



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



Climate-Smart Villages

A community approach to sustainable agricultural development

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is working with communities to develop 'Climate-Smart Villages'. These are sites where researchers, local partners, and farmers collaborate to evaluate and maximize synergies across a portfolio of climate-smart agricultural interventions. We aim to improve farmers' income and resilience to climatic risks and boost their ability to adapt to climate change.

Although global food production has substantially increased in the past few decades, the Millennium Development Goal that aims to halve the proportion of people who suffer from hunger between 1990 and 2015 appears to be beyond reach. Nearly 870 million people still live in hunger today, most of them in South Asia and sub-Saharan Africa. These highly-populated regions with widespread poverty, have large areas under low agricultural productivity. They are prone to high climatic stresses which further compound the problem. These are regions which have been identified as climate change 'hotspots'.

Global food production must double by 2050 to match population and income growth and much of this must happen in Asia and Africa. But even as food insecurity has increased in several regions because of competing claims for land, water, labour and capital, the need of the hour is to improve production per unit of land and water, as these resources are shrinking.

Sustainably increasing agricultural productivity is therefore central to the future of global food security and the realization of the Millennium Development Goals. Now is the time for action, as practices to adapt agriculture to climatic risks take time to root and become effective. Strategies that enhance climate-smart agriculture are the most appropriate starting point for sustainable agriculture.

To address this challenge, the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), in collaboration with national programmes, is partnering with rural communities to develop Climate-Smart Villages as models of local actions that ensure food security, promote adaptation and build resilience to climatic stresses. Researchers, local partners, farmers' groups and policy makers collaborate to select the most appropriate technological and institutional interventions based on global knowledge and local conditions to enhance productivity, increase incomes, achieve climate resilience and enable climate mitigation.

Climate information is an important part of Climate-Smart Villages and consideration is always given to integrating village developmental and adaptation plans together with local knowledge and institutions (Figure 1) into the project. There is no fixed package of interventions or a one-size-fits-all approach. The emphasis is on tailoring a portfolio of interventions that complement one another and that suit the local conditions.

Climate Smart Agriculture

Climate Smart Agriculture aims to sustainably increase productivity and income, build resilience to climate change, reduce greenhouse gas emissions and enhance achievement of national food security and development goals.



Figure 1. Components of a Climate-Smart Village.

CCAFS Climate-Smart Villages are located in regions considered climate change 'hotspots'. These are currently in East Africa, West Africa and South Asia. New sites will be developed in Latin America and Southeast Asia.

We work in:

- **West Africa:** Kaffrine in Senegal.
- **East Africa:** Nyando in Kenya
- **South Asia:** Western Terai Region in Nepal, Bihar and Haryana in India.



Photo: Vinaynath Reddy (VfDocs)

Demonstration of the leaf-colour chart in Bihar, India. Using this, farmers can judge the best dosage of fertilizer for their crops.

Setting up a Climate-Smart Village

1. Selecting the site

The location of a Climate-Smart Village is selected based on its climate risk profile, alternate land-use options, and on the willingness of farmers and local government to participate in the project.

2. Working with communities

Community involvement is integral to the success of a Climate-Smart Village. CCAFS forms, or works with existing community groups, consisting of farmers, researchers, rural agro-advisory service providers and village officials. They are briefed on the objectives of Climate-Smart Villages and encouraged to formally register with the government (if they have not already) to benefit from subsidies on government schemes.

3. Conducting the baseline survey

Researchers conduct a comprehensive baseline study to capture the current socio-economic situation, resource availability, average production and income and risk management approaches of village households. This enables an assessment of the impact of the interventions after a certain period of time.

4. Prioritizing interventions

Stakeholders convene to prioritize and test which climate-smart technologies and approaches are best suited to their local conditions. Focus group discussions involve farmers in a choice experiment using dummy money to indicate which actions they would most willingly carry out.

5. Building capacity

To promote the community's involvement and motivate farmers, a range of tools and approaches are sometimes offered up front. These include rain gauges, improved seed varieties, new livestock breeds, tree seedlings, simple machinery such as zero-till machines, subsidies on index-based insurance premiums and discounts on cellphone SIM cards. Scientists, private sector representatives, and local government organize regular training sessions for farmers on good agricultural practices. At some sites a small farm is used by the researchers to demonstrate the complete portfolio of interventions.

6. Monitoring and evaluating progress

The lead partner in the village appoints a site coordinator and assistant to provide technical inputs and liaise with CCAFS resource persons. Participating farmers maintain a daily diary of their farm activities and work with the site coordinator to monitor and evaluate the progress of their chosen interventions. These results are digitized and analysed by researchers at the end of every crop season.

7. Disseminating outcomes

To spread the message of climate-smart agriculture, participatory videos on success stories and testimonials from the pilot villages are screened in nearby villages. Success stories are also widely publicized through local, national and international media. Local government partners organize regular 'farmer field days' to motivate farmers, address their questions and improve on existing strategies.

CCAFS Climate-Smart Villages and UNDP's Millennium Villages: what's the difference?

