RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security

CGIAR CCAFS

Info Note

Integrating Gender into the Climate-Smart Village Approach of Scaling out Adaptation Options in Agriculture

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Key messages

- Gender disaggregated data forms the basis of prioritization and implementation of climate-smart agriculture (CSA) technologies, practices and services in a Climate-Smart Village (CSV)
- Women led institutions are playing an important role in implementation as well as dissemination of CSA technologies and practices in the CSVs
- The institutional approach is also enabling the scaling out of CSA to other farmers through social interactions in the form of field visits and farmer fairs
- Results point to the potential of the CSV approach as an appropriate platform for integrating gender in climate change adaptation in agriculture

Differences in adaptive capacities and vulnerabilities of women and men in agriculture to climate change make a strong case for integrating gender in climate change adaptation processes. Literature suggests that climate change is expected to exacerbate existing gender inequalities, impacting women more than men in areas including agricultural production, food security, water, energy and health (IPCC 2014, Goh 2012). This is also linked to women's significant contribution in the sector.

Strengthening the capacity of women farmers, therefore, is known to be an essential step towards building climate resilient households, communities and food systems. To do this, adaptation interventions in the form of climate-smart agriculture (CSA) are being increasingly suggested (World Bank Group; FAO; IFAD 2015). As opposed to traditional agricultural practices, CSA can help farmers improve their agricultural productivity, lower labour requirements, and diversify income options, while building their resilience towards current as well as future climate risks.

CCAFS's Climate-Smart Village (CSV) approach is one of the options to address the climate change challenges in agriculture and food security (CCAFS 2016). It incorporates CSA technologies, practices, services and processes relevant for local climatic risk management and aligns them with local adaptation policies/plans and village development programs (Aggarwal et.al. 2018). Gender and social inclusion is an essential aspect of the CSV process for conducting research on relevant and location/context-specific enabling conditions, to generate greater evidence of CSA effectiveness.

As a step towards building climate resilience, a USAID funded project aimed at scaling out climate-smart agriculture through the CSV approach in Madhya Pradesh in India, is providing an enabling platform to women farmers to manage and lead climate change adaptation and mitigation interventions in their villages. This info note presents preliminary information on each of the major steps of a CSV approach and its components and linking them with gender and CSA. It focuses on the initial findings of a baseline assessment, the process of CSV formation and the initial output of CSA implementation (for Rabi/monsoon season) with due consideration of gender dynamics in agriculture.

Location and methods

Betul district in Madhya Pradesh is dominated by the Scheduled Tribes[1] whose primary occupation is farming, although, in a conventional form with minimal use of technology and information. Agriculture is primarily rainfed and is characterized by low productivity. As a secondary income source the households are dependent on casual wage labour to fulfil their basic household

[1] Scheduled Tribes are indigenous population groups that are economically, socially, educationally and politically backward and have been granted special rights under the constitution of India

expenditure and dietary requirements. Most of the villages are located on a hilly terrain and do not adopt water recharge measures. Additionally, a gender and climate risk related assessment, identifies the district as a hotspot having a larger proportion of women labourers and cultivators in agriculture, while facing higher climate risk of drought, compared to other districts in the state (Chanana-Nag and Aggarwal 2018).

For the project implementation, 25 villages were selected. The selection of project villages was done based on consultation with local stakeholders (Non-Governmental Organization and government agriculture officials) and discussion with the farmer groups.

A baseline survey was also conducted in 375 households in 2017 to provide an information base for monitoring and assessing progress and effectiveness of the CSV. Additionally, gender disaggregated data was collected through six Focused Group Discussions (FGD) in three randomly selected villages in the project areas. The discussions were held with three women and three men groups, each having 10-15 participants.

Baseline assessment

Agriculture and livestock

Four major crops define the agricultural activities in the district, rice and maize in Kharif (monsoon) season and chickpea and wheat in Rabi (winter) season. Maize and wheat form an important part of the region's staple diet and are grown by most of the households (Table 1). In case of lower rainfall, the cropping pattern shifts towards maize and chickpea. The yields of crops such as wheat are lower than the state's average highlighting the scope for improvement through efficient use of resources.

