



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



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A man in a light-colored, patterned shirt and grey trousers is crouching in a field of green leafy plants. He is holding a single leaf in his right hand and looking at it intently. The field is filled with rows of similar plants, and the background is slightly blurred. A decorative wavy line in yellow and green runs across the top of the image.

CAAFS Climate-Smart Agriculture Learning Platform, *South Asia*

Photo Credits: Neil Palmer (CIAT)



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Setting the stage for south-south learning

Nepal state government officials present their future plans to invest in large scale Climate-Smart Village programmes at a workshop held in New Delhi

Arun Khatri-Chhetri and
Nitya Chanana (CCAFS)

Nepal is a hotspot of global climate change affected by multiple risks such as floods and rising minimum temperatures across different parts of the country. With an economy heavily dependent on agriculture, the newly formed provincial governments are in the process of strengthening their climate change adaptation plans, especially for the agriculture and allied sectors.

With a goal of building climate resilient agricultural systems, senior government officials from two of Nepal's provincial government visited New Delhi during 1-2 October to attend a workshop titled, '*Designing and Implementing the Climate-Smart Village (CSV) approach at the State Level of Nepal*', organized by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). The objective of the workshop was to promote south-south knowledge sharing among different stakeholders and learning from field-based experiences.

Strategizing future investments

The first day of the workshop began with setting the context with a brief introduction about the need and objective of the workshop, followed by an overview of CCAFS's work in South Asia and how CCAFS can work with the Nepal government to help tackle climate stress in agriculture. Representatives from two states of Nepal, namely Gandaki and Province 5, then spoke about their plans to initiate programmes to promote climate-smart agriculture in their respective districts. They mentioned that Province Gandaki has budgeted for the implementation of the CSV approach in 36 villages, to be approved by the provincial government while, province 5 has a total budget of 260 million NPR to develop the same in 52 villages in the province.

Presentations by CCAFS scientists explained how best to design, implement and prioritize the investments announced by the governments. They highlighted that given the governments' objective of improving farmers' yields and income in a changing climate, it is necessary to focus on three key areas; **closing the yield gap, knowledge and technology transfer, resilience building** and **developing linkages with the market and the private sector**. Representatives from the Agriculture and Forestry University of Nepal also presented the potential areas of collaboration between governments with research centres.

A glimpse of the Indian fields



Understanding the farm level climate-smart interventions in Mathura's Climate-Smart Village, India (Photo credits: CCAFS South Asia)

The second day's agenda comprised of a field visit to Mathura in the state of Uttar Pradesh, where participants witnessed the portfolio of interventions being implemented in a CSV supported by the United States Agency for International Development. They interacted with the members of the all-women Custom Hiring Centre (CHC) who explained how the CHC model works to transfer technologies to poor and marginal farmers. Interactions with the Village Climate Management Committee, also highlighted the role of local farmer organizations in leading and managing multiple climate-smart interventions. A visit to the pearl millet crop field and fodder field exposed the participants to the practices of line sowing, nutrient management, fodder management, insurance and agro-advisory which are helping farmers in improving crop yields and incomes.

The participants appreciated the guidance and knowledge shared by CCAFS and its partners and expressed their keen interest in continuing to strengthen their relationship with CCAFS and its local implementing partners in India. As next steps, the two provincial governments plan to organize a workshop in the coming months to finalize their implementation plans and strategies for setting up the budgeted CSVs, with CCAFS expected to be a key knowledge partner for extending this approach.



Photo Credits: CIMMYT

Change agents for climate resilience in agriculture

New study discusses business models of small and medium-sized enterprises (SMEs) as a mechanism for scaling climate-smart agriculture in Punjab, India

Annemarie Groot,
Jaclyn Bolt,
M.L. Jat and
Tripti Agarwal (CIMMYT)

In a recently published paper, '*Business models of SMEs as a mechanism for scaling Climate Smart Technologies: The case of Punjab, India*' by Wageningen University and International Maize and Wheat Improvement Center (CIMMYT), supported by the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), critical issues and drivers of SMEs' business models supporting or hindering the adoption and scaling of CSA have been identified.

The intention of the study is to inform policy makers and development practitioners about the potential of SMEs to act as change agents for the uptake of CSA technologies where their business models may be seen as adoption and scaling mechanisms. The study provides recommendations for changing the current government subsidy scheme as being a major factor hindering adoption and scaling of CSA. It highlights the need for flexible and targeted (financial) incentives and advises research and extension to support SMEs in the acquisition of new CSA related knowledge and skills, which they can in turn share with their customers.

