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Promoting socially inclusive and sustainable agricultural intensification in West Bengal and Bangladesh

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Scaling Ethical Community Engagement in Context

Resources to support scaling discussions and processes in SIAGI

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With contributions from the SIAGI Team, August 2019

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Document overview

This document is intended as an internal resource document for the SIAGI team. It tries to capture the depth of the teams' discussions, and a provide reference point from which to extract and/or develop further resources (for ourselves, and for our stakeholders and others interested in Ethical Community Engagement (ECE)).

Part 1 focuses on ECE and provides practical examples and guidance on what is meant by ECE, and what it looks like in practice.

Part 2 focuses on the process of scaling – or increasing the impacts – from ECE and what this means for the SIAGI team in our stakeholder engagement.

Part I Ethical community engagement

This section provides an overview of Ethical Community Engagement – why it is important, the legacy it builds on, and what it means in theory and practice. It includes broad principles and practices as well as detailed case studies. The case studies are intended to provide insight into what ECE looks like in practice, but also to highlight the diversity of contexts and ways in which ECE can play out.

1 Justification

There are both instrumental and intrinsic reasons to pursue engagement with communities ethically and inclusively, many of these reasons overlap (SIAGI, 2017). Fundamentally, improving livelihoods and incomes alone does not necessarily lead to individuals and communities being able to engage in independent, empowered and sustained livelihood strategies. As the goals of development shift beyond project delivery to strengthening capacity, enhancing self-esteem and building lasting resilience, so must the attitudes and practices of development actors, including community-based organisations, government, financial institutions, the private sector, and researchers. Without constructive and inclusive[1] collaboration, research and development initiatives are neither scalable nor sustainable (MacLachlan et al., 2010; Mishra, 2016).

Funded by the Australian Centre for International Agriculture Research (ACIAR) – researchers, NGO practitioners and government partners – are working together with local communities to ensure development activities are more inclusive and equitable. Our project, *Promoting socially inclusive and sustainable agricultural intensification in West Bengal and Bangladesh* (SIAGI) is challenging the usual specialist-driven, top-down approach to understand how development programs can be designed, implemented and scaled through the use of Ethical Community Engagement (ECE) principles and practices.

SIAGI works closely with 2 other ACIAR Projects: (i) Dry Season Irrigation for Marginal and Tenant Farmers (DSI4MTF), which operates in West Bengal, Bangladesh and Nepal (see case study 3); and (ii) Cropping systems intensification in the salt affected coastal zones of Bangladesh and West Bengal, India (CSI4CZ). While these two projects have different entry points of engagement with communities, it has become clear that ECE is a core component and driver for creating sustained community and equitable benefits.

Our work builds on a rich history of development practitioners, scholars and communities agitating for different approaches to rural development. Such approaches have sought to reframe the approaches to development – putting local knowledge, aspirations and agency at the centre of efforts to shape rural development (eg. Chambers and Jiggins 1987), recognising that the communities targeted by development programs have the knowledge, wisdom and capability to be their own agents of change (Bandura, 1982). ECE shares many qualities with the methodologies behind participatory rural appraisal, which sought to empower local communities to take control of their development paths, partly through recognising the deep knowledge held in communities (Chambers 1994).

In many ways, ECE reflects the original intention of participatory approaches. However, overtime participatory approaches have become mechanistic methods for extracting data, rather than empowering communities to drive their own development pathways. ECE focuses on the quality and processes of engagement (that may include participatory methods), with the intention to

[1] By inclusive, we mean equal access to knowledge, resources, opportunities and decision-making processes.

build capacity as a way of enabling enduring change driven by the community (rather than projects).

ECE challenges the fundamental structure of how development projects are pursued, allowing for community-driven, inclusive, and more equitable participation and decision-making for programs aiming to improve the lives of the poor (Carter, 2018). Described in Section 2, ECE acknowledges the entrenched institutional and historical influences on how communities perceive, participate and benefit from donor-driven development initiatives. The poor are given the opportunity to offer insights and perspectives from their own unique positions, unlike mechanical participation processes where community is not enabled to be reflective, proactive and self-efficacious. ECE helps build this capacity within individuals and the community, increasing sustainability of interventions.

2 Principles of Ethical Community Engagement

Inclusive or ethical community engagement (ECE) plays a pivotal role in the quest for more equitable and sustainable development. Initiatives which meet the community where it is, with what is has, and with whomever is present is an ideal starting point for building meaningful relationships with communities.

As a concept, ECE recognises that the poor and marginalised, including women and the landless, can be excluded from development processes and do not automatically reap its benefits (Carter 2018a). As a process, ECE strives to facilitate the inclusion of individuals and groups in collaborative and participatory decision-making. ECE is about supporting community organisations to take control of their own futures to achieve enduring outcomes. It is an empathetic process which acknowledges and respects communities' perspectives and potential and cultivates trust that they can change their own situation (i.e. build self-efficacy). Over time, the process of community decision-making, learning and reviewing, leads to a greater sense of confidence and self-esteem so that the community manages its own aspirations, goals and achievements. As an outcome, ECE facilitates a rediscovery of hope in a community's ability to change their condition and influence their future.

The following six principles encapsulate the concepts, processes and values underpinning ECE.