Table 1: Major crop and production

Crop	Betul (% of HHs)	Average area (hectare)	Average yield (tons/hectare)
Rice	63.7%	0.87	2.1
Maize	93.3%	1.75	2.6
Chickpea	43.2%	0.86	1.4
Wheat	76.2%	1.78	2.8

On an average, a household owns four cattle, one buffalo and one sheep or goat in Betul. Fodder and feed management are the key activities in animal husbandry. Majority of the farmers (66%) use fodder from their own land while 60% of them practice free grazing in private or communal lands. Use of crop residues for livestock feed is practiced by 55% of the households. Milk yields are very low and only used for the family's consumption.

Climate risk impact

Farmers identified multiple climate related changes faced by them in the last few years (Figure 1). As per both women and men farmers, delayed monsoon and decrease in rainfall are the most significant risks in Kharif season that often lead to water scarcity for irrigation, resulting in delayed or no crop sowing in some cases. Also, excess rainfall after a period of low or no rainfall adversely affects the sown crops. Increased pest incidence due to high temperature and humidity is a common phenomenon in Rabi crops leading to increased usage of pesticide and insecticides. Maize and rice crops are most affected by these changes. Less rainfall in the Rabi season also affects the overall water availability in the village impacting the production of wheat and vegetables. Heat waves during summers impact the health of livestock, further reducing their milk yields. Given the subsistence nature of farming in the villages, crop loss or lower yield directly affects food consumption making them dependent on markets to realize part of their food intake. Additionally, a lower income coupled with increased input cost also increases dependency on credit from the local trader to meet the household requirements.

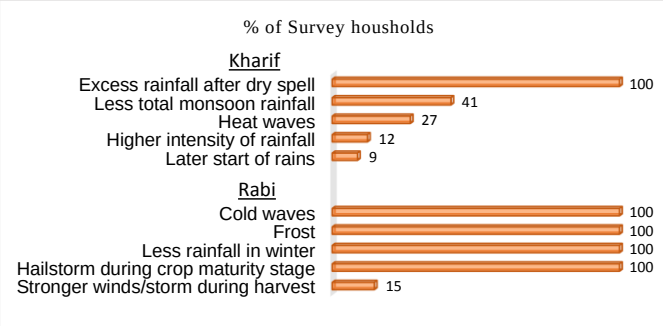

Figure 1: Changes in climate observed by farmers in the last 15-20 years in Betul district

Coping mechanisms

Women and men farmers had similar responses to managing climate risks highlighting the involvement or awareness at a household level, as shown in Table 2. As per them, the most common strategy for maize and rice crops (monsoon season) is to change sowing dates, change crop type and reduce the area sown. Some farmers also buy water from those having irrigation facilities at a rate ranging from INR 500-1000 per acre. In the case of vegetables and wheat (winter season), however, the most common coping mechanism to prevent crop loss is to 'do nothing'. In case of pests, the farmers noted that despite increasing pesticide application, they are unable to minimize losses.

Table 2: Coping strategies adopted by farmers

Risk	Coping strategy
Increase in water shortage/ Later start of rain/ Heat wave	Change sowing dates, buy water for agriculture, change crop type, increase pesticide application
Less rainfall in winter	Buy water for agriculture, change crop type
Loss of crop and income	Sell assets, borrow money from relatives and friends, take credit from trader, reduce food intake, diversify livelihood options, receive remittances from migrant members, sell livestock

To compensate for the loss in crop and as a result income, due to weather risks, working as wage labourers in other farmer's fields (mostly by women) or undertaking off-farm employment in nearby towns (mostly by men) is also a common strategy adopted across households. In addition, the women farmers also noted that that in cases of major income loss, they sell their jewelry to sustain the family. In extreme cases, all the family members reduce the food intake to curtail food related expenses.

