Socio-Technical Innovation Bundles (STIBs) for Enhancing Women's Empowerment and Resilience: A Synthesis

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Socio-Technical Innovation Bundles (STIBs) for Enhancing Women's Empowerment and Resilience: A Synthesis

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Executive Summary

This synthesis report brings together the findings of four case studies carried out by organizations that were brought on board from across India by the International Rice Research Institute (IRRI) as part of the Empower work package of CGIAR's Gender Equality Initiative (HER+). The focus of the work package is to bundle social and technical innovations for women's empowerment and resilience. The four case studies highlight projects/programs that combined social, technical, and technological innovations and contributed to increasing women's empowerment and resilience. The overall objective of this synthesis report is to distill good practices from the findings of these case studies and present them as guidelines for designing socio-technical innovation bundles (STIBs) and scale them up in a context-appropriate manner. The following four organizations collected and synthesized the individual case studies:

- Grameen Foundation India (GFI) did a case study focused on promoting adoption of biofortified mustard seeds in four districts of Uttar Pradesh state of India (Jain et al., 2024).
- Institute of Social Studies Trust (ISST) and Utthan carried out a case study that focused on the innovative pedagogy implemented by the latter, a Gujarat-based non-governmental organization, integrating sustainable agriculture, gender sensitivity, and land rights (Bhatt et al., 2024).
- Satmile Satish Club "O" Pathagar (SSCOP) studied the Sustainable and Resilient Farming System Intensification (SRFSI) project, which is aimed at reducing poverty in the eastern Gangetic plain of India by improving the productivity, profitability and sustainability of small farmers while safeguarding the environment (Saha et al., 2024).
- Swayam Shikshan Prayog (SSP) focused on the Women-Led Climate Resilient Farming (WCRF) project, which works with landless and marginalized women farmers and their households in the drought belt of erstwhile Osmanabad district of Maharashtra, India (Jadhav et al., 2024).

The four case studies highlight the point that social, technological and technical interventions were made in all these projects in an interconnected manner.

- Social interventions: Across the four case studies, social interventions operated at three levels: Community, policy and market.
    - Community-level interventions focused on peer learning, development of women leaders to bring women farmers together in collectives, and working to build more acceptance for women at the community and household levels to go out and work.
    - Policy-level interventions included linking women farmers to various government schemes and facilitating access to banks and government departments. Utthan specifically also focused on supporting women to get land registered in their names.

- Market-level interventions focused on facilitating market linkages for women farmers. GFI and SSCOP facilitated this through farmer producer organizations (FPOs) while SSP, seeing the barriers women face in accessing markets, facilitated formation of an all-women federation of FPOs that now procures grain for the Indian government's Public Distribution System (PDS) schemes.

- Technological interventions: Examples of these include introduction and promotion of biofortified seeds of mustard by GFI, promotion of sustainable organic farming by Utthan and SSP, and promotion of modern technology and climate-smart agriculture by SSCOP.
- Technical interventions: These included training programs for women farmers by Krishi Vigyan Kendras (KVKs)1, exposure visits to KVKs and successful women-led farms, informative videos and knowledge-sharing sessions.

The impact of these interconnected interventions for women farmers and their families has been significant. They have made women farmers more knowledgeable about the technical inputs needed for sustainable farming and enhanced their self-esteem and sense of agency at the household as well as community level. Women farmers involved in the case studies reported having more involvement in decisions related to family, land and agriculture. Since these women are now members of collectives, a feeling of sisterhood has developed amongst them. They have progressed toward identifying themselves as farmers.

However, where the focus on women was not direct, as in the case of the GFI case study in which the intervention operated more at the household level, the potential to bring about a gender-transformative change was limited. In the GFI case study, for instance, we found that many women associated with the project did not attend training on occasions as they had other engagements (such as unpaid work) and their husbands and children attended it on their behalf. Thus, there was a clear gap in their knowledge and their association with the intervention.

At the household level, however, there was vast improvement in terms of nutritional intake. Families also benefited economically with the quality of produce fetching a better price. There is now more acceptance of alternative agricultural practices to mitigate the negative impacts of climate change.

In terms of gaps and challenges, this report states that none of the interventions focused on involving men as stakeholders. Furthermore, these interventions also fail to recognize and work around the burden of unpaid care work that women bear. Additionally, since all the interventions focus on small and marginalized farming communities, the scope for scaling any of the interventions is limited.

[1] Krishi Vigyan Kendras (KVKs) are agricultural extension centers that serve as a connecting link between the Indian Council of Agricultural Research and farmers. Their key focus is on testing and transferring advanced agricultural technologies to the grassroots level, effectively bridging the gap between research and practical implementation for the benefit of farmers.

In terms of women's resilience to the impacts of climate change, there is only limited evidence available in these case studies. In most of them, climate-smart technology was implemented in a top-down manner and there is not much discussion on how this impacted women's everyday lives.

This synthesis report of the four case studies concludes that there is no doubt that STIBs as a combinatorial innovation have the potential of bringing about a gender-transformative impact on the lives of women farmers. However, as the case studies document, there is a need to bundle innovations in a more systematic approach as opposed to the ad hoc manner these grassroots organizations have resorted to. It is important that a gender-transformative approach is embedded within the design and core of the program to ensure that STIB interventions are more strategic and effective in promoting women's empowerment and resilience in the agrifood system.

In addition, to ensure that beneficial impacts are sustainable and bring about empowerment at large scale, awareness building strategies with men and encouraging their involvement in building support systems for women farmers could be useful. It may also be helpful to involve women farmers from different classes by using an intersectional framework so that there is wider acceptance of sustainable farming practices and more scope for scaling these interventions.

1. Research Overview

1.1 Rationale

Climate change is impacting lives everywhere in terms of lost biodiversity, shrinking agricultural land, warming oceans, melting glaciers, and rising pollution. However, it is largely communities residing in low-income countries and depending on extraction and cultivation of natural resources that are most vulnerable to its aggravating impacts. The World Water Development Report 2020 states that climate change will disproportionately affect about 800 million people (nearly 78% of the world's poor) who are chronically hungry. A majority of them live in rural areas and earn their livelihoods from the primary sector (EPW Engage 2023) and belong to socially marginalized groups lacking the social and financial capital to deal with stresses and shocks (Butt et al. 2020).