1. **Individual and organisational values and cultures play a key role in ethical practice.** A deep commitment to intrinsic values about people, their 'endowments' and their agency are integral to inclusive (and effective) engagement. For some development partners, this may require a fundamental shift in attitude to acknowledge the centrality of people's wisdom, self-esteem, competencies, capabilities, cultures, values and aspirations in catalysing change. It requires treating all male and female farmers as collaborators and equal partners in the research and development process. ❶

2. **Ethical engagement demands an empathetic attitude along with specific skills integral to the engagement process.** Highly skilled facilitators who are able to: communicate meaningfully; learn and practice non-judgemental and empathetic listening; practice sophisticated interpersonal skills and; who have awareness of local social and environmental factors. Facilitators work hard to make meaningful connections with others, and between individuals and groups. These skills are not innate and potentially require guidance to develop. Beyond the technical skill required of facilitation and analysis, a willingness to learn and experiment, and character traits such as sensitivity, empathy and a sense of justice are vital in ethical engagement with communities. ❷

3. **Situational awareness is paramount to building trust and achieving inclusion**. Communities carry with them embedded experiences of historical, social, cultural and economic contexts which have influenced their participation in development initiatives. Previous and existing poor experiences with research programs, unsuccessful government-led initiatives, perverse incentives by political factions, and empty promises of momentous change have led to a general sense of disempowerment and distrust among communities.

   Communities tend to be heterogeneous with stereotypes attached to different social categories – class, gender, age etc. Community priorities and roles need to be fully understood by researchers. For example, women have reproductive roles that practitioners must be aware of as they enter communities. Knowledge of these barriers and persistent effort and patience in engaging with communities despite these constraints is needed to achieve inclusion. This may require careful planning before field work commences.

   The building of trust is a process which needs to allow for: the verification of agents' credentials and any inputs offered; repeated visitation to create rapport between researchers and communities and; the creation of space for conversations and interactions. This may include spending time with communities to understand their needs and aspirations. It may also mean ensuring that physical spaces for conversations are created to encourage the participation of less powerful individuals and groups. This requires presence on the behalf of the researcher, commitment and time. Without these efforts, trust-building is made more difficult and the potential for additional burdens to be imposed (and harm done) is placed on communities. ❸

4. **Qualitative methods are a key technique for inclusive engagement**. The use of storytelling, day-to-day observations, participatory planning, scenario analysis, individual and community level dialogues and conducting multi-stakeholder meetings requires skill in qualitative methodology. The monitoring and evaluation of such engagement processes demands the use of novel indicators which seek to measure quality and value in favour of quantity and frequency. ❹

5. **Participatory monitoring, evaluation and learning enhances the facilitator's and the community's ability to reflect, collaborate, co-create and adapt to situations** as they arise. A commitment to continuous learning and experimentation is required to successfully engage. Ongoing learning increases self-efficacy and agency, as well as building the skills to support the scaling of initiatives**.** For some communities, the need for NGOs to facilitate a realisation of human potential, to empower individuals and groups, to build their capacity, etc., sets the foundations for inclusivity and unity. ❺

6. **Scaling initiatives without beneficiaries driving the desired change is unsustainable.** Without sufficiently deep commitment and ownership, (for example, those achieved through a process of ECE), initiatives are less likely to sustain over time. There needs to be a unity of purpose, as well as planning, leadership and discipline to achieve the desired

changes. In addition, purely externally-imposed agendas deplete the resources and capabilities of communities and over time, erode trust and diminish energy for participating in new programs. This presents considerable risk for the wider development community. ❻

These six principles are considered by the SIAGI team to be fundamental to ECE approaches at the time of writing (March 2019). We expect that over time, as we learn and capture new information, these principles will evolve experientially and as such may be amended or clarified in future versions of this document.

3 Practices of ECE

ECE is a process that seeks to support community organisations to take control of their own futures to achieve enduring outcomes. The six ECE Principles outlined in section 2 describe the key concepts, processes and values that underpin ECE approaches – essentially, the philosophy of ECE.

To articulate how these principles function in practice, the SIAGI team has created a compendium of ECE Practices which serve to guide the field practitioner in the planning and management of interactions with communities. For this purpose, ECE Practices are defined as the intentions, behaviours and actions that underpin an ECE approach.

The Table of Key ECE Practices below was compiled in collaboration with our NGO partners through several rounds of reflection and discussion. Communities from Sidagora and Komo villages, Bankura district were also invited to share their views. General feedback from communities currently working with CDHI is also included in this compendium.

The Table is organised into five Practice categories, each containing a set of Practices generally aligned to a broader theme. A brief explanation of the Practice is included, along with a reference to the corresponding ECE Principle (eg. ❶). Community perspectives are also included in the table where available and appear as direct quotations.

Table 1: Key practices of an ECE approach

PRACTICE CATEGORY/THEME	PRACTICE (the intention, behaviour or action that underpins ECE approach) incl. the corresponding Principle	EXPLANATION (and link to ECE Principles)	COMMUNITY PERSPECTIVE (quotations from FGDs)
Overarching general practices of ECE	**Treat community members as equal partners in a collaborative process.** ❶❸❻	To insist communities pursue activities they are uncomfortable with erodes trust and can be damaging.	*Everyone is equal. Walking alongside us, in our fields and communities, eating our food, experiencing our lives, this will help us to build trust with you.* *We should not be forced to do things we are not comfortable with.*
	Respect community cultures and social norms. ❶❸	To treat every interaction with integrity, honesty and openness demonstrates respect and helps to build trust.	*Respect our language. It is our mother tongue.* *We require time to talk to you because sometimes we are scared to speak. Please have patience while talking with us.*
	Wear dress that respects local custom. ❶❸	Pay attention to your dress, remaining sensitive to local social norms.	
	Avoid aggression, violence and negative or confrontational postures. ❶❸		*Rude behaviour from outsiders is not acceptable to us.* *Do not be aggressive or violent in our community.*

