



RESEARCH PROGRAM ON  
Climate Change,  
Agriculture and  
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**SPECIAL EDITION  
ON GENDER AND  
SOCIAL INCLUSION**

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## Accounting for women in adoption of new technologies in agriculture

A study undertaken by IFPRI aims to explore the gender dimension in decisions for investments towards climate-smart agricultural technologies

P.K.Joshi, Md. Tajuddin Khan  
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**Studies** on the gender division of labor in rice production reveal that women in South Asia contribute 60–80 percent of the required labor. This labor division results in different preferences for agricultural techniques. Few studies measuring willingness to pay (WTP) for new technologies often rely on a comparison of male and female headed households. But this approach provides only limited information on a small segment of female producers and ignores majority of female farmers who live in male-headed households. International Food Policy Research Institute (IFPRI) had undertaken a study with an aim to survey a man and a woman from each farming family in the sample to measure their marginal valuations for different attributes of direct seeded rice (drum seeders).

Direct seeded rice (DSR), can reduce the water and labor requirements and result in lower greenhouse gas emissions and increased yield. However, adopting this technology needs buy-in from both women and men. IFPRI undertook a study to examine the willingness to pay for a drum seeder, the main equipment needed for DSR with the following objectives:

- To understand the preference heterogeneity between men and women for a CSA technology and
- To measure the willingness to pay for direct seeded rice (drum seeder) for both men and women and to find out the factors that influence WTP.

### **Data, Sampling and Methodology**

Respondents were also asked questions from the Women Empowerment in Agriculture Index (WEAI) to measure the roles and extent of women's engagement in the agriculture sector in five domains—agricultural production, resources, income, leadership, and time. WEAI measures the empowerment, agency, and inclusion of women in the agriculture sector in an effort to identify ways to overcome those obstacles and constraints. The WEAI module was administered to both male and female respondents in the sample. The module consisted of a series of questions; respondents were asked to rate the extent to which they could make decisions, if they wanted to, in different domains in their lives. They were asked to give a rating from 1 to 5, with 1 denoting “no say” and 5 denoting “complete say.”

The study used a discrete choice experiment with 666 female and male farmers from 395 families in two predominantly rice-growing districts (Thane and Palghar) in Maharashtra to

measure their WTP for a drum seeder. The authors tried to select a man and a woman engaged mainly in agriculture from each household in the sample for choice experiment; however, it was possible to find both a male and a female farmer in only 271 families. In the other 124 families, either a man or a woman was surveyed. Thus, the sample consists of 337 women and 329 men. Of these, 542 men and women belonged to the same family. In each family where both the man and the woman were interviewed, they were interviewed separately to elicit their independent WTP for the drum seeder, without influence from their partner or any other family members.

### **Results and Conclusion**

The findings indicate interesting similarities and differences in marginal valuations of different attributes of drum seeders between female and male farmers in the sample. Both women and men prefer cheaper drum seeders and have positive valuations for reductions in labor use and seed rate and for increase in crop yield; however, men value an increase in crop yield more than women do. Women, on the other hand, have significantly higher valuation for labor savings. And overall women farmers are more willing to pay than men. The higher WTP for a new technology runs somewhat contrary to the existing literature on technology adoption, which shows that women have slower observed rates of adoption of a wide range of technologies than men and lower WTP for new products, such as weather-indexed insurance. In this sample, women are more interested in and are willing to pay more for a new technology that promises to reduce the backbreaking work.

Using WEAI, this study also found that, decision to buy, rent, or use machines is almost entirely in the man's domain, although women are not completely powerless. In fact, women do have a considerable say in many household decisions. Therefore, existing development programs, including agriculture extension, should not ignore women when promoting new climate-smart technologies, products, or practices, as ignoring women may reinforce the existing gender inequalities. Given women's interest in new and better technologies, extension for the promotion of DSR drum seeder is likely to be more successful if it also targets female farmers and highlights the attributes of the technology that are of greater interest to them.



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## Mainstreaming gender and Climate-Smart Agriculture in the National Adaptation Plan (NAP) of Nepal

A project is devised to strengthen the capacities of policy makers in Nepal towards creating more gender informed policies.

Lakpa Sherpa (LI-BIRD),  
Arun Khatri-Chhetri and  
Nitya Chanana (CCAFS South  
Asia)

**Agriculture** is a primary source of income in Nepal and women are an indispensable part of the Nepalese agriculture. 61% of those involved in the sector are women. Women in agriculture participate as unpaid labourers in farm activities including in the selection of crop variety, crop management, harvest and post-harvest operations, but without much recognition as important agents of production. Social and gender based norms govern and limit equal access to resources and extension services. In the wake of such challenges wherein women's capacity to adapt to extreme weather events is visibly limited, it is essential to devise programs and strategies that would help build their resilience, ensure positive welfare and bring about food secure outcomes.