It is well-documented that gender along with other intersectionalities deepens vulnerability to climate change (GIWPS 2015; EPW Engage 2023; MacGregor et al. 2023). Due to patriarchal structures existing in public and private domains, women and men experience climate change differently and possess differential capacities to deal with the risks that it brings. Women who are located in varied intersections of marginalization such as class, caste, race, religion, sexuality and disability are more vulnerable to its impacts because climate change aggravates the already existing socioeconomic inequalities that women confront daily in terms of structural constraints, cultural norms, access to resources, and power hierarchies. In addition, since climate change adversely affects availability of resources fundamental to life and access to public provisioning, women and girls, who tend to be responsible for the care of others, find that the time and effort they spend doing unpaid care work exacerbates their situation. With mass migration becoming a key strategy for men to deal with adverse impacts on livelihoods, it has been observed that climate change is by default making women and girls solely responsible for all forms of productive and reproductive work, especially in rural areas and amongst communities of small and marginal farmers. At the same time, women farmers continue to have less access to the productive inputs and resources needed to improve returns from their farming activities and enable them to meet the challenges of climate change. This situation remains true despite the introduction over the past few decades of many technical and technological innovations aimed at making the agri-food system more climate smart.

The CGIAR Initiative on Gender Equality (HER+: Harnessing gender and social equality for resilience in agrifood systems) recognizes this gap and sees gender equality and social inclusion as core requirements across food systems in the Global South to achieve climate resilience. It envisages support to women to increase their agency, acquire and gain control over resources that would help them adapt to climate change-related shocks and stresses, and facilitate their social and economic empowerment. This initiative also recognizes the transformative impact of combinatorial innovations involving bundles of technical, technological and other sociobehavioral components. It aims to develop and test context-specific bundles of social, technical, and technological innovations that would increase the uptake and benefits of technologies and innovations for women in agrifood systems on multi stakeholder platforms called 'learning labs'.

The practice of bundling various innovations is not new. A lot of projects and programs have been bundling different innovations/interventions focused on climate-smart agriculture (CSA) without necessarily calling them STIBs. It has mostly been done as per need, but not in a systematic manner.

Social innovations are often initiated more as a last-mile effort to create a more accepting and enabling environment without including them in the design (Barrett et al. 2022). The STIB approach, on the other hand, does not take such a compartmental approach. It is built on the needs, priorities, and preferences of the end-users, i.e., farmers2. An important aspect of this project is that it considers women as the main drivers of STIBs.

The International Rice Research Institute (IRRI) leads Work Package 2 of the CGIAR Initiative on Gender Equality (HER+), which is operational in various countries in Africa and Asia, including India. As part of this work package, the present case study research was supported by the CGIAR Gender Impact Platform. Interested and capable organizations and independent consultants were invited to send proposals to conduct rigorous case studies of projects/programs that have bundled social, technical, and technological innovations and contributed to increasing women's empowerment and resilience. Good practices gleaned from such case studies could guide the design of STIBs and help scale them up in a context-appropriate manner.

Four organizations from different parts of India were selected to conduct these case studies. This is a synthesis report of the four case studies, highlighting key learnings from them, which are also published as independent reports (Jain, et al., 2024; Bhatt et al., 2024; Saha et al., 2024; Jadhav et al., 2024). The organizations that conducted the case studies are:

- Grameen Foundation India, Uttar Pradesh
- Institute of Social Studies Trust (ISST) in collaboration with an NGO named Utthan active in Gujarat, India
- Satmile Satish Club "O" Pathagar (SSCOP), West Bengal, India
- Swayam Shikshan Prayog (SSP), Maharashtra, India.

The objectives of this synthesis report and the theoretical framework adopted to understand the impact of STIBs on women's empowerment and resilience are presented in the following section. In the sections that follow, we give a contextual overview of each case study and the methodology adopted for this synthesis report. In Section 2, we distill the findings of the case studies, unpacking the STIBs they dealt with and highlighting the common aspects. We discuss the evident impact of STIB innovations in terms of women's empowerment and resilience and identify the gaps and challenges that emerge. Lastly, we conclude with a summary of the findings and give suggestions for sustainable and scalable interventions.

1.2 Research Objectives and Theoretical Framework

This report synthesizes the findings of the case studies with the wider aim of understanding:

- How different organizations are bundling social, technological and technical innovations to limit the impact of climate change in agrifood systems; and
- The potential of these interventions to bring about transformative change in the lives of women farmers.

[2] https://www.cgiar.org/news-events/news/socio-technical-innovation-bundles-stibs-for-womensempowerment-and-resilience-in-the-agrifood-system/

The report attempts to unpack the STIBs discussed in each of the case studies and highlight the common parameters that exist in the different approaches. It also highlights the impacts the STIBs have had on the lives of women farmers in terms of empowerment and resilience.

As a theoretical framework, this report uses Naila Kabeer's framework (1999) which posits empowerment as an open-ended processual model of social change by which those who have been denied the ability to make strategic life choices acquire an ability to do so. It considers three interconnected dimensions of this ability:

- **Resources**: Access and also future claims to material, human and social resources;
- **Agency:** A role in the processes of decision-making with the ability to define one's goal and act upon it; and
- **Achievements:** The ability to achieve valued outcomes.

Unfortunately, despite the availability of frameworks and indicators of resilience and vulnerability assessments that indicate a lack of resilience in general (Moret 2014; Serfilippi and Ramnath 2018; Sharifi 2016; Prosperi et al. 2016), there seem to be none that are specifically focused on climate resilience of women in agrifood systems. A review of available evidence by Bryan (2022) found no study that directly measured the linkages between indicators of women's empowerment and well-being outcomes following disturbances. As a result, most researchers and organizations tend to develop and use tailor-made frameworks and indicators for measuring and tracking individual-level resilience (IFAD 2015; Adaptation Consortium 2016). This report too tries to understand resilience in a context-specific manner within the larger framework of 3D resilience propounded by Béné et. al. (2012).