Gender roles and decision making

Both women and men farmers are actively involved in agricultural as well as livestock production. Figure 2 highlights the decision making role of women and men in agriculture. About 28% of the respondents said that only men have a say in taking all the agriculture related decisions while 69% responded that the women and men take decisions together.

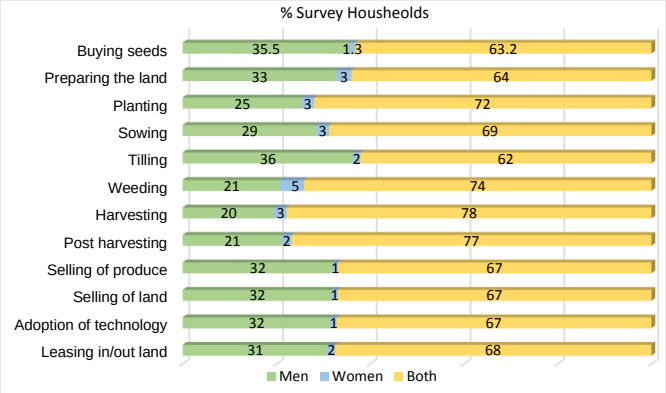

Figure 2: Activity wise decision-making of women and men farmers in agriculture

The joint decision making is more in case of livestock related activities, as mentioned by 76% of the respondents (Figure 3). Individual decision making by women farmers is higher in case of livestock (6% of respondents) compared to agriculture (2%) related activities.

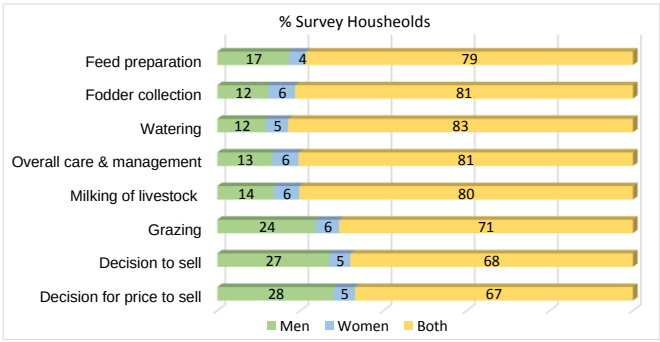

Figure 3: Activity wise decision making of women and men farmers in livestock rearing

However, male respondents comprised 93% of the survey respondents. Therefore, in order to overcome respondent bias, the role of women and men in agriculture as well as in decision making was discussed with women and men farmer groups separately. These discussions revealed slightly different roles. As per all women and men groups, tasks involving technology selection and use are mostly done by men whereas women's contribution is mostly labour intensive. Similarly, activities involving market access are men's responsibility while women's work is limited to the farm and household. Irrigation is considered a man's activity and in the absence of a male household member, a male labourer is hired for the task. In terms of decision making, it was highlighted that in most cases, the doer is often perceived as the decision maker. Women and men take decisions together during pre and post crop season, while in-season farming decisions are primarily men driven. Women have an equal say in important decisions of selling produce as well as livestock. They are also responsible for managing the household expenditures. Both women and men are actively involved in livestock related activities as well but taking care of the animals is primarily women's responsibility while the men are more involved in milking, grazing and selling.

Technology and information access

The penetration and awareness of CSA technologies and practices was very limited among both women and men farmers. The most commonly used technologies and practices included sprinkler irrigation, concentrate feeding for livestock, fodder management, crop insurance, and integrated pest management, drainage management and fodder banks, being used by only 5-12% of the survey respondents (Table 3).