CCAFS along with Local Initiatives for Biodiversity, Research and Development (LI-BIRD) is engaged in the promotion of CSA practices among women farmers in Nepal, to address the aforesaid challenges. The joint initiative envisions the proliferation of CSA technologies such as solar irrigation, plastic tunnel farming, grey water collection pond, home garden, drip irrigation and cattle shed improvement in multiple villages in Nepal. These have the potential to increase farmers' productivity and resilience, mitigate greenhouse gases, and enhance achievement of food security and development goals. CCAFS and partners are also devising project interventions for capacity development of a wide range of stakeholders to help create more gender sensitive programs and policies in the agriculture and food security domain.

### **Gender and social inclusion in Nepal's policy framework**

Government of Nepal recognises the importance of addressing the gender concerns across sectors. Within the agriculture sector, several initiatives have been undertaken to promote women's participation and leadership. Policies related to climate change including Climate Change Policy (2067), National Adaptation Program of Action (NAPA) and National Adaptation Plan (NAP) have also considered gender issues and needs. However, although climate change policies address gender, meaningful participation of women and disadvantaged groups of people in policy making is limited, making essential, the need to adopt a collective and coordinated effort to influence current as well as future NAP and Right to Food (RtF) related policies. Policymakers' awareness on the national and international climate change policies, negotiations and treaties, as well as ground practices

and issues related to gender and social inclusion also needs to be further augmented and strengthened.

### **Gender amelioration through project design**

CCAFS along with LI-BIRD is implementing a project titled, 'Enhancing awareness and capacity of women leaders and policy makers on gender, agriculture and climate change' in Nepal. The project aims to raise awareness of women members of parliament (MPs), high echelons of the bureaucracy (with a focus on women officials) and women members of the President's office on climate change, agriculture, right to food, and gender equality issues.

### **Objectives and outputs geared towards gender inclusive outcomes**

The objectives of the project are to develop knowledge products for raising awareness on gender, agriculture and climate change for different beneficiary groups, stakeholders, and practitioners; raise awareness of women parliamentarians, high-level women bureaucrats, other relevant government officials and farmers on the impact of climate change on women farmers; provide evidence-based inputs to relevant policies on gender, agriculture and climate change to make them grounded and conducive to women farmers and their families. Through these objectives, the project aims to arrive at:

- A framework on gender, climate change and agriculture nexus in Nepal based on the review of existing policies on the same,
- Capacity building of parliamentarians in the form of interaction workshops of stakeholders, travelling seminars and field exposure visits in Climate-Smart Agriculture pilot sites,
- A wide range of knowledge products such as factsheets, leaflets, summary of relevant policies, summary of NAP process, Right to Food bill, climate change vulnerability status, and available Local Adaptation Plan of Action (LAPA) documents targeting different beneficiary groups, stakeholders, and practitioners and
- Evidence based feedback to parliamentarians on gender, agriculture and climate change related policies conducive to women and their families.





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## ‘April showers bring May flowers’: Integrating gender and social inclusion dimensions in climate adaptation research

A study illustrates the pathways and benefits of gender and social inclusion in project design

Shalander Kumar, ICRISAT

It is widely accepted in research for development that women and men can be powerful agents of innovation in response to climate change and may have different adaptive knowledge and capacities. CCAFS strongly believes in engaging women and men in participatory, gender-responsive technology design and management to bring about changes in gender relations, and improve community outcomes and strengthen community climate resilience. A study supported by the Ministry of Environment, Forest and Climate Change (MoEFCC), Govt. of India, under National Adaptation Fund for Climate Change (NAFCC) and implemented by ICRISAT and its consortium partners in India, provides a good illustration of how integrating gender and social inclusion concerns, right from project design to implementation, brings about transformation of the communities with a special focus on enhancing resilience to climate variability and change.

The climate-smart agricultural interventions are being implemented as part of this project to improve the livelihoods and thereby income and nutrition of the farming community in targeted villages of Mahbubnagar district, Telangana.