1.3 Contextual Overview of the Case Studies

The four case studies have diverse contexts.

The case study by ISST specifically focuses on interventions carried out by the NGO Utthan working with women farmers in Hathab and Bhumbhali villages of Bhavnagar district in Gujarat. It examines Utthan's unique pedagogy of transitions, which integrates sustainable agriculture, gender sensitivity, and land rights, to understand how it empowers women farmers and enhances their resilience. The NGO takes a gender-transformative approach that recognizes the importance of addressing structural gender disparities by advocating for and facilitating women's land ownership and access to land rights supported by Utthan's paralegal workers. Through peer-to-peer learning and technical training by krishi sakhis (friends of farmers or trained para-extension professionals), Utthan equips small and marginal women farmers with knowledge and technical skills beyond traditional farming practices. This intervention has achieved a shift of women farmers from inorganic farming toward sustainable farming.

Both ISST and Utthan have been working for more than 40 years on issues linked to women and their labor. ISST is a not-for-profit organization that was established as a charitable trust in 1980. It works to bring about social change with a focus on the livelihoods, work, and well-being of vulnerable communities. It addresses the gender dimensions of labor with a critical public-spirited inquiry and a gender-transformative approach.

Utthan's work began in the early 1980s to help marginalized communities in the remote Bhal region of Gujarat self-organize around critical livelihood issues. It is a grassroots institution with a mission to empower women and young girls by providing them the perspective, resources and tools they need to amplify their voice, gain access to and control over productive resources, entitlements and services, and take control of their bodily autonomy. Utthan promotes women-led action to address issues linked to

women's human rights. The NGO's work directly impacts the lives of over 8.5 lakh individuals in six districts of Gujarat.

The case study done by **Grameen Foundation India focuses on an innovative intervention strategy the NGO introduced in the Purvanchal region** of Uttar Pradesh. It aims to increase the incomes of farmers (especially women) and enhance resilience to climate change impacts by **promoting adoption of biofortified mustard in four districts**. GFI worked with 126 women farmers to increase their access to improved mustard cultivation practices, knowledge, and resources. This project also focuses on building the capacities of women to become active decision-makers on farming, and in their households and communities, thus contributing to their own empowerment.

Funded in 1997, Grameen Foundation is a global non-profit organization whose mission is to enable the poor, especially women, to overcome poverty and hunger. It is inspired by the women-focused anti-poverty efforts of Nobel laureate and social entrepreneur Muhammad Yunus. It works to alleviate world poverty by investing in the power of women and identifying where and how economic and social systems are failing them. The NGO partners with local actors to transform these systems from the inside to give women the equitable access they need to come out of poverty.

The case study carried out by **SSCOP focused on the Sustainable and Resilient Farming System Intensification (SRDSI) project in the eastern Gangetic plains**. It was part of a regional multi-partnership project that aims to reduce poverty in the eastern Gangetic plains straddling the Bihar and West Bengal states of India, northwestern Bangladesh, and the eastern Terai of Nepal by improving the productivity, profitability and sustainability of livelihoods practised by small farmers while safeguarding the environment. SSCOP, as one of the implementing partners of the project, addressed the vulnerabilities of smallholder women farmers by seeking to improve their opportunities and outcomes through **adoption of more productive, profitable, and low-risk farming systems. This included trials of innovative farming technologies such as conservation agriculture and water-efficient production methods** to mitigate the carbon footprint. It also focused on policy and institutional mechanisms to improve the lives of men and women farmers.

SSCOP started out as a club to organize social and cultural events and sports activities in 2001 but today it works to strengthen and facilitate community institutions at the grassroots level. It creates a convergence area for government and international agencies and corporate bodies to promote holistic development of rural communities, especially their livelihoods. It facilitates formation of collectives like farmers' clubs, FPOs and self-help groups (SHGs) to ensure that their participation in their own development fosters collective decision-making.

The fourth case study, done by Swayam Shikshan Prayog (SSP), examined the Women-led Climate-Resilient Farming (WCRF) project which focused on landless and marginalized women farmers and their households in the drought belt of erstwhile Osmanabad district in Maharashtra state. The project promotes women as change-makers innovating sustainable, affordable, and scalable solutions that enhance climate resilience. It gives them leadership roles in households, farms, cooperatives and communities. Over seven years, 75,000 women farmers and their households have been shifting toward climate-resilient farming involving 65,000 acres in 750 villages across Osmanabad, Latur, Solapur and Nanded districts of Maharashtra.

Established in 1998, SSP emerged from collaborative efforts with the Government of Maharashtra to carry out reconstruction after the Latur earthquake. It has empowered 350,000 women in seven states of India, including drought-prone Maharashtra, to act as decision-makers, leading to an improvement in their health, food, nutrition security and economic well-being. Working in the intersection of nutrition, sustainable agriculture, natural resources protection and gender, SSP's initiatives have led to the

creation of 5,500 self-help and savings groups and eight FPOs as community institutions for economic and social resilience. They support women in their engagement as farmers, entrepreneurs and leaders. SSP's work has received global recognition, including the Global Local Adaptation Award at COP27 in 2022, NITI Aayog's Women Transforming India Award in 2021, and the Roddenberry Foundation's +1 Global Fund in 2021 for impactful work during the COVID-19 pandemic.

1.4 Methodology

1.4.1 Methodology for synthesizing the case studies

The methodology for synthesizing these four case studies consisted of three steps. Initially an intensive literature review was conducted to get a basic understanding of what the case studies proposed to capture. The review included the initial proposals submitted by the organizations, their inception and methodology reports, organization websites, and publications related to the interventions. Next, literature on STIBs and agrifood systems was reviewed. Apart from this, contents of meetings and methodology workshops organized by IRRI were also incorporated. Finally, individual meetings with representatives of each organization were organized to gain an in-depth understanding of each case.

1.4.2 Methodology adopted for each case study

The research methodology adopted by the four organizations to collect data for their case studies is detailed below.