- The Millennium Villages, a project of United Nations Development Programme (UNDP) and its partners, is an integrated approach to rural development for ending extreme poverty and meeting the targets of Millennium Development Goals in Africa. Key interventions relate to access to clean water, sanitation, education, food production and basic health care. The project makes considerable financial investment in these villages.
- CCAFS Climate-Smart Villages, on the other hand, focus on climate change hotspots in Africa, Asia and Latin America and work solely on sustainable agricultural development. This is achieved through strengthening the capacity of farming communities using targeted agricultural technologies, climate information services and by engaging with institutions and policy makers. Only limited financial support is provided to facilitate the project.

Key interventions in a Climate-Smart Village

Weather

For farmers, information of near-term weather events go a long way in planning climate resilient agricultural production. Farmers are linked to weather information and value-added agro-advisories through radio shows, television, newspapers and mobile phone voice messages. Farmers can use index-based insurance schemes to cover risks associated with changes in rainfall and temperature at the different stages of crop growth.

Water

Resilient water management practices which aim at enhancing the efficiency and productivity of water, are critical climate-smart interventions. These could include aquifer recharge, rainwater harvesting, community management of water, laser land levelling, water conservation, drip irrigation and on-farm water management practices. For instance, drainage is important in places that are prone to becoming waterlogged, such as Bihar in India and Bangladesh. Vertical drainage systems are being evaluated in Bihar with the expectation that it will help floodwater seep more quickly back into the natural aquifer, providing the dual benefit of recharge and protecting standing crops.

Carbon

Carbon content in the soil can be increased through agricultural practices such as agroforestry, livestock and manure management, conservation tillage, diversified land-use systems and residue management.

Nitrogen

In Climate-Smart Villages, farmers use leaf-colour charts, hand-held crop sensors, and nutrient decision-maker tools to decide the most appropriate dosage of nitrogen fertilizers for their crops. This saves on costs and also cuts down on greenhouse gas (GHG) emissions.

Energy

CCAFS promotes fuel-efficient agromachineries, residue management and reduced tillage as interventions to conserve energy and reduce GHG emissions. In some cases, biogas systems are promoted using manure slurry from intensive dairy enterprises as part of the portfolio of innovations.

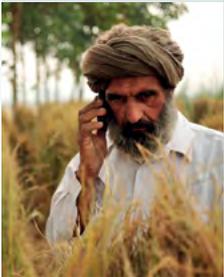
Knowledge

CCAFS and partner organizations arrange cross-site visits of farmers to analogue sites and to other areas practising climate-smart agriculture. An innovative approach of crowdsourcing seeds is used in Climate-Smart Villages. A large number of farmers are provided with seed packets of adapted varieties to evaluate those best suited to their local conditions. They provide feedback to researchers to help them develop better varieties.

“ We have seen the weather change to a great extent, low or delayed rainfall has become the norm. This project shows us how in a changing climate, farmers can continue farming with new climate smart technologies. ”

Horil Singh, farmer, Bihar, India

Climate-Smart Village Activities

Weather Smart	Water Smart	Carbon Smart	Nitrogen Smart	Energy Smart	Knowledge Smart
 <ul style="list-style-type: none"> • Weather forecasts • ICT-based agro-advisories • Index-based insurance • Climate analogues 	 <ul style="list-style-type: none"> • Aquifer recharge • Rainwater harvesting • Community management of water • Laser-leveling • On-farm water management 	 <ul style="list-style-type: none"> • Agroforestry • Conservation tillage • Land-use systems • Livestock management 	 <ul style="list-style-type: none"> • Site-specific nutrient management • Precision fertilizers • Catch-cropping/legumes 	 <ul style="list-style-type: none"> • Biofuels • Fuel-efficient engines • Residue management • Minimum tillage 	 <ul style="list-style-type: none"> • Farmer-to-farmer learning • Community seed and fodder banks • Market information • Off-farm risk management

Partnerships in a Climate-Smart Village

Several CGIAR centres work with various partners, NGOs, local government bodies, farmers' groups and national research organizations in a Climate-Smart Village.

In Rajapakkar village in Bihar, India, for example, CCAFS identified study regions for establishing the villages and an NGO facilitated the formation of farmers' communities for this project.

- The International Food Policy Research Institute (IFPRI) works with these communities to prioritize adaptation and mitigation options using a simple cost-benefit analysis.
- The International Water Management Institute (IWMI) is addressing issues of seasonal waterlogging through vertical drains.
- The International Maize and Wheat Improvement Center (CIMMYT) is providing the knowledge base for conservation agriculture and the precise use of fertilizer nutrients.
- Bioversity International works with farmers to evaluate crop germplasm and seed varieties.
- Private sector partners provide rainfall and temperature insurance.
- Information and Communication Technology (ICT) service providers in collaboration with Indian Meteorology Department and NARS disseminate voice messages about weather, market prices, and related information through mobile phones.
- Government officials offer institutional support and advice on various schemes.

Way forward

One of the great strengths of the Climate-Smart Village approach is its inclusiveness in bringing together farmers, policy makers, scientists and local organizations to work on a portfolio of practices to adapt agriculture to climate change.

Initial testimonies from farmers indicate exciting opportunities to scale out the Climate-Smart Village model in a number of villages in different regions.

Integrating the model into existing or proposed government policies can ensure the food and livelihood security of millions of farmers living in regions vulnerable to climate change.

“This programme has exposed me to key scientists who are helping us address climate risks. I am now mobilizing other farmers within the Hoima Climate Smart Villages and very soon these interventions will spread further.”

Godfrey Kairagura, farmer, Hoima District, Uganda

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