Adoption and scaling from a business perspective

There is growing interest in studies looking into the private sector as delivery mechanism for CSA and supporting its scaling. This study takes a business perspective and examines the business models of two types of SMEs, i.e. **farmer cooperatives** and **individual service providers** who sell climate-smart services to smallholder farmers. The study applies the Business Model Canvas (BMC) as a lens to identify critical issues and enabling factors in the way both SMEs create value, relate to their customers and generate revenue from selling and/or hiring out a package of CSA technologies. This package includes the following technologies: Land Laser Leveller, Happy Seeder, Zero-till multi crop planter, Combined Harvester and Tractor.

The study takes the discussion further on to scaling, both, **scaling out** (spreading geographically) and **scaling up** which occurs in multiple dimensions. Scaling CSA quantitatively and functionally typically requires scaling politically and organizationally as well as involving multiple actors and layers. Scaling from a business perspective is about market scaling requiring a supportive institutional and policy environment.

Key findings

Drawing upon extensive fieldwork in Punjab, India during which over 100 respondents have been interviewed, the study shows that SMEs' business models can be seen as a mechanism for adoption of CSA technologies. This is enabled by the presence of a mix of drivers including scientific and practical evidence of CSA technologies, good partnership between SMEs and researchers, good customer relationships and effective channels through farmers' field trials and demonstrations in Climate-Smart Villages. All together creating a clear value to their customers, i.e. farmers and therefore supportive to the adoption of CSA. Distortive government subsidies on energy and the lack of market intelligence negatively affect the profitability of the business model and as such adoption.

SMEs' business models, as mechanism for scaling requiring favourable institutions and policies is less evident. Good partnership, customer relationships and effective channels in combination with favourable regulations facilitate SMEs to support scaling of CSA. However, a lack of market intelligence, difficult socioeconomic circumstances and distortive government subsidies limit the role of SMEs business model as mechanism for scaling.

To strengthen SMEs' role as change agents for CSA, policy makers should reconsider current subsidy regime and ensure flexible and targeted (financial) incentives. Research and extension services can help SMEs in the acquisition of new knowledge and skills, which they can in turn share with their customers.

From a scientific perspective, the novelty of the study is the distinction between adoption and scaling of CSA technologies. Previous literature on business models supporting CSA focused on adoption only. By introducing the concept of scaling, the paper explicates the institutional and political dimensions of large scale adoption at different levels involving multiple actors to bring about the societal changes needed to address climate change impacts and enhance food security.



Photo Credits: GLZ India

Understanding baseline situations for clean energy promotion in agriculture

A project launched with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH aims to evaluate diverse solar irrigation systems for their scalability in India

Nilanjan Ghose and
Diego Senoner
(GIZ, India) and
Paresh Shirsath (CCAFS)

The issue of solarization of the agriculture sector in India, has steadily risen through the policy agenda over the last few years. The country has diverse agro-climatic zones, which is why, the energy rich and water scare regions in the western part of the country needs a very different approach than that of the ground water rich and energy scare regions in the eastern and north-eastern parts of the country to address the irrigation demand through solar pumps. Different solar water pump centric deployment models are being piloted by different stakeholders across India. Apart from the government supported subsidy-based deployment models to replace the off-grid diesel pumps, there are bank-financed deployment models, grid-connected solar pumps with the option of earning revenue through selling of excess energy and different 'water-as-a-service' models being piloted across the country. However, a comprehensive synthesis of such pilots leading to identifications of factors of success and barriers for adoption has not yet been developed. Therefore, there is a limited understanding of the existing deployment models for promotion of solar water pumps.

Partnership between CCAFS and GIZ

There is a growing concern that rapid deployment of solar water pumps (in addition to the existing electric or diesel irrigation pumps) would lead to increased depletion of ground water levels. The sustainable use of solar powered irrigation pumps primarily depends on the understanding of the irrigation demands of the farmers. The subsidy-based deployment model does not necessarily factor in the demand for irrigation water by the farmers and therefore there is a mismatch between what a farmer needs (in terms of the technical solution) and what he/she gets as a solution for irrigation. To understand the irrigation demands, there is a need to understand the geographical region, existing ground water table, solar radiation in the region, land size, crops grown, water requirements for the crops for each of the irrigation cycle, rainfalls over the past couple of years etc.