Grameen Foundation India

GFI adopted purposive random sampling for respondent selection. Research participants were selected from a pool of women farmers who had received training and capacity-building assistance in areas where biofortified mustard seeds were introduced and other relevant practices implemented. Out of the five FPOs targeted by the project intervention, women farmers from three FPOs were selected as respondents for this case study, representing two out of the four districts covered by the intervention.

GFI adopted a mixed-method research approach using both quantitative and qualitative techniques. This comprised the following methods:

- **Desk research** – Existing literature as well as secondary data specific to the intervention were reviewed. The desk review supported the team in developing tools for data collection.
- **Quantitative survey** – A total of 50 women farmers were surveyed for this study. They were part of a cohort who had been given training and necessary support for cultivating biofortified mustard.
- **Qualitative focused group discussions** – Two focus group discussions (FGDs) were conducted with groups of 7-8 women farmers each.
- **Key informant interviews (KIIs)** – Interviews were conducted with two members of the GFI intervention team to gain programmatic understanding and gather information on implementation design and the challenges encountered. One KII was conducted with a board member of an FPO based on availability and their level of engagement with the intervention.

Institute of Social Studies Trust

ISST used qualitative research methodology to collect data for its study in two villages, Hathab and Bhumbhali, of Bhavnagar district in Gujarat state. Purposive sampling was used in consultation with the staff of Utthan to identify the respondents. Data was collected from women farmers, krishi sakhis,

paralegal workers and key informants including scientists, program implementers and revenue officials. The following qualitative techniques were undertaken for the case study:

- **Secondary research analysis** – This consisted of a **comprehensive review of key program documents shared by Utthan and a desk review of literature about STIBs** to understand what they entail and to design data collection tools.
- **Focus group discussions** – FGDs were conducted with women farmers and krishi sakhis to assess the impact of STIBs on their farming practices and resilience.
- **In-depth interviews** – Semi-structured in-depth interviews were conducted with women farmers on work and asset ownership, unpaid and care work, farming practices and division of labour, decision-making related to agriculture and household; with krishi sakhis on their roles and responsibilities; with paralegal workers on their roles and responsibilities, the challenges faced by them, their learnings and the impact of their work.
- Key informant interviews – KIIs focused on understanding the impact of Utthan's interventions.

Satmile Satish Club O Pathagar

For this case study, SSCOP focused on eight blocks (administrative units) of Cooch Behar district in West Bengal state where the SRFSI project and other work of SSCOP involving women farmers was being done. A total of 50 women farmers who had received training and support under the SRSFI project were identified through purposive sampling as respondents from 17 villages across these eight blocks. The following methodological tools were used for this study:

- **Semi-structured interviews** – Interviews were carried out with women and men farmers, agriculture officials such as the Assistant Directors of Agriculture of some of the blocks and officials from the Department of Agricultural Extension.
- **FGDs** – Discussions were conducted with women and men farmer groups separately.
- **KIIs** – Interviews were conducted with functionaries of farm equipment/custom hiring centers, agricultural input sellers, village panchayat (assembly) leaders and faculty members of Uttar Banga Krishi Vishwavidyalaya (North Bengal Agricultural University)
- **Observation** – The method was used to see the ground-level farm practices of women farmers.

Swayam Shikshan Prayog

SSP conducted inductive research and collected data using **qualitative research techniques**. Applying purposive sampling techniques, it used a pool of 15 distinct criteria (landless person, Scheduled Caste/Tribe, single women/widow, etc.) to identify potential respondents. From this cohort of potential respondents, 50 women farmers who met most of the criteria were chosen as respondents. As 4 of the identified respondents were not available for interviews, the case study was limited to 46 women respondents, all of them active participants in the WCRF project. Semi-structured interviews and FGDs were conducted to collect data from these respondents. FGDs were conducted with staff of SSP who were involved in the implementation of the project.

2. Key Findings

2.1 Unpacking STIBs

The social, technological, and technical innovations bundled in the four case studies were based on two distinct premises: One, the need to shift to climate-smart practices in agriculture; and two, the need to counter gendered norms and structural constraints to bring women to the forefront of climate-smart practices. Although most of these interventions were not thought of as part of a bundle, there was an organic interconnection between them, be they social, technical or technological innovations. The case studies included linked interventions that would ideally be more appropriate to categorize as market interventions (for example, creating market linkages, setting up women FPCs) and policy interventions (for example, collaborating with government departments, linking women farmers to government schemes). However, since the STIB literature groups all innovations other than technical and technological innovations in the category 'social', for the purpose of this synthesis too policy and market interventions have been grouped together as social innovations. Further, it was also found that the four case studies have some common approaches in terms of varied interventions (Table 1), as discussed below:

Table 1. Social and technical innovation bundles included in the case studies.

	Social innovations			Technical innovations	
Case study	Community	Policy	Market	Technological	Technical
ISST-Utthan	Peer-to-peer learning facilitated by *Krishi sakhis*; Paralegal assistance on land rights; Setting up collective groups (SHGs); Working with community and families	Setting up a desk ('Swabhumi Kendra') in the office of block-level Land Revenue Officer; Paralegal workers acting as bridge between women farmers and government system	No visible market linkages	13 PoPs (package of practices); Involving KVKs in tool design; mulching; drip irrigation	Training at KVKs and by *krishi sakhis*; Exposure visits to successful organic farms beyond the village

GFI	Working with women farmers in SHGs through FPOs; couraging peer influence and learning	Bringing government agencies on board for training purposes and awareness building	Market linkages were part of the plan for FPOs but since the project was conducted on a pilot basis and most farmers did not use their entire land for growing biofortified mustard, the roduce was only enough for own use. Thus, no market linkages were made.	Free distribution of biofortified mustard seeds	Training; Field visits; Knowledge sharing sessions
SSCOP	Working with women farmers in SHGs; Training women leaders; Peer learning	Linking with government schemes; Working with state agencies on training and increasing access for women farmers	Promoting market linkages; Facilitating FPOs to become custom hiring centers for farm machinery so that women farmers can hire equipment on low rent	Facilitating adoption of modern farm practices and protocols of using conservation agriculture or climate-smart agricultural technology	Training; Field visits; Knowledge sharing; Engaging KVKs and agriculture scientists in capacity building inputs

SSK	Developing women leaders to become coaches (*krishi samvaad sahayaks*)	Linking with government schemes; Facilitating access to banks and agriculture offices	Facilitating the formation of all-women FPOs to ensure market linkages	The WCRF model included soil management, water harvesting, mixed cropping, fruit tree plantation, vermicompos-ting, natural pesticides, livestock rearing, modern agricultural techniques, extension services, and market support	Training and field visits through *krishi samvaad sahayaks*

2.1.1 Social Innovations

Social innovations include community-level innovations, policy-oriented innovations, and market-oriented innovations.