Table 3: Level of technology adoption before CSA intervention

CSA category	Major technologies	% house-hold users
Water-Smart	Sprinkler irrigation	8.3%
	ADW in rice	3.5%
	Raised bed planting	3.2%
	Drainage management	5.6%
Energy-Smart	Zero/minimum tillage	0.3%
Nutrient-Smart	Concentrate feeding for livestock	6.4%
Carbon-Smart	Fodder management	10.7%
Weather-Smart	Crop insurance	6.7%
Knowledge- Smart	Integrated pest management (IPM)	11.5%
	Fodder banks	5.6%
	Seed systems/Banks	2.4%
	Prophylaxis & Area specific mineral mixture for livestock	4.8%

The surveyed farmers were not getting any agro-advisory services and majorly relied on neighbors and relatives, television and seed traders for weather information. For women farmers, informal channels including discussions with friends and neighbors, and Self-Help Group (SHG) meetings were the most common source of receiving any market and agriculture related information.

Institutions

About 74% surveyed households are members of at least one community based organization such as farmers' groups (including SHGs) and Farmer-Producers' Organizations (Table 4). It was observed that most of the

women farmers are actively involved in SHGs established by local NGO's in the area. These groups are majorly involved in income generating activities.

Table 4: Institutional membership of farmer households

Type of institution	% of households with membership
Farmers group	79.7
Farmers Producer Organizations	20.3

CSV design

Prioritization of potential interventions

Based on production system, agro-ecological conditions, nature of climatic risks, type of farmers, gender assessment and other baseline information, a list of 55 relevant CSA technologies, practices and services was prepared. The list of the CSA options included weather, water, seed/breed, nutrient, energy and knowledge-smart agriculture technologies, practices and services (CCAFS 2016, Aggarwal et al 2018). An initial participatory prioritization exercise was conducted with three women and three men farmer groups to understand their preferences of on technologies, practices and services as per their priorities. All 55 interventions were explained in detail to the group members. The costs and benefits of each technology/practice were also highlighted. Each group shortlisted 20 options and ranked them as per their preferences (Picture 1).

Picture 1: Group exercises being conducted for prioritization

During the ranking exercise, technologies and practices related to water management and conservation were given higher priority by both women and men, given the climatic conditions and water scarcity. Apart from that, improved seeds, weeding machine and zero-tillage was prioritized by women farmers while men prioritized livestock insurance, use of farm-yard manure and weeding. The weeding machine was prioritized for its labour saving feature and ease of use by the farmers (Table 5).

Table 5: Average ranking of technologies by women and men farmers (in ascending order)

Technologies/Practices	Women's group	Men's group
Aquifer recharge shaft and wells	-	19
Bio-gas	19	20
Check dam	-	2
Climate-smart housing for live-stock	10	14
Cono-weeder	7	8
Crop insurance	11	-
Drip irrigation	15	-
Dug out ponds and Storage tanks	3	5
Dug well	9	1
Farm bunding	16	12
Gully control structures	-	6
Improved/Short duration crop varieties	6	18
ICT based agro-advisory	12	-
Integrated pest manage-ment/Organic pesticides	-	15
Livestock insurance	17	3
Minimum tillage/Zero tillage	8	13
Nala bunding	1	10
Paddy rice cutter	13	11
Solar pump	5	17
Sprinkler	4	9
Stress tolerant high-yielding breeds of livestock	14	16
Tubewells	2	-
Use of farm yard manure	20	4
Use of vermi-compost	18	7

Selection of farmers

Three categories of farmers were selected for the implementation of all CSV activities namely, Super-Champion[2], Champion[3] and CSA[4]. One woman Super-Champion, 14 women Champion farmers and 134 CSA women and men farmers were selected from each of the 25 villages to lead the technology implementation for creating evidences. These farmers were provided training and capacity building exercises for implementing the portfolio of technologies and practices in their farms.

Institution building

- *Group formation*: A committee by the vernacular name of 'Gram Jalvayu Samiti' (Village Climate Management committee: VCMC) has been formed in each village to work as an informal body headed by a Chairman (the Super-Champion farmer). 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 committee members are actively involved in the design, selection, monitoring, and dissemination of CSA interventions in their villages.