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), is working towards spearheading 'Climate-Smart Agriculture' and is trying to address the issues relating to climate change from the agricultural side. Indo-German Energy programme- Access to Energy for Rural Areas (IGEN-Access) project of GIZ is trying to create an enabling

environment for promotion of solar powered irrigation projects and trying to increase the use of clean technologies for agriculture. Both the organizations are trying to address the problem from two different sides. Hence, CCAFS is a natural partner for IGEN-Access project of GIZ to contribute to the overall goal of attaining a climate resilient-agricultural space for future.

Project objectives and potential impacts

The project is comprised of the following key objectives for research and development on use of solar power in rural areas of India:

- To develop a compendium of major solar irrigation pilot projects in India; and
- To carry out a systematic review of existing piloted models for their scalability;

The project intends to develop a scientific assessment of the existing solar irrigation deployment models and to identify the factors of success and barriers to large scale adoption. The lessons learned will be of great use for various stakeholders attempting to scale up solar irrigation with optimal resources. Thus, the collaboration would address the existing knowledge gap through designing a compendium for the present operational models along with the potentials for replication. The findings would also form the foundation for future interventions in this space.



Photo Credits: CCAFS South Asia

Flowering growth through seeds of inclusion

Integrating gender inclusion in all stages of project strategy and framework for climate-smart agriculture adoption

Nitya Chanana,
Arun Khatri-Chhetri,
Kunal Pandey (CCAFS) and
Rajashree Joshi (BAIF)

The United States Agency for International Development (USAID) through its support towards scaling the Climate-Smart Village (CSV) approach in India, has also helped set sail the ship for gender inclusion and empowerment in agriculture. With a strong focus on integrating gender aspects in all stages of the project, there is an attempt to leverage the conspicuity of women farmers in the Betul district of Madhya Pradesh for inclusive development. Conscious efforts have been taken to include women and young farmers as not just beneficiaries but also as active participants across the key stages of the project, from the baseline to scaling up activities.

Point of commencement

Gender-disaggregated data served as the starting point for initiating an informed integration of women farmers into the CSV approach implementation. For instance, disaggregated data on labor days revealed higher women's participation in activities such as transplanting, weeding, harvesting and threshing in rice crop. Data on decision making for agricultural activities also highlighted women's equal participation in taking decisions throughout the cropping activities. Additionally, women were found to be active members of locally established self-help groups (SHGs) in the project villages.

An analysis of the climate vulnerabilities linked to their roles and socio-cultural norms facilitated designing of appropriate gender specific weather resilient technologies to be implemented as part of the project activities. A prioritization exercise with men and women groups exhibited that technologies and practices related to water management and conservation were given higher preference by both women and men, given the climatic conditions and water scarcity. In addition, improved seeds, weeding machine and zero-tillage were prioritized by women farmers while men prioritized livestock insurance, use of farm-yard manure and weeding.

Interventions and results

To implement the prioritized portfolio of CSA, three categories of farmers, namely Super Champion (1 woman), Champion (14 women) and CSA (134 women) farmers were selected from 25 villages. Institutions, in the form of a Village Climate Management Committee (VCMC) as well as Custom Hiring Centers (CHC), were formed for successful implementation of gender inclusive interventions in the CSVs. About 80 women

SHGs, involving a total of 900 women farmers across 25 villages are represented through the VCMCs. This committee is responsible for the management of the CSV project activities. The CHCs, on the other hand, are women led groups that provide relevant climate-smart technologies and practices at a rental to farmers in the region.

As a result of these activities, farmers in the district have been provided with a varied set of CSA technologies, practices including improved seeds, clean energy technologies (solar pump and biogas), cattle development services (including artificial insemination, mineral mixture, pasture management, vaccinations and deworming), climate information and advisory, and crop insurance among others. In addition, the project is also promoting income generation activities such as preparation of bio-fertilizers and vermi-composting and vegetable farming on commercial level for income generation for women farmers. The institutions of VCMC and CHC are also providing a platform for scaling out potentially effective CSA options to other farmers through private sector involvement and convergence with other government schemes.

So far, more than 3,700 farmers in 25 villages have become part of this project funded by USAID. They now have access to daily weather based agro advisory through SMS and Voice call along with CSA related capacity development and training activities being conducted in their villages. Average yield of major crops such as Wheat have improved by more than 35% with simultaneous average gross income improvements of more than 40%. More than 50 hectares of land and 250 farmers have witnessed this yield and income increase. Most importantly, women have been at the forefront of this project, adding to the holism and robustness of the entire approach.