In terms of **community innovations, three specific interventional approaches were highlighted by the four cases. These were peer learning, identifying role models or local leaders, and collectivizing women or working with women farmers in groups, i.e., through SHGs**. While Utthan identified peer-to-peer learning mediated by *krishi sakhis* as a significant model of community intervention, the other three organizations reported that women farmers who participated in their projects themselves brought other women farmers on board by sharing their experiences and knowledge with them. Apart from this, Utthan, SSCOP and SSP trained women leaders to become the bridge between the organization and other women farmers. These leaders were responsible for forming groups of women farmers and linking them to the training, awareness building and resource support programs organized by the respective organization. GFI, on the other hand, reached out to SHGs through collaborating with FPOs, which supported the women farmers through the entire process, i.e., from providing seeds to imparting training and giving the necessary resources to cultivate biofortified mustard seeds. It is important to note that since GFIs' inclination was toward promoting adoption of biofortified mustard seeds in the community and at household level by building awareness of their benefits compared to other traditional crops, there was limited intervention by way of implementing gender-transformative strategies. As a strategy they provided seeds of this climate-smart crop free of cost to farmers. Also, since GFI's intervention operated at the household level, often men and children attended the training and knowledge sessions instead of the identified woman farmer as she had other personal engagements, mostly unpaid household chores. In the studies by Utthan and SSP, community engagement and engagement with families was a key part of the strategy for countering gender biases within the community.

Policy interventions in all the four case studies were limited to linking women farmers to government schemes. However, Utthan through its paralegal workers was able to start a discourse

around land rights. By ensuring that its paralegal workers had a permanent seat in the block-level revenue office, Utthan was able to maintain a constant link between women farmers and the government agency. It was also able to enhance the women farmers' reach in the government offices.

SSP reported that the WCRF project was able to increase women farmers' access to banks and agriculture offices. SSCOP and GFI involved government agencies in capacity- and awareness-building activities. They also link women farmers to government schemes for micro-irrigation and water harvesting models, which resulted in 35-45% of adopter farmers having access to drip or sprinkler irrigation or a farm pond.

In terms of market-oriented interventions, creating market linkages for women farmers was a critical aspect of the projects documented by SSCOP and SSP. In the case of SSCOP, this was facilitated through the collaborating FPOs. In the case of SSP, since there were no women traders, women farmers were discouraged from going to the market. So, the organization facilitated the formation of an all-women FPO that procures grains for government schemes. In the ISST-Utthan project, it was observed that since women farmers were mainly encouraged to cultivate for self-consumption, establishing market linkages was not given much focus. .

In the GFI project, creating market linkages was part of the initial objective. However, since the project was run on a pilot basis with small and marginal farmers who planted biofortified seeds on only a small parcel of land, the produce was not big enough for the market and was mostly used for self-consumption.

2.1.2 Technological Innovations

The technological innovations, in the form of climate-smart technology or climate-smart practices, adopted in the documented cases largely focused on mitigating the impacts of climate change. While GFI introduced a new and enhanced variety of mustard as a step toward climate-smart agriculture, Utthan, SSCOP and SSP focused on ensuring that women farmers employed water-efficient, chemical-free cultivation practices and engaged in diversified mixed cropping and increasing crop cycles. They supported adoption of sustainable practices such as mulching and drip irrigation.

Utthan's 13 PoPs (package of practices) were technological inputs developed with the help of local agricultural knowledge as well as an understanding of sustainable agricultural practices. Of the 13 PoPs, 8 inputs were made mandatory as they were deemed essential for building a complete ecosystem of sustainable agriculture and are crucial to bring about a shift from inorganic to sustainable farming practices.

The core components of SSP's WCRF model were soil management, water harvesting, mixed cropping, fruit tree plantation, vermicomposting, natural pesticides, livestock rearing, modern agricultural techniques, extension services, and market support.

SSCOP focused on facilitating adoption of modern farm practices and protocols as part of conservation agriculture, employing climate-smart technology including zero tillage, rice transplanters (RTPs), weeders, pumps, combine harvesters, etc. SSCOP facilitated, with the active support of the Cooch Behar office of the Department of Agriculture of the Government of West Bengal, a number of FPOs to become custom hiring centers for providing farm machinery to women farmers at low cost.

2.1.3 Technical Interventions

Technical interventions in each of the case studies mainly included training programs, exposure visits to KVKs or other farms practising sustainable farming, and knowledge and experience sharing sessions. The training modules used various methods of teaching and learning through audio-visual stimulation. Utthan, for example, used videos with which *krishi sakhis* are trained to develop an understanding of sustainable farming. Similar videos are then used by the *krishi sakhis* to train women farmers on farming techniques. Women farmers are also taken to other organic farms for demonstrations on preparation of organic fertilizer.

In relation to cultivation of biofortified mustard, GFI initiated collaborations with different stakeholders that included research institutes, KVKs, FPCs, and government bodies to facilitate technological support and knowledge exchange.

SSP used demonstration farms operated by women who had successfully implemented components of sustainable farming as practical learning platforms. They identify, train, and develop skilled women coaches called *krishi samvad sahayaks* (KSS) to guide other women farmers. These KSSs play a central role in on-ground campaigns, awareness programs, and farmer selection and act as facilitators between women farmers and local government officials.