[2]*Super-Champion* farmers are large landholders, having the capacity to implement large portfolio of technologies and practices, proactive and financially well-off, and can influence other farmers in the village and play a leadership role in developing a climate resilient agricultural production system.
[3]*Champion* farmers and medium-large land holders and can implement a relatively limited number of technologies and practices (compared to super-champions).
[4]*CSA farmers and small (landholders) and resource poor farmers who can implement a very limited set of technologies and practices.*

- *Custom hiring center*: Farmers in the district are small landholders and have low investment capacity for technologies. With an objective to create a sustainable farm model, five custom hiring centers have been established to provide access to affordable and relevant climate-smart technologies and practices to the center members as well as other farmers. These centers are run by women farmers who manage as well as use the technologies for agricultural operations. Equipment available in these centers include sprinkler set, spray pumps, manual crop harvester, weeding machine, zero-tillage machine, seed driller, paddy transplanter and portable solar irrigation pump system.

Portfolio of technologies, practices and services

Based on discussions with farmers, three different portfolios of locally-relevant and evaluated CSA technologies, services and practices were developed for each farmer category: Super Champion, Champion, CSA and other farmers (Table 6). These were designed keeping in mind the differences in preferences of women and men farmers.

Table 6: Portfolio of technologies for different categories of farmers

Super Champion	Champion farmers	CSA farmers	Other farmers
➢ Improved seed ➢ ICT based weather and agro-advisory services ➢ Crop insurance ➢ Water management ➢ Integrated nutrient management (based on LCC, Green Seeker) ➢ Alternative wetting and Drying ➢ Direct seeded rice ➢ Minimum tillage ➢ Fodder management ➢ Concentrate feeding for livestock ➢ Stress tolerant high yielding breeds of livestock ➢ Area specific mineral mixture for livestock ➢ Weather smart housing for livestock ➢ Bio-gas ➢ Solar pump (in group)	➢ Improved seeds ➢ ICT based weather and agro-advisory services ➢ Crop insurance ➢ Water management ➢ Integrated nutrient management (based on LCC, Green Seeker) ➢ Fodder management ➢ Concentrate feeding for livestock ➢ Stress tolerant high yielding breeds of livestock ➢ Area specific mineral mixture for livestock	➢ Improved seeds ➢ ICT based weather and agro-advisory services ➢ Crop insurance ➢ Area specific mineral mixture for livestock ➢ Fodder management ➢ Concentrate feeding for livestock	➢ ICT based weather and agro-advisory services including market information ➢ Information about weather resilient technologies

Creating evidences

Key activities for CSV formation

- *Improving farmers' access to better seeds*: Majority of the farmers in the CSV areas were cultivating low yielding traditional crop varieties since long time and seed replacement rate was very low. Seed of major crops in the CSVs: wheat, gram and mustard were replaced with drought/insect pest tolerant high yielding varieties in all Super-Champion and Champion farmers. These seeds were also distributed to CSA and other farmers in the CSVs. Vegetable cultivation was also promoted among some Super-Champion and Champion farmers for cropping system intensification and income generation. All Super Champion and Champion farmers were trained on seed treatment, nutrient application and intercropping of wheat with legumes and mustard crops.

- *Capacity building and trainings:* Training and capacity building of farmers on usage and relevance of various CSA technologies and practices were given, as presented in Table 7. A total of 835 women and 61 men attended these trainings.

Table 7: Number of trainings given to women and men farmers

CSA technology/practice	Number of trainings
Improved seed	50
Precision nutrient management	125
Intercropping with legumes and vegetable	75
Irrigation and drainage management	25
Crop insurance	25
ICT based climate, market and agro-advisory	25
Water use efficiency improving technologies	50

- *Establishment of cattle development centers (CDC):* To address the issue of decreasing cattle productivity, specialized cattle centers were developed to promote improved cow breeds (Holstein Friesian, Jersey and Sahiwal) and buffalo breeds (Murrha), preventive animal health care, and capacity building training for health and feed management. A total of 114 households benefitted from this intervention and are now seeing significant improvement in milk production.

