by improving soil fertility through carbon sequestration via tree roots and reducing soil erosion.

The technology developed by ICRISAT had two main components—water harvesting techniques and high-value nutritious trees and annual crops. The water harvesting techniques included half-moons (demi-lunes) for trees, zaï pits for annual crops and trenches for leafy vegetables. Through these techniques rain water was stored to sustain crops in the cropping season and trees in the dry period. The system also used micro-dosing of fertilizer in the zaï holes to stimulate root growth of vegetable crops and promote better nutrient utilization. Examples of high-value trees and annual crops include drumstick tree (*Moringa oleifera*), pomme du sahel tree (*Ziziphus mauritania*), okra (*Abelmoschus esculentus*), hibiscus and sicklepod (*Senna obtusifolia*) among others.

6 Major Approaches for Building Climate Smart Farming Communities

As mentioned earlier, with droughts, unseasonal rains and unpredictable dry spells becoming more frequent, reaching farmers with **timely climate information and cropping advice** is crucial as are coping strategies to face future climate shocks. For this **holistic communication strategies** that use best available technologies and target not just farmers but link all the stakeholders along the agricultural value chain are needed. In this context, **partnerships** are invaluable and adopting the consortium approach with public and private entities has helped tap into a wide area of expertise.

Approaches implemented by ICRISAT focus on equipping farmers to use climate-smart scientific interventions and innovations, use climate information for cropping decisions, diversify livelihoods, link to markets, make agriculture profitable, rehabilitate and restore their environment and influence policy makers.

The **watershed management approach** focuses on rehabilitating agroecosystems and deploys a pool of climate-smart agricultural practices developed by ICRISAT which have resulted in increasing crop yields and incomes of farmers. This approach which is gaining momentum in India is also favored by companies for their corporate social responsibility activities. The success of this approach has led to efforts to replicate it in sub-Saharan Africa.

The **futuristic multi-model approach** uses computer simulated scenarios to give policy makers in Zimbabwe the climate scenario up to the year 2050. The result was renewed support for promoting dryland cereals—sorghum and millet and greater support for groundnut value chains. With the support of the Government of Zimbabwe, ICRISAT imported 20 tons of groundnut seed from Malawi which was distributed to farmers for seed multiplication and testing.

The **digital technologies approach** has helped farmers from the Doggoh community in remote Ghana to adopt climate-smart agricultural practices and take up agroforestry in a big way. Farmers who had never used a phone are now using mobiles for climate information to make cropping decisions. About 90% of the

farmers find the weather alerts useful and 64% of them also make use of the helpline when needed.

The **metrological advisory and farm systems approach** used in Mopti, Mali, demonstrated that climate change adaptation is achievable by using eco-friendly methods and climate information. Close to 76,000 women and 94,000 men representing all stakeholders in the value chain reported using climate information in their decision making.

The **climate and crop modelling approach** helped farmers who followed crop advisories in the drought-prone district of Kurnool in Andhra Pradesh, India, to earn 20% more than those who did not. The success of this pilot project has led to its expansion in other villages of Andhra Pradesh and the neighboring state of Karnataka.

7 Conclusion

From running awareness campaigns to popularize environment-friendly crops, creating a market pull and using social behavior change communication techniques for subsequent adoption; building capacity of stakeholders through trainings on customized technical knowhow and use of technology parks for demonstrating successful experiments; using innovation platforms to get all stakeholders to share information, knowhow and time their activities; leveraging partnerships to replicate successful projects on a large-scale, using a consortium approach for implementation of multidisciplinary components; and using the latest digital technology for quicker and timely dissemination of climate information, the development communication approach encompasses it all.

Acknowledgements I would like to thank ICRISAT staff Ms Joanna Kane-Potaka, Director, Strategic Communication and Marketing; Scientists—Dr. Anthony Michael Whitbread, Program Director, Innovation Systems for the Drylands, Dr. Suhas P. Wani, Research Program Director, Asia Program and Theme Leader, IDC; Dr. Sabine Homann-Kee Tui, Senior Scientist, Markets, Institutions, Nutrition & Diversity; Birhanu Zemadim Birhanu, Scientist, Land and Water Management; and Dr. Samuel Tetteh Partey, Scientist, Climate Change, Agriculture and Food Security (CCAFS); and all contributors to the ICRISAT Happenings newsletter for sharing information used in this article.

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