Entry, permissions and building rapport; establishing relationships	**Be courteous when organising visitation with communities – the community's time is as precious as yours.** ❶❷	Communities are not always able to see you at short notice. Working with communities directly to organise a mutually agreed schedule is best practice. When requesting meetings with villagers, providing information prior to your visit helps communities prepare for your visit. On arrival, introduce yourself and explain the purpose of your visit and interaction.	*Any meeting called by the outsider must have prior information available. This helps us in our own preparation.*
	Speak modestly about your qualifications, official position or institutional affiliation. ❷		
	Make effort to understand the communities' history, natural resources, socio-economic conditions, needs, deprivations and visions for the future. ❶❷❸	Improving your understanding of the social, environmental and economic context of the community you visit has many advantages including building stronger relationships and better-developed initiatives. Avoid dismissing community views irrespective of how these views fit with your value sets – this demonstrates equity and respect.	
	Seek permission to engage with communities. ❶		*Before initiating any interventions, the outsider should seek permission and agreement from us.*
	Make effort to build trust immediately through direct, honest interaction. ❷❹	There are several ways to begin creating rapport and building trust. Actively listening and empathising with community about their previous experiences and; avoiding discontinuity of engagement are two examples.	*The outsider must be introduced to as many of us as possible and visit frequently to gain our trust.* *The purpose of the visit must be explained to us clearly.*

Process of participatory engagement; planning and decision-making; learning	**Ascertain the most effective and inclusive way of communicating with communities about your purpose.** ❷❸	The use of multiple languages may be required to communicate with community. Not everyone will be fluent in the language used and patience is required to assist understanding. Assist the community to understand meeting agendas according to the context and language.	*The outsider must help us to understand the agenda according to our context and language.* *No intervention should be taken without helping us to build an understanding or significance of the proposed activities.*
	Avoid bringing and eating packaged food from outside the villages when visiting. ❷		
	Accept local offerings such as tea or local produce with equanimity. ❷	Showing appreciation of gifts on occasion helps to build relationships. However, care must be taken not to enter into a frequent practice of gift exchange – this may lead to shifts in social power and perceptions of injustice.	
	Ensure open and transparent financial dealings. ❶❺	Establishing proper systems of accountability is essential in this regard. It is important to maintain clarity about capacity and manage expectations about delivery.	
	Create an enabling environment for mutual interaction. ❹❺❻	Interacting with children and elders, walking with farmers to view their farms and yards will assist in learning about people's lives and livelihoods. Frequent visitation, showing interest in matters of importance to community (but perhaps periphery to your own agenda), and a willingness to assist with pressing community concerns in order to create space for other discussions, all offer opportunities for deeper engagement.	*Never negate anyone's views without understanding.*

		Encouraging joint decision-making and building on communities' strengths will also help to create vision and commitment among members.
	Assist communities to initiate action using their own efforts and decisions. ❹❺❻	Proposing initiatives that do not support the community to achieve their own goals can create dependency.
	Remain sensitive to gender roles, responsibilities and gender relations. ❷❸	Engaging women facilitators for women's groups, organising crèche facilities or engaging in door-to-door visitation are examples of applying a gender lens to engaging with communities.
	Pay attention to group dynamics, ensuring inclusivity in group situations. ❷❸❹	Ensuring equal sitting positions during meetings and treating every idea expressed by an individual as equally worthy as the next promotes inclusion and discourages dominance.
	Engage multiple stakeholders and government and non-government service providers. ❺❻	Accompanying authorities, introducing them respectfully, taking time to facilitate interaction between visitors and communities is advised. Avoid influencing communities' impressions of other stakeholders/individuals/organisations by remaining neutral.
	Plan to spend time answering questions, elaborating on concepts, listening to communities' reactions. ❷❸❺	Participatory engagement takes time and effort especially during initial visits.
Handling conflict	**Maintain transparency and neutrality when handling conflict.**	On occasion, conflict may emerge in the process of engagement. Conflict is a normal and natural feature of complex interactions. Diffusing conflict

	❶	by making unrealistic promises or showing favouritism will likely be disruptive in the long-term.	
Exit and ensuring sustainability	**Plan for and openly discuss milestones and exit strategies with communities, early.** ❺❻	Communities have their own goals and insights for continuing project outcomes. Avoiding aid dependency should be a priority.	*Past experiences have on occasion breached our trust and caused us suffering.*
	Initiate long-term planning with key stakeholders throughout the project cycle. ❺❻	Maintaining quality relationships with key stakeholders from the very beginning of the project to the end will help to ensure sustainability of outcomes.	
	Avoid perpetuating false hope with promises of project extensions unless certainty exists around resourcing. ❸❺❻		

4 Case studies of ECE

This section explores three examples of where ECE has been applied from different development intervention points: water user groups, nutrition sensitive agriculture and collectivisation to manage water resources. Further case studies are under development, including the development of inclusive value chains.

The case studies highlight the different entry points and processes for ECE and how it can be scaled in different contexts, which are useful in informing consideration of different options and strategies for scaling in the next sections.