Training provided under the WCRF project covered organic cultivation, vermicomposting, water harvesting, leadership, financial management, and entrepreneurship. Peer learning was encouraged to create a supportive network with community facilitators and trainers serving as touchpoints for learning, demonstrations, and issue resolution.

SSCOP mainly facilitated training of women farmers by training FPOs who in turn imparted training to farmers in SHG groups.

2.2 Assessing Impact of STIB Initiatives

The various STIB interventions initiated in the projects have had significant impacts on the lives of women farmers and their families. They gained **acceptance for sustainable farming** as an alternative practice to counter the impacts of climate change. The shift to cultivation of local, less water-intensive crops and utilization of naturally available bio-inputs contribute to soil moisture retention and improve soil health as seen in the SSP, GFI and ISST-Utthan projects. The interventions also promoted crop diversification, as seen in the GFI case study: With the Biofortified Pusa Mustard 30 cultivar promoted by GFI taking less time to grow, farmers are now able to grow both chickpea and mustard.

Adoption of modern technology has **reduced drudgery and labor** for women as seen in the SSCOP and GFI interventions. However, women farmers reported to ISST-Utthan that preparing organic inputs such as biomanure and vermicompost is more time- and labor-intensive.

At the household level, the **nutritional intake of family members improved**. Since biofortified mustard has high nutrient content and organic farming does not use chemicals, women farmers in the GFI and ISST-Utthan interventions reported they were happy to be able to feed their families healthier and more nutritious food. **Families also benefited economically** as better-quality produce fetched them better prices. In the SSCOP project, women farmers reported they were able to produce more by using modern techniques, and so were able to earn more.

The impacts of these interventions for women have been multi-dimensional. Respondents reported that involvement in these initiatives and their related training programs made them **more informed and enhanced their self-esteem**. They were now able to **go out on their own and negotiate with other stakeholders**. The case studies also showed that women farmers' involvement in these projects

enhanced their agency at home. While women had a limited role in decision-making earlier, even on issues such as which school their children should go to, enhancement of their knowledge by virtue of these interventions and the success they were now achieving in their farms led to them enlarging their role **in decision-making on land and agriculture**. Since these initiatives also encouraged collectivization, a **sense of sisterhood** has emerged among the women farmers. They are now willing to support each other not only on farming and agriculture but in personal matters as well.

It is important to highlight here that since each of the projects specifically addressed the situation of the most marginalized, poor, small and landless women farmers, they also in multiple ways **challenged the dominant structural constraints and cultural norms at the community level**.

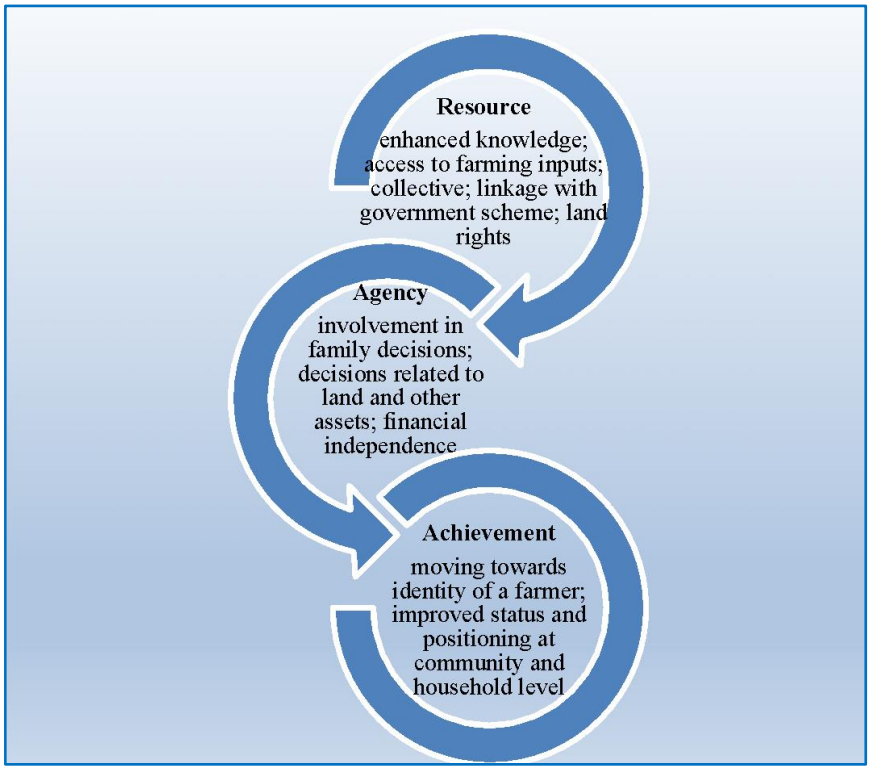

Figure 1. The empowerment framework.

Thus, the innovation bundles enabled women farmers to be financially more independent, more informed, more able to assert their agency and navigate through the power dynamics both at the household as well as community level. The case studies reported that **while women are still not fully identified as farmers in their community and their family and by the women farmers themselves, a significant change in the language has been achieved. These interventions have created a roadmap that could lead to strengthening the identity of women as farmers.**

From the perspective of the empowerment framework developed by Naila Kabeer (1999), these impacts can be understood as per the scheme shown in Figure 1. The inputs that the women farmers received through interventions in terms of STIBs led to enhanced agency for women farmers at the household as well as community level. The interconnectedness between access to various resources and enhancement of agency in varied terms led to shaping the women's identity as farmers. Thus, STIB innovations bundled together definitely have the potential to put women farmers on the path to empowerment.