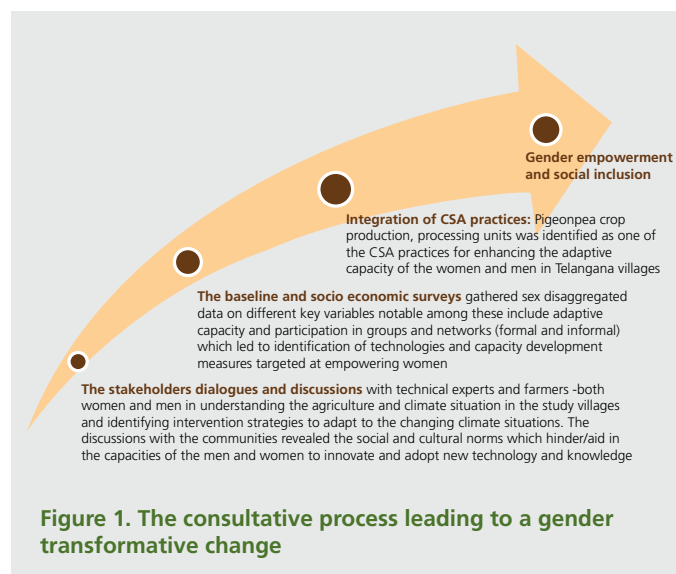
Gender transformation was achieved via a consultative process (See figure 1) mainly through - **a.** Series of Focus Group Discussions (FGDs) with women and men farmers to identify climate related constraints; **b.** Identifying and prioritizing household type specific climate-smart agricultural practices such as integrating millets, pulses and horticulture in the farming systems, back yard poultry, small farm mechanization, climate information among others; **c.** Women farmers better integrated into the value chain through value addition to climate-smart crops (millets) and pulses (establishment of a mini daal mill facility for processing); **d.** Linking men and women farmer producers and processors to the market ; and **e.** building the capacity of women, men and youth on Climate-Smart Agriculture.

## Gender inclusive outcomes

**Improved diversity in diets:** The introduction of pigeon pea into the cropping pattern not only helped in improving the soil fertility (thus soil health) but also in improving incomes and diversity in the diets of the vulnerable households and groups, especially women. Women provided labor for pigeon-pea crop and thus improved their incomes. Women appear to have more control over the crop produce and plan to retain a portion of the grain for home consumption.

**Human capital enhancement:** Through regular capacity building of women, men and youth, the establishment of the mini daal mills and processing units, value addition opportunities for rural poor has been facilitated. The handholding, mentoring and training activities by ICRISAT and consortium partners continues to enhance skills of the communities in business opportunities.

**Market linkages:** The linking of the producers and processors to the market is helping in educating the communities, especially women and youth, in better price realization. Providing marketing knowhow is one way of empowerment as the market information helps strengthen the negotiation skills of the women and youth.







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## Women's groups reaping the benefits of solar energy for irrigation in Nepal's Climate-Smart Villages

Solar powered water pumps for agricultural use in the CSVs of Nepal, are helping groups of rural women in ditching fossil fuels while enabling the increase of cropping intensity, productivity and income.

Arun Khatri-Chhetri  
and Nitya Chanana  
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Large number of male out-migration from among rural communities is escalating the feminization of agriculture in Nepal. Consequently, women are over burdened with their involvement in agriculture and are increasingly making farming decisions that were traditionally the responsibility of men. Heightened frequency and severity of climatic risks such as floods, droughts, extended dry spells during and after crop sowing, and unseasonal spring storms are adding pressure on women farmers to adapt to unpredictable weather conditions. One of the most promising options for adapting to such weather extremes is to improve water management system and water use efficiency. However, poor irrigation systems, high cost of pumping groundwater and limited availability of electricity in the rural areas of Nepal are major concerns. Similarly, women's access to new water management technologies and knowledge that can help to minimize climatic risks is limited.

### Transitioning to smart water management practices

In the Terai region of Nepal, underground water is readily available in low depths but access to energy to draw water for agricultural use is a major problem. In 2013, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) initiated piloting the Climate-Smart Village (CSV) approach in the Terai region in collaboration with Local Initiatives for Biodiversity, Research and Development (LI-BIRD), Ministry of Agricultural Development (MoAD), District Agriculture Development Offices (DADOs) and Village Development Committees (VDCs). This project has targeted rice fallow cropping systems where provision of irrigation can increase cropping system, improve crop yields and farm income as well as facilitate better access to water for women.

In four districts across the Terai region (Bardiya, Dang, Nawalparasi and Mahottari), 12 solar based irrigation systems were installed through project funds, including leverage fund from district agriculture office and private solar companies. Farmers have contributed 25% of the total capital cost by cash and through labour contribution. Out of 12 solar irrigation systems, 50% are managed by women farmers' groups and 50% by mix groups with both men and women farmers. Majority of women in the solar irrigation groups are household heads due to out migration of their spouses in search of off-farm income.