4.1 Case Study 1: Water user groups

Background

Since the 1960s, there has been a programme of polderization in the coastal zone of Bangladesh to convert low-lying areas into permanent agricultural lands through enclosed dykes, drained to the river systems through excavated water canals. In some instances, the canals are also used to store freshwater for irrigation the rabi an kharif seasons. These canals are a feature of *Sekendarkhali* village (located in Amtoli subdistrict) and *Khatail* village (Dacope subdistrict). However, these canals in these villages had become silted and were not functioning effectively due to mismanagement and misalignment of community aspirations, impacting on the ability to irrigate crops and supply freshwater for household drinking and sanitation and fisheries.

In both Sekendarkhali and Khatail the number one priority identified by households was access to dry season freshwater for crops and household use. Access to freshwater is determined by three aspects: *Freshwater availability*, *Equitable decision-making* and *Capacity to access water.* SIAGI, through a local NGO, Shushilan, using an ECE approach has established Water User Groups (WUGs) and a Water and Silt Management Committee (WSMCs) within these communities in order to ensure equitable decision-making and to enhance the capacity of villages to access water.

The WUGs are informal water management groups. Some of their members are represented on the WSMCs, which is a legal entity that has a constitution setting out the governance structure including inclusive representation and fiscal management. The WSMC's role is broader than water management, also focusing on silt management, crop planning and crop management. It also interacts with government departments to obtain permits and resolve conflicts.

Members of the WSMC realised that a collective action approach was required to ensure the re-excavation of the canals, including obtaining government permission, physical excavation, and determining fair water allocation. Core to the approach has been the inclusion of women and marginal farmers, so that they have a voice in the management of their water infrastructure. This case study highlights key aspects of this process.

Process of establishing the WSMC and WUGs

There have been a number of critical steps in the process of establishing the WSMC to ensure sustainability, including:

1. *Engagement with community to build trust and unity, identify aspirations and develop a vision:* Shushilan facilitated an engagement process focused on understanding the community, their norms, values, beliefs, behaviours, attitudes, their problems and challenges through an anthropological approach using transect walks, social mapping, focus group discussions (FGDs), key informant interviews (KII), informal discussions, working side by side with the farmers and villagers, and regular communication. This ongoing engagement and mobilization was conducted over a number of months where Shushilan listened more and talked less, built trust with the community. Discussion was facilitated around the communities' aspirations and building a common vision. Out of these discussions a unity of purpose emerged around the management of their water infrastructure, looking for solutions to re-excavate their canals, and ways of working together.
2. *WSMC constitution and elections:* Prior to the establishment of the WSMC, the canal was not publicly controlled but controlled by a few elite/powerful people (i.e. decision making was not equitable). Part of the ways of working together was the development of a WSMC constitution. Shushilan supported the development of the constitution in consultation with the communities. Within the constitution the majority representation is women, landless and marginal, with the premise that such a democratic institution should provide them a voice where they should be able to determine and enforce rules, and co-create the action plan.

   An open meeting was held to elect representatives onto the WSMC. The meeting was actively promoted within the community and required at least 75% adult representatives from the community households to conduct the election meeting. Local government was also represented. The process ensured wider social inclusion of more marginal voices within the community through the representatives they elected. This has established a new framing for WUGs and WSMCs to work more equitably.
3. *Capacity building and cooperation – governance:* Building the capacity of communities to develop their own agency, voice and self-efficacy is crucial for long term sustainability of any community intervention. Through the context studies and ongoing discussions with the community a number of capacity building issues were identified, including developing a vision to create cooperation and unity; water governance and leadership; and crop planning and crop management techniques. The community themselves has identified who should participate in the trainings developed by Shushilan and have co-invested in the planning, organization and budgeting. Community members are also being trained to be co-facilitators and trainers.
4. *Empowerment, power relationships and alliances:* Shushilan has focused on empowering the community through motivation and interactive discussions to enhance the capacity of individuals and groups to make choices about the just use of the water resources and to transform the choices into desired actions and outcomes. Management of water and water resources at the community level of both Sekendarkhali and Khatail village has become closely entangled with livelihood development and investment decisions in the community and local

government (Union Parishad, local administration and local fishery department) level that cannot be done in isolation from the wider local power structures and relationships in which they are embedded. Powerful actors are also making decisions on how the water resources should or should not be managed by the communities, allies, NGOs and government agencies by applying the government rules and political power. The project empowers the WSMC and WUGs to form alliances with the government agencies and NGOs, thus increasing political power for management of water and any conflicts.

5. *Obtaining Government support:* As a result of empowering the members of the WUGs and WSMC Shushilan has actively supported their engagement with the local administration, department of agriculture and fisheries and Union Parishad (UP). This has been important in obtaining permission for the canal re-excavation in Sekendarkhali, the community level negotiation, and preparing a new culvert associated with Sekendarkhali canal. It has also been key in the management and resolution of some of the conflicts around canal excavation, water distribution and use of community land.

Resulting outcomes

There have been a number of positive outcomes through using an ECE process. These have included:

(a) *Increased social cohesion, inclusion and equity:* Shushilan played an active role in supporting the creation of the WSMC and the design of the constitution which ensured the inclusion of marginal farmers and women. This has been key to ensuring that these groups are able to engage in managing the water in their communities in an equitable manner. For the first time, women have sat and made their voice heard and they are valued in the committee. Initially women sat behind the men and did not speak but they now sit in the front and actively engage and speak in meetings. The WUGs have developed crop plans with a diversity of vegetables and staples, which they have implemented, irrigating their crops on the dykes with the water in the canals. Women have been actively involved in determining what crops will be grown including bottle gourd, spinach, long bean and short bean.