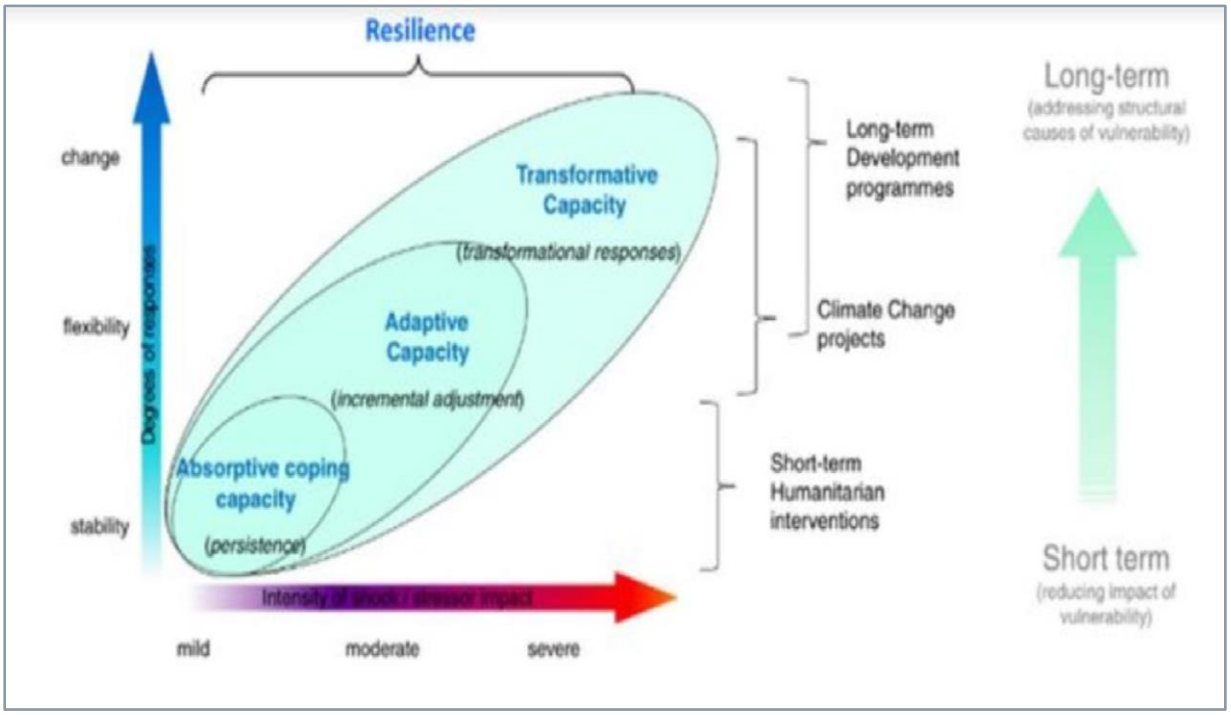

Figure 2. The resilience framework.

Béné et al. 2012

In relation to resilience, however, it is difficult to comment on any transformative changes as the four initiatives documented in these case studies were conducted at very small scale. In addition, the climate-smart practices or technologies examined by the case studies were adopted through a top-down approach with the intervention and support of an external organization. Thus, there seemed to be insufficient evidence of gendered resilience documented in the women's everyday lives. However, some technologies like zero tillage and rice transplanters (in the case of SSCOP project) or training women to use soil testing kits (in the Utthan case) and the WCRF model (the SSP case study) do to an extent build the adaptive capacities of women in the study communities. However, there is a need for more grounded engagement with the women of these communities to understand and document their everyday forms of resilience. This can be an essential next step to build a sense of ownership among them and help them improve their adaptive and transformative capacities to plan and organize better against any kind of climate shock or crisis.

2.3 Gaps and Challenges

While the impact of each of the interventions has been significant as discussed above, certain gaps and challenges were observed.

All four case studies found that **the interventions had limited involvement of men**. Any gender-transformative approach, even one focused on enhancing women's empowerment, must also involve other genders, specifically men, since their dominance is prevalent across regions. The involvement of men will help to build a sense of responsibility amongst them to facilitate equitable development of women. It will ensure that women receive support at the household level and help build a safe and enabling ecosystem where their participation and contribution is acknowledged and respected. We see evidence of this happening to a certain extent in the SSP case study which found that consistent engagement with husbands, families and community leaders resulted in women feeling more confident to step out of the house.

A second significant gap observed in all the interventions was the **negligible recognition of the unpaid care work that women have to do**. Due to the increasing impact of climate change, men are migrating out of their villages to find work in other sectors, leaving women behind to take care of their land, carry out allied activities and care for other family members in addition to household chores. This burdens women with no support. Any intervention involving women must therefore recognize the care and unpaid work burden that they bear and accordingly think of support structures that could ease the burden, which would resultantly enhance their participation in the interventions.

Further, since all the interventions examined by the case studies were targeted at small and marginal farmers mainly engaged in subsistence-level cultivation for self-consumption, **there was limited scope for scaling**. If middle and big farmers were also involved in the interventions, there might have been a more visible change curve. All the case studies highlighted that the potential for scaling would remain limited without external support or government linkages, such as a mid-day meal or a grain procurement scheme from these women farmers. Furthermore, it was found that **women are still not at the forefront of designing climate-smart practices**. They are still at the receiving end where they practice what they are advised but are not involved in the decision-making process. This limits their ability to develop resilience.

These interventions aim to enhance women farmers' empowerment and resilience and bring them to the forefront of climate action. They work toward a gender-transformative change in the ecosystem. However, **changing mindsets is an extremely slow process.** Any significant and sustainable change in the lives of marginalized women farmers may take several years.

3. Conclusion and Recommendations

The interventions detailed in these four case studies were designed to achieve two objectives: One, to bring about a shift in agriculture practices to counter the impacts of climate change; and, two, to build pathways to bring women to the forefront of climate-smart practices. The interventions tried to balance both objectives and accelerated the process of achieving them. Even though most of the interventions were not consciously thought of as innovation bundles, there appears to be an organic interconnection between them, whether they were social, technical or technological innovations. More conscious bundling of these interventions would probably have increased their potential to result in more significant change.

STIBs as combinatorial innovations have the potential to make a gender-transformative impact on the lives of women farmers. However, to ensure that this impact is sustainable and brings about empowerment and resilience at large scale, there is a need to plan the bundling consciously and as per contextual requirements. It is also important that the design and integration of combinatorial innovative bundles in a food agri-system take into consideration the involvement of men, a conscious assessment of the limitations that women farmers currently deal with, and a realistic assessment of scaling opportunities from an intersectional lens.