Women members of a solar irrigation cooperative

### Outcomes of the transition

Initial results indicate that installation of solar irrigation systems helped to increase cropping intensity via introduction of new crops such as vegetables, wheat and maize (in rice fallow system) and legumes. These solar irrigation systems have reduced farmer's dependency on rainwater and enabled crop diversification, especially during the pre-monsoon and dry season. Female farmers particularly appear to have benefitted from the initiative. Solar irrigation, combined with trainings and knowledge sharing, mobile based market information, as well as support from district agricultural office, has enabled female farmers to grow high value crops and earn higher incomes. With most of the female member beneficiaries being household heads, the incremental income along with strengthened capacities through trainings, have been responsible for enhancing their identities and prestige among the community. This pilot project is set for a detailed socio-economic impact analysis of the solar irrigation system, followed by the same on the policy and institutional front.

*"In a country where there isn't even enough electricity supply for domestic purposes, irrigation through solar pump intervention is a boom. We want to experiment with more profitable crops now" – Member of women solar water user group, Rajahar Climate-Smart Village (Nawalparasi)*



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## Climate-smart farmer profile: Bangladesh

Climate-smart research on vegetable gardens is fostering Hashi Begum's skills while enhancing her self-respect and income

Md. Emdad Hossain &  
Harun Or- Rashid, WorldFish



**H**ashi Begum, a wife and mother of three children, is a climate-smart farmer from Biraljury Climate-Smart Village (CSV) of Pirojpur district in Bangladesh. She started participatory action research on vertical agriculture since 2016 and made a vegetable tower in her homestead with the support of WorldFish research officers. She is planning to make two more vegetable towers in the upcoming winter of 2017.

Hashi's tryst with Climate-Smart Agriculture can be traced back to 2015, when CCAFS along with WorldFish field officers were piloting research on rice field fisheries by installing fish microhabitats in Biraljury-Joykul rice fields. That is when Hashi's husband, Alauddin Hawlader got involved in the initiative and installed one set of rings in his rice plot. Hashi in fact, became aware of the CCAFS project as well as about climate change from her husband.

Subsequently, in 2016 piloting of vegetable gardens as one of the climate-smart interventions began, which captured Hashi's interest, who was by then very eager and willing to take some initiatives herself. She began researching on the potential of vegetable gardening in her yard. Farmers like Hashi in Biraljury CSV had established a learning center, in which Hashi till date is an active member. On attending regular meetings and exchanging knowledge with fellow farmers and service providers, she began comprehending the concept and effect of climate change and how farmers like her can do their bit to build resilience.

During the CSV knowledge sharing meetings, WorldFish research officers also shared learnings from other CSVs. In such meetings, Hashi learnt that vegetables can grow during heavy rainfall and water logged periods through vertical agriculture. Empowered with the technical know-how, Hashi successfully constructed a vegetable tower with help from her husband and children. Today, her daughters and son also help her in producing vegetables by irrigating, removing weeds and controlling insects, all by using Integrated Pest Management (IPM) techniques. Hashi says,

*"Now I can cultivate year-round vegetables; summer, winter and inter season".*

Hashi's involvement in this climate-smart practice has brought about some visible dividends. Her husband, is a day laborer who sometimes catches fish from the nearby canal, rice fields and the Shandhya River. His monthly income is BDT 2500 (\$ 31), which is insufficient to meet the family needs. Now, Hashi adds to the family income by contributing some money (\$10/month) from vegetable production and poultry rearing. It is almost one third of the total earning of her household. In fact, she invested the income from selling vegetables to buy the poultry. She is also contributing to the costs of her children's education and for other family necessities. Hashi's decision making role within the family has become prominent as her husband consults her before finalizing any decisions regarding agriculture, vegetables, poultry and other family issues.

Around two hundred women are living in Biraljury village. Most of them are housewives and are illiterate, lacking knowledge on climatic risks to agriculture which casts a shadow on their own backyards. Hashi's simple story of awareness and adaptation has helped at least some from within the village to understand climate change impacts and adopt simple yet resilient practices like vertical agriculture. Hashi's neighbors were not able to grow vegetables due to waterlogging last year. However, now some of them are inspired by Hashi. This monsoon, several women are starting to make vegetable towers like Hashi Begum. Hashi says,

*"I feel very happy when villagers visit my house to see my vegetable tower. It's a good opportunity to share my knowledge and experience with them. It creates a good impression and increases my importance in the community."*



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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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