"*I realise the benefit of the meeting thus I join here with male member that is not usual norms of our village*" Quote from woman villager.

The result has been increased levels of motivation, harmony and unity among the community to grow different types of vegetables based on market demand, risks and profit margin. Shushilan actively helped the WSMC to develop community/individual norms of 'just or equitable distribution of water and water resources' and 'do not harm' around accountability – 'I can see what others do and they can see what I do'.

(b) *Conflict resolution:* Shushilan has supported the two WSMCs to develop the skills to resolve conflicts. In Sekenderkhali, there was conflict over the re-excavation of the Hafamari Canal as some landowners and community members refused to contribute land for the dyke, as the previous location was unclear. They also actively tried to prevent the construction of a new culvert for regular channelling of the freshwater into Hafamari canal, as they would not benefit. In negotiation with these landowners, as well as the support of the Union Parishad and other government departments, the WSMC the conflict was resolved, and the canals have

been excavated. More importantly, in negotiating with landowners, the community particularly WSMC played a major role.

(c) *Autonomy to engage with other stakeholders:* In Sekendarkhali, Shushilan engaged the community and helped create empowering conditions for the community to negotiate with the Upazila Nirbahi Officer. As a result, the community autonomously obtained a non-objection certificate (NoC) for the canal re-excavation. In Khatail, the community autonomously called a meeting with the government to resolve the conflict over livestock entering the planted fields during the dry season when traditionally livestock were allowed to roam freely. Controlling open livestock entering into the crop land during the dry season is now a common occurrence and is becoming part of communities' regular activities.

(d) *Contributions by community members:* In the lead up to canal excavation the Sekenderkhali community was raising fish in one section of the canal to contribute funds for the excavation. As part of engaging local government, the UP also contributed financially in canal re-excavation. In addition in Khatail the group excavated 3 dykes to section of parts of the canal against salt water intrusion on their own initiative to store freshwater. In both communities, members of the WSMC contributed their labour to excavate the canals and dykes. The groups will continue to contribute both in-kind and finance for the maintenance of the infrastructure.

(e) *Water distribution:* Rabi season 2018/19 is crucial for the community as, for the first time, canal water was used for growing more dry season crops. Analysis of the results is ongoing and the question of water distribution has yet to be answered. However, the groundwork has been done to achieve an equitable outcome as the community has given the WSMC authority to decide crop plans based on availability of water.

Pivotal Lessons

Establishing the WUGs is vital for the long term sustainability and equitable management of water resources within Sekenderkhali and Khatail. The process has not always been straight forward and has played out differently in both communities. The following lessons have been gleaned from SIAGI's experiences in scaling ECE approaches in the WUGs and WSMCs in these communities:

- *Having skilled facilitators to guide the community engagement process*

  The skill of the facilitators to listen and guide the process is crucial while the capacity of the community is built and the ways of behaving are changed so that equity is valued within the community. The facilitators also need to be actively building the skills of the community members so that they become autonomous and do not require ongoing support. Having both male and female facilitators also allows for women to more proactively engage. Female facilitators can also role model some of the skills and norms for women in the community.

- *Building the community vision and aspirations – know where you are going*

  Taking the time to understand the community's needs and then to support them to develop their own vision and aspirations creates trust. Interventions can then be developed which align with these aspirations rather than being imposed on the

community. Addressing the community identified needs creates the buy-in, allows communities to be empowered, and ensures co-investment into the interventions. This process can take time initially but without knowing where the community wants to go, everyone can become lost.

- *Setting up a formal structure with an equitable and enforceable constitution is critical*

  The establishment of the constitution for the WSMC was a crucial step for inclusion, as it sets out that women and marginal households have to be represented, and that the majority of households in the community have to vote for the committee representatives. This has ensured legitimacy of the WSMCs, as well equity in decision-making and distribution of the resources.

- *Building capacity of members of the WUG and WSMC to work together to achieve community outcomes*

  Capacity building is multi-faceted but key to the success has been linking the training to the aspirations and identified needs of the WUGs and WSMCs, as well as building in small wins to start the journey and build confidence. Shushilan has focused the capacity building on empowering individuals to engage with each other, Government and other stakeholders. They have focused on building skills that will have tangible and long term benefits. An example is the establishment of management systems for the water assets including financial contributions, labour for the canal establishment and maintenance, and water distribution based on crop plans. Each opportunity or issue that emerges is used to build capacity, such as conflict resolution skills around the re-excavation of canals, and cattle damage to crops; and engagement skills developed through the acquisition of the NoC.

- *Inclusion, inclusion, inclusion*

  The project never assumes inclusion as it is a dynamic process that needs to be continually monitored and discussed as needs of community, households and individuals evolve. Shushilan is aware that elite capture can happen in many ways, and therefore is actively monitoring the WSMC processes and supporting all members to have their voice heard, especially in the early stages. As members develop their capacity and become more empowered, this will become less important.