Finally, any innovation design in both social as well as technical interventions must involve women in the planning phase. Unless women are brought to the forefront of climate decisions, building and strengthening resilience amongst women farmers will always depend on external factors.

Bibliography

Adaptation Consortium. 2016. Resilience assessment toolkit. Nairobi, Kenya: Adaptation Consortium. https://www.adaconsortium.org/images/publications/Resilience%20Assessment%20Tool%20Kit.pdf

Barrett, C.B., Benton, T., Fanzo, J., Herrero, M., Nelson, R.J., Bageant, E., Buckler, E., Cooper, K., Culotta, I., Fan, S., Gandhi, R., James, S., Kahn, M., Lawson-Lartego, L., Liu, J., Marchall, Q., Mason-D'Croz, D., Mathys, A., Mathys, C., Mazariegos-Anastassiou, V., Miller, A., Misra, K., Mude, A., Shen, J., Sibanda, L.M., Song, C., Steiner, R., Thornton, P., Wood, S. 2022. Sociotechnical innovation bundles for agri-food systems transformation. Palgrave Macmillan, Switzerland. https://doi.org/10.1007/978-3-030-88802-2

Béné, C., Wood, R.G., Newsham, A., and Davies, M. 2012. Resilience: New utopia or new tyranny? Reflection about the potentials and limits of the concept of resilience in relation to vulnerability reduction programmes. *IDS Working Papers* 405: 1-61. http://dx.doi.org/10.1111/j.2040-0209.2012.00405.x

Bhatt, R., Das, B., Rajpal, P.S., Ghosh, A., Zaidi, M., Mukhopadhyay, P., Chadha, D. and Puskur, R. 2024. Socio-technical innovation bundles for enhancing women's resilience and empowerment: A case study of Utthan's interventions in Bhavnagar District, Gujarat. New Delhi: CGIAR Initiative on Gender Equality, CGIAR Gender Impact Platform and International Rice Research Institute. https://cgspace.cgiar.org/items/9c392c32-2ed3-4df4-bb52-c724674fef56

Bryan, E. 2022. State of knowledge on gender and resilience. Gender, Climate Change and Nutrition Integration Initiative (GCAN) Evidence Brief. Washington, DC, USA:

International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.135005

Butt, M.N., Saleha, K.S., and Fareeha, A.Y. 2020. Caregivers at the frontline of addressing the climate crisis. *Gender and Development*. 28(3): 479-498. https://doi.org/10.1080/13552074.2020.1833482

EPW Engage. 2023. Climate change and gendered vulnerabilities: Accounting for women and patriarchal systems in climate governance policy. Mumbai, India: Economic and Political Weekly. Available at https://www.epw.in/engage/article/climate-change-and-gendered-vulnerabilities

GIWPS (Georgetown Institute for Women, Peace and Security). 2015. Women and climate change: Impact and agency in human rights, security, and economic development. Washington, DC, USA: GIWPS. https://giwps.georgetown.edu/resource/women-and-climate-change/

IFAD (International Fund for Agricultural Development). 2015. How To Do note: Measuring climate resilience. Rome, Italy: IFAD.

Jain A., Joshi, G., Chadha, D., Mukhopadhyay, P., Gartaula, H.N., and Puskur, R. 2024. Biofortified mustard, socio-technical innovation bundling approach: Empowering women and nurturing resilience. New Delhi: CGIAR Initiative on Gender Equality, CGIAR Gender Impact Platform and International Rice Research Institute. https://cgspace.cgiar.org/items/db2c3169-8ab5-4df2-8d45-d41ef8ab0f84

Kabeer, N. 1999. Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change* 30(3): 435-464.

MacGregor, S, Arora-Jonsson, S., and Cohen, M. 2022. Caring in a changing climate: Centering care work in climate action. Oxfam Research Backgrounder series Available at https://policy-practice.oxfam.org/resources/caring-in-a-changing-climate-centering-care-work-in-climate-action-621353/

Moret, W. 2014. Vulnerability assessment methodologies: A review of the literature. Durham, North Carolina, USA: FHI 360. Available at https://www.fhi360.org/wp-content/uploads/drupal/documents/Vulnerability%20Assessment%20Literature%20Review.pdf

Prosperi, P., Allen, T., Cogill, B., Padilla, M., and Peri, I. 2016. Towards metrics of sustainable food systems: A review of the resilience and vulnerability literature. *Environment Systems and Decisions* 36 (1): 3-19. https://doi.org/10.1007/s10669-016-9584-7

Jadhav, R., Mukhopadhyay, P., Chadha, D., Saikh, N., Goel, K., Patil, U., Gartaula, H.N., and Puskur, R. (2024). Socio-technical innovation bundles for enhancing women's resilience and empowerment: A case study of Swayam Shikshan Prayog's women-led climate resilient farming. New Delhi: CGIAR Initiative on Gender Equality, CGIAR Gender Impact Platform and International Rice Research Institute. https://cgspace.cgiar.org/items/455b6c10-e224-450b-b470-9f5e08b3b4c4

Saha, A., Karjee, S., Choudhury, T., Mukhopadhyay, P., Chadha, D., Gartaula, H.N., and Puskur, R. 2024. Socio-technical innovation bundles for enhancing women's resilience and empowerment: A case study of SSCOP's intervention in Cooch Behar, West Bengal, India. New Delhi: CGIAR Initiative on Gender Equality, CGIAR Gender Impact Platform and International Rice Research Institute. https://cgspace.cgiar.org/server/api/core/bitstreams/9fef6dd6-6f78-4263-a4f4-24fcd9072cd3/content

Serfilippi, E., and Ramnath, G. 2018. Resilience measurement and conceptual frameworks: A review of the literature. *Annals of Public and Cooperative Economics* 89(4): 645-64.

Sharifi, A. 2016. A critical review of selected tools for assessing community resilience. *Ecological Indicators* 69: 629-47. https://doi.org/10.1016/j.ecolind.2016.05.023

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