- *Promotion of clean energy development:* To increasing farmer's access to clean and renewable energy for use in their farms and households, five biogas models and five portable solar irrigation systems were provided to Super-Champion farmers for demonstration in the CSVs. The objective was twofold; to reduce carbon emissions, and to reduce women's drudgery through reduced labour in firewood collection and preparation of cattle dung cakes. The biogas slurry is also being used to produce vermicompost which is being applied directly in the fields for vegetable and fruit cultivation. Solar irrigation system is enabling access to water at affordable rates for farmers. The technology is not only helping in uplifting water from the wells for irrigation purposes, but is also replacing diesel based water pumping system. The portability of the solar system makes it easy and convenient to use on multiple farms.

- *Provision of weather based agro-advisory services through ICT:* To mitigate potential risk due to weather variability, agro-advisory services are being provided to 1,412 farmer households through one SMS and two voice calls a day to the farmers. The advisory information contains weather forecast for 72 hours, and crop specific advisories based on crop calendar prepared in consultation with farmers, local NGO staff, and local government agencies. Considering the limited access of mobile phones for women farmers, these messages are also communicated daily by writing them on the village notice boards. Messages

are also customized for the need of women farmers based on their role and responsibilities in agriculture.

- *Improving farmers' access to weather based insurance program:* Farmers in the CSVs locations are linked with Prime Minister Crop Insurance Program: Pradhan Mantri Fasal Bima Yojana (PMFBY). It provides insurance coverage and financial support to farmers in the event of crop losses as a result of natural calamities, pests and diseases to stabilize the income of farmers and to encourage them to adopt modern agricultural practices. Given the low levels of awareness and enrolment in the insurance program, several camps were organized in all 25 project villages to enroll Super-Champion, Champion, CSA and other farmers.

Scaling

The project is also undertaking horizontal scaling of CSA activities across village communities through multiple methods.

- *Farmer-to-farmer*:
  - Non-beneficiary farmers are regularly invited to visit the fields of the Super-Champion, Champion and CSA farmers to learn about the application of the CSA technologies and practices in different crop and livestock production systems.
  - A "Farmers Fair" also called as "Kisan Mela" was organized to spread awareness about climate-resilient technologies in agriculture and promote a face to face interaction among the farmers visiting from different parts of the district. During the event, the women Super-Champion and Champion farmers in all 25 villages shared their experiences on climate-smart interventions in agriculture and their preliminary results. The attendees were exposed to information about farm machinery, feed for livestock, crop insurance, improved animal breeds and seeds, small agro enterprises and custom hiring centers. Field visits were also organized during the event to show the evidence of interventions.
- *Private sector involvement*: The project has collaborated with private players such as IFFCO Kisan Sanchar Ltd. (ICT service provider), and established Farmer Producer Organizations to increase their involvement and contribution to CSA activities and spread their services beyond the CSV project.
- *Convergence with government schemes*: To take advantage of the multiple social schemes by the state and central government, the project is also converging some of its resources with those of other local government schemes to attain maximum impact among the beneficiary households. These include schemes related to sanitation, health, drinking water and fuel. The project has managed to benefit 1,591 beneficiary households.

Progress so far

Figure 4 highlights the performance of the activities in CSVs during the six months of the Rabi (winter) season. The active participation of women groups in CSA implementation has resulted significant improvements in farm yield and income.