- *Importance of government support*

  While a great deal can be achieved through an ECE approach and empowering communities to identify and implement solutions, in the case of water resource management it is critical that there is government support. Building the capacity of communities to identify their water needs and then engage with government in a pro-active and constructive manner to achieve outcomes has been a core part of Shushilan's role. The positive support of the UP and other government in Sekenderkhali and Khatail has resulted in the development of new or re-excavated infrastructure (canals), ensured the legality of the development, as well as conflict resolution. Engagement of relevant government departments are crucial from the beginning to the end. Where government is not supportive the scaling of water infrastructure and management is also not possible.

- *Adaptive learning: change is good and inevitable*

Change is inevitable. Building processes where WSMC/WUGs regularly meet and reflect on progress, learning from what has and has not worked and adapt activities is important for their ongoing success and relevance. Shushilan has actively supported this reflection process at the start of SIAGI to identify interventions and solutions. The scaling of the crop plans and increased use of irrigation from the canals will be used as a learning process over the next growing season.

Box 1 Considerations for scaling ECE in the context of water user groups

- The community's unity, power relationships and alliances with multi-stakeholders considerably assist the empowerment of the less-voiced community to take initiative and transform the initiatives and the choices for the conflict resolution, distribution of water and ensuring the equal benefit of interest.
- Identification of community resources and how they are used at the start of an engagement process is an important part of the process, and helps set out a pathway to create co-ownership and equitable management of these resources, especially water.
- Developing processes of engaging with the whole community at the start to create governance structures which are representative and inclusive creates buy-in and foundation for managing and reducing conflicts.
- When managing water resources ensuring communities develop the capacity to engage with government and other relevant stakeholders to deal with legal aspects, ensure sustainability, manage conflicts and to scale interventions.
- Basing interventions on community identified aspirations and needs creates buy-in and challenges the general myth that farmers do not contribute to development projects.

4.2 Case Study 2: Nutrition Sensitive Agriculture

Background

There is renewed international interest for investing in nutrition-sensitive agriculture (NSA) to enhance nutrition outcomes. International frameworks and knowledge platforms to support agricultural R4D programs to incorporate nutrition considerations in the planning and delivery of interventions have been developed and are now being utilised (Carter & Peishi, 2018). Known agriculture-nutrition impact pathways include: improving women's control of income and decision-making power; increased expenditure on nutritious food or health-related services; improving women's ability to care for themselves and their families; improved hygiene and sanitation; and access to nutrient-dense food for consumption (Herforth and Ahmed 2015; McDermott et al. 2013).

While elements of inclusivity (and equity) are addressed in many internationally-agreed NSA frameworks, questions about equity remain limited to the collection of largely quantitative data to meet equity indicators. Equity and inclusivity as it relates to research participation, processes or conduct is not typically addressed within these frameworks. Scaling ECE practices within an NSA research case study provides opportunity to combine considerations of equity in research and practice by investigating, for example, how nutrition outcomes can be advanced through more locally-driven and self-directed community mechanisms.

Armed with this knowledge, in early 2017, PRADAN and CSIRO set about designing an evidence-based NSA program for two villages in the Bankura district of West Bengal - Chakadoba (Hirbandh block) and Hakimsinan (Ranibandh block). It was imperative that international pathways and principles informed the most appropriate NSA action plan and uncovered the most direct pathways for improving the food and nutrition environment of these two sites. The goal has always been to scale NSA programming more widely if it proved successful.

A key challenge has been to balance multiple objectives simultaneously. Initially, this activity sought to achieve multiple outcomes including: to build the capacity of PRADAN staff to identify NSA pathways; test NSA approaches not previously used in comparable settings; while using an ECE philosophy; and looking ahead to scale both NSA and ECE if they proved to be successful. Building the capacity of PRADAN staff to empower community leaders and trainers to implement the plan was considered the best scaling strategy.

Our original plan

In early 2017, CSIRO and PRADAN devised a plan consisting of a phased, adaptive R4D approach to improving nutrition outcomes. Essentially, the plan followed internationally recognised NSA guidelines while striving to balance community needs and remaining mindful of existing resource constraints. Our primary objective was to devise an evidence-based NSA program that over time, could be scaled to other districts.

Formative research undertaken revealed some important links between water (quality, access and management practices) and its effect on food production, women's empowerment, care practices

and the health and sanitation environment for the villages under study. It was quickly realised that these factors in turn directly impacted community diets and health status and therefore nutrition outcomes.

To find out more, the team re-purposed a data collection tool (see Figure 1 below) to better understand the food and health environment at the village level (with a focus on water). This exercise enabled the research team to identify general themes for further investigation while following a recognised agriculture-nutrition pathway. The tool also allowed the team to conduct research using an ECE philosophy where research remained focused on understanding issues relevant to justice and equity, and was sensitive to limiting research burden for farmers, but also PRADAN staff. This work helped to inform the next step - determining community aspirations to inform a plan for NSA action.