Photo Credits: CCAFS South Asia

Adding to the swing of climate-smart agriculture in South Asia

A workshop brings together CCAFS project leaders and national partners to assess current developments and future strategies for scaling climate-smart agriculture in South Asia

Shehnab Sahin (CCAFS)

Effective collaborations and collective action are fundamental aspects of the CGIAR Research Program on Climate Change, Agriculture and Food Security's (CCAFS) approach towards agrarian distress management under a changing climate. There is strong consensus across regions and flagships that synergies need to exist in the efforts of multiple stakeholders to confront global challenges to food security due to climate change. The line-up of interventions and impact are not simply resilience building in agriculture but also supporting better livelihoods, disaster management and gender inclusive agricultural systems.

To assess the progress made so far through various projects and strategize future plans for climate-smart agriculture (CSA) scaling in the South Asia region, CCAFS alongside the International Water Management institute (IWMI) organized a regional meet bringing together project leaders and national partners from Bangladesh, India, Nepal and Sri Lanka. The three day workshop held in Colombo, included in its agenda, panel discussions, project presentations, thematic group discussions and country strategy development.

The present opens up the future

Several project and co-project leaders utilized the workshop forum to present the on-going advances in their existing projects while delineating future strategies for strengthening the same. These projects cover a wide spectrum of climate-smart interventions within broader themes of agrarian risk management through insurance, big data application, scaling CSA in different agro-ecologies, capacity development of farmers, fishers as well as gender inclusiveness in CSA to institutions and policy shaping through south: south collaboration. Some of the developments to look forward to in the period 2019-21 include but are not limited to: Leveraging the 'big-data' revolution for directing CSA research across the region. Some elements to anticipate are, increased digital surveys, customized CSA agro-advisory at scale, interactive digital outputs like CSA dashboards for wide sharing among next users etc.; Strengthening the modus of delivery of context specific, real-time climate information to millions of farmers and fishers through information and communication (ICT) technology fed decision support tools; 'Smartening' agricultural insurance in the region by developing smart solutions for conducting loss assessments for yield index, rationalization of number of crop cutting experiments, bundling of CSA with insurance and devising ways to reduce basis risk in weather based crop

insurance; Closely integrating climate risks in the aquaculture space and undertake scaling of interventions through bilateral projects and partnerships; Advancing and formalizing south: south learning between South Asia and Africa on CSA; Aligning CSA research with national and global agendas and attaining convergence with Nationally Determined Contributions as well as Sustainable Development Goals in the area.

Collective discussions foster collective resolve for action

An objective of the workshop was to gather the collective opinions of CGIAR scientists and national partners to draft future strategies for CSA scaling in the region. These combined knowledge sharing sessions were done through theme based group discussions as well as country-wise strategy groups. Three themes that were accorded to participants along with resultant action plan are as follows:

- **CSA Technologies, Practices and Policies:**
In this area: To prioritize big data investment planning; Envisage a cross-regional CSA consortium; Create mechanisms for enhanced data sharing within region and; Foster higher collaborations with policy projects.
- **Climate Services and Safety Nets:**
In this area: Strengthen research support to enhance reliability of climate- forecast information to farming communities; Foster closer ties with public MET and private companies; Assess the effectiveness, types of products and costs in the insurance space and; Augment regional skills for differential forecasts and expand access to global data.
- **Gender, Youth and Social Inclusion:**
In this area: To ensure research and extension services in support of women's entrepreneurship; Explore gender related opportunities in the insurance space; Policy information to prioritize labour saving technologies to help women farmers in the region.

The country-level discussions were steered towards assessing the extent of alignment between research agendas of CGIAR and NARS and intra-country coordination between agencies. There was common consensus that partnerships should be made more expansive with higher incidences of participatory science-policy dialogues and rapid conversion of agriculture and climate change research into scalable interventions and models throughout the region.



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About CCAFS

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a research initiative seeking to overcome the threats to agriculture and food security in a changing climate. CCAFS invests in research to address the crucial tradeoffs between climate change, agriculture, and food security and works to promote more adaptable and resilient agriculture and food systems in five focus regions: South Asia, Southeast Asia, West Africa, East Africa and Latin America. CCAFS work is carried out with support from CGIAR Fund Donors and through bilateral funding agreements. For details please visit <https://ccafs.cgiar.org/donors>. The views expressed in this document cannot be taken to reflect the official opinions of these organizations.

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For more information, contact:

South Asia Regional Program Leader
Pramod K. Aggarwal
E: p.k.aggarwal@cgiar.org

South Asia Science Officer
Arun Khatri-Chhetri
E: A.Khatri-chhetri@cgiar.org

South Asia Communications Specialist
Shehnab Sahin
E: s.sahin@cgiar.org

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