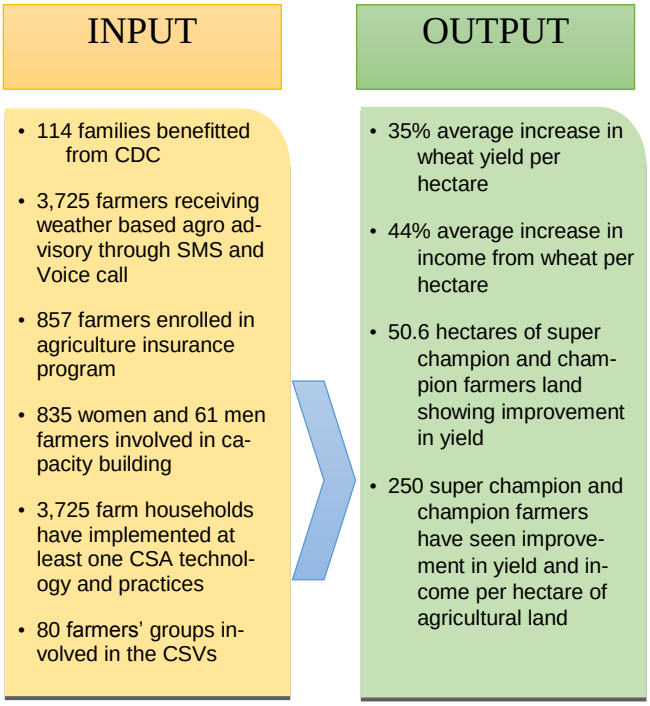

Figure 4: Assessing outputs of CSA implementation in Betul

Conclusion

The findings in this Info Note highlight the importance of gender disaggregated data in prioritizing and implementing CSA technologies, services and practices in the CSVs. While facing similar climate risks, women and men farmers in Betul had different priorities for building their adaptive capacity. These differences were incorporated when implementing CSA through the leadership of women Champion and Super-Champion farmers. The institutional approach, in the form of a Village Climate Management Committee as well as the custom hiring centers, appears to be an enabling factor for successful implementation of gender inclusive interventions in a CSV setup. These institutions are also providing a platform for scaling out potentially effective CSA options to other farmers through private sector involvement and convergence with other social welfare schemes. The results provide a positive outlook towards the achievement of the long term objectives of improved food security and reduction in poverty. They also highlight

the role of the CSV approach for mobilizing women farmers, especially in regions where a large number of women are actively involved in agriculture and are vulnerable to climate risks.

Further readings

- Aggarwal P. K., Jarvis A., Campbell B. M., Zougmoré R. B., Khatri-Chhetri A., Vermeulen S. J., Loboguerrero A., Sebastian L. S., Kinyangi J., Bonilla-Findji O., Radeny M., Recha J., Martinez-Baron D., Ramirez-Villegas J., Huyer S., Thornton P., Wollenberg E., Hansen J., Alvarez-Toro P., Aguilar-Ariza A., Arango-Londoño D., Patiño-Bravo V., Rivera O., Ouedraogo M. and Tan Yen B. 2018. The Climate-Smart Village Approach: Framework of an Integrative Strategy for Scaling Up Adaptation Options in Agriculture. Ecology and Society 23(1):14. https://doi.org/10.5751/ES-09844-230114
- CCAFS. 2016. Climate-Smart Villages. An AR4D Approach to Scale Up Climate-Smart Agriculture. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available online at: www.ccafs.cgiar.org
- Chanana-Nag N., and Aggarwal P.K. 2018. Woman in Agriculture, and Climate Risks: Hotspots for Development. Climatic Change. https://10.1007/s10584-018-2233-z
- Goh A. H. 2012. A Literature Review of the Gender-Differentiated Impacts of Climate Change on Women's and Men's Assets and Well-Being in Developing Countries. International Food Policy Research Institute, CAPRi Working Paper No. 106. http://dx.doi.org/10.2499/CAPRiWP106.
- IPCC. 2014. Summary for Policymakers. In: Climate Change 2014: Impacts,Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Cambridge University Press. https://www.ipcc.ch/pdf/assessment-report/ar5/wg2/ar5_wgII_spm_en.pdf.
- World Bank Group, FAO, IFAD. 2015. Gender in Climate-Smart Agriculture: Module 18 for Gender in Agriculture Sourcebook. World Bank, Food and Agriculture Organization of the United Nations, and the International Fund for Agricultural Development. https://openknowledge.worldbank.org/handle/10986/22983

This brief summarizes preliminary results of a study undertaken to assess the performance of CSA interventions in Betul district of Madhya Pradesh. The study was conducted as part of a USAID funded project, aimed at scaling out CSA through the CSV approach in India, implemented by CCAFS, BAIF Development Research Foundation and farmers' groups in Betul.

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