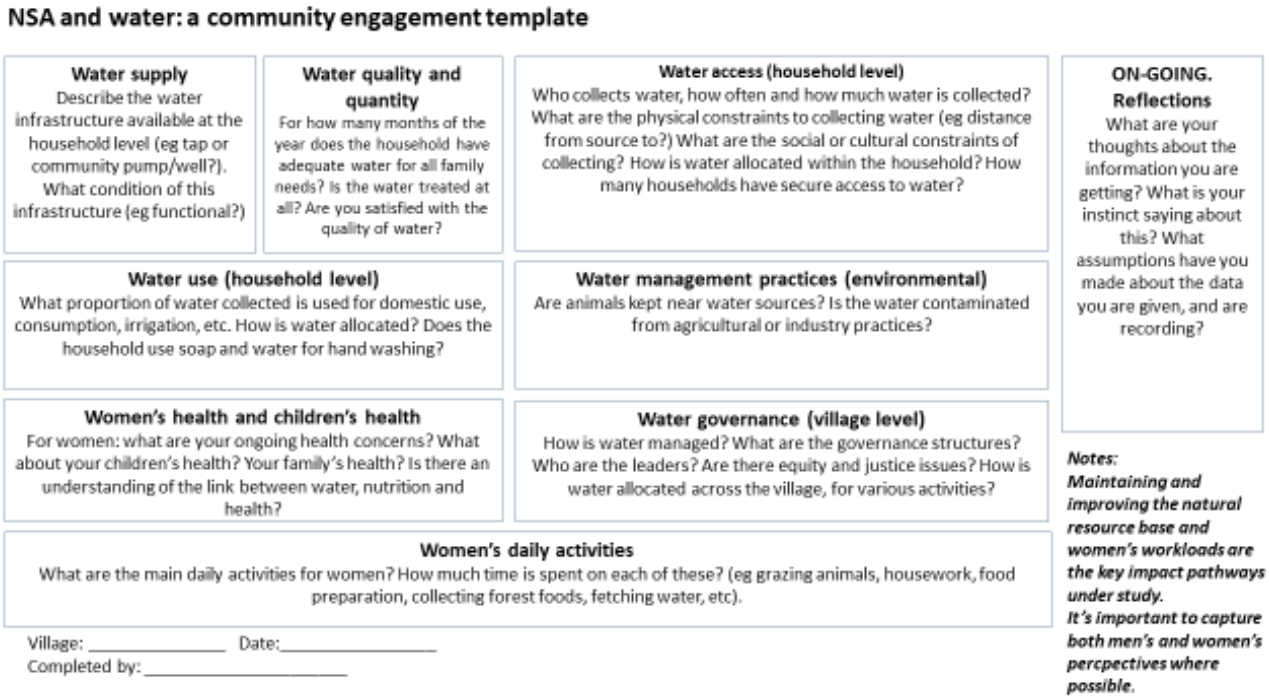

Figure 1. A community engagement template for determining links between water, NSA and justice

Turning Points

In the conduct of this research activity the SIAGI team have encountered multiple challenges in applying currently available international guidance on NSA and have documented our learnings. For example, in resource poor communities (eg poor tribal villages) income generation might not be the immediate pathway to improved nutrition. Women often spend money on children's education and immediate health needs first. Until households reach a base level of income, it is unrealistic for money to be spent on nutritious food. In addition, without special attention to WASH (water, sanitation and hygiene) – a key mediating factor for good nutrition outcomes, any NSA intervention will be less successful. Linking with partners who were able to assist in the provision of WASH infrastructure, knowledge and/or services was considered critical to success in achieving our NSA goals.

Since then, a combination of planned and unanticipated circumstances has led to the direct engagement of the West Bengal Accelerated Development of Minor Irrigation project (WBADMIP) as development partners at these Bankura sites. WBADMIP's primary role has been to provide and negotiate access to a range of irrigation and water infrastructure aimed at improving water availability for crop diversification and human consumption at the community level. This timely and fortunate partnership with WBADMIP has enabled some of the communities' visions to be realised.

It has also meant that original plans to purposefully follow previously determined NSA pathways has been tested by the engagement of a new, well-resourced and motivated partner. Honouring PRADAN's (and SIAGI's) commitment to ECE has been challenged – at the very least in the speed at which infrastructure has been put in place and the extent of further work planned. As progress gets underway, documenting the turning points, challenges and unexpected opportunities will be an important exercise.

With WBADMIP engaged, and community preferences identified, the focus has turned to pulse production for family consumption, the formation of water-user groups (WUGs) to help manage water, and the diversification of crop cultivation to include drumstick, cashew and dragonfruit. The Bidhan Chandra Agricultural University (BCKV) is now also providing technical guidance on cultivation. Support from MGNGRES for these enterprises is presently being pursued.

Following the rainy season, partnerships to secure a WASH program will also be pursued.

Pivotal Lessons

Given PRADAN's institutional focus on empowering women by developing individual and group self-agency and self-efficacy, and given PRADAN's existing relationships with community members in the building of self-help groups (SHG), several fundamental principles of ECE were already in practice prior to the commencement of activities in these two villages. This has not meant that the task of ECE has been easy or without trade-offs.

The following lessons have been gleaned from SIAGI's experiences in applying ECE approaches through the lens of establishing an evidence-based NSA action plan:

- *Keeping true to internationally recognised NSA methods and tools has been challenging in an economically, culturally and environmentally constrained context*

  In the course of our attempt to identify a suitable approach to NSA, we have found that currently available international frameworks and tools are not clearly aligned to ECE principles. Current guidelines assume an existing resource base, functioning groups, and relatively high farmer risk-taking capacity. In addition, currently available data collection tools to determine the food and nutrition landscape and to evaluate change are onerous and burdensome for both farmers and practitioners.

  Significant environmental, economic and socio-cultural constraints have exacerbated the challenge. For example, water scarcity, low land holding, lack of safe drinking water and limited irrigation facilities combine to constrain agricultural intensification options. For farmers who are first generation cultivators and who are regularly experiencing drought and climate change and who are reliant on immediate returns, the difficult decision to pursue cash cropping or NSA is very real.

- *'Learning by doing' has been a necessary aspect of capacity building*

The SIAGI team has invested heavily in building the capacity of team members to access a range of research techniques including the use of qualitative methodologies. This has enabled staff to conduct in-depth probing on issues of direct relevance to research questions and has revealed different information than what might have been obtained using quantitative methodologies. This process has required a more structured research approach but also one which demands more relationship-building and conversation prior to the collection of information. Improving our understanding of the interrelated issues of poverty, food and nutrition security, health and gender equality for informing a roadmap will further build our capacity.

- *Resisting the urge to know and do everything*

  Adhering to applying ECE principles while uncovering new knowledge has been a fine balance. It has reminded the SIAGI team that research undertaken should be focussed on providing community benefit rather than for satisfying intellectual curiosity. A frequent practice for researchers has been to elucidate as much information from one visit as possible in order to take advantage of time efficiency. This practice is often not a fair or respectful exchange and does little to empower or build trust.

- *Responding to unanticipated partnering (and scaling) opportunities*

  While a structured NSA action plan has been an essential foundation from which to start thinking about how to approach NSA, remaining open to unexpected partnering opportunities has meant that the original plan is adapted to accommodate change. The timing of engagement with technical and research partners who are able, for example, to provide infrastructure capacity or share expert knowledge in pulse cultivation has been fortuitous. Keeping true to both NSA pathways and ECE principles in the course of partnership will require careful attention and planning.

- *Proactively creating collaborations, partnerships and opportunities*

  Given the magnitude and inherent complexities of the task ahead, this is not a vision that can be achieved alone. Working with partners to create different, more mutually valuable relationships will be a key ingredient for our success. Comprehensive mapping of stakeholders who operate in the broader social-ecological system continues to be a key task. Identifying and engaging partners who are able to provide support by sharing essential skills or experiences, knowledge and other resources can potentially assist in achieving long-term goals.

- *WUAs are enabling communities to manage money but at a cost*

  A major achievement so far has been enabling the community to manage money through water user associations (WUAs). Early lessons are now emerging. These groups require significant capacity building to function well while the process of registering community members has revealed high transaction costs. Monitoring these and other trade-offs will be an important exercise as ECE process are scaled.

Box 2 Considerations for scaling ECE in the context of trialling NSA approaches

- Given knowledge of best (field) practice in NSA is still emerging, and developing capacity remains a key focus for field staff, trialling NSA approaches remains a challenging and slow process.
- Approaching the scaling task with a minimum 'do no harm' (to nutrition outcomes) philosophy remains a valid goal for scaling development initiatives.
- Effort is best spent integrating existing knowledge sets, having clear research objectives and seeking to collect only targeted and specifically relevant data which directly links to one or two key research questions. A structured and efficient research process reflects commitment to ECE practices.
- ECE can be a time- and resource-intensive endeavour where trade-offs and compromise can present often. A minimum basic set of standards may guide field staff in their decision-making and planning.

Case Study 3: Farmer Collectives[2]

Background

This case study draws on the experiences of the project *'Dry Season Irrigation for Marginal and Tenant Farmers (DSI4MTF)'*, supported by the ACIAR. DSI4MTF aimed to analyse and understand socio- institutional and technological interfaces mediating dry season agriculture by marginal farmers. Bio-physical and social interventions were tested for their viability and appropriateness. The project adopted ECE as its overarching perspective, which underlines collaboration, acknowledgement, respect and encouragement to others, and values community perspectives and insights. This case is based on our engagement in North Bengal (India) at the Uttar Chakowakheti village, and illustrates how ECE perspectives have helped collectivisation of farming communities.

Uttar Chakowakheti is a tribal village, both physically and socially marginalised dating back to the mid-nineteenth century. Today, the village has 323 households comprising of: 30% Scheduled Caste, 63% Scheduled Tribe, 4% Minority and 3 % General[3]. Households depend mainly on agriculture, forest-based activities, sand mining, livestock, vegetable business and daily wages for their livelihoods. Paddy has traditionally been the primary crop, but diversification has occurred over time and the village has access to ponds and shallow tube wells for water. The community has cultural diversity, social cohesion and harmony, important considerations supporting their acceptance of ECE perspectives.

Process of Ethical Community Engagement and Collectivisation

Unequal distribution of land, small and fragmented holdings, tenure insecurity and high rent limit agricultural intensification. Institutional innovations are essential for successful adoption of new irrigation technologies, and sustainable agricultural intensification.

Collective farming models were facilitated, with pooled land, labour, capital and skills, to create larger units of production. Social mobilization commenced in mid-2015 through a series of community meetings to introduce the project, assess interest in forming collectives, and identify potential communities and households.

Different collective models evolved, accounting for different land ownership situations. These included a collective incorporating both landowners and landless, a collective with only landless and a collective with only landless women. Each group pursued different levels of cooperation and management appropriate to their needs. ECE formed an overarching perspective to engage with the community in-order to include their views and vision on project components and strategies.

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[2] This case was authored by Rajeshwar Mishra (Social psychologist and Professor, CDHI, Jalpaiguri) and Erik Schmidt (Deputy Director, Centre for Agricultural Engineering, University of South Queensland and team leader for DSI4MTF) as part of ongoing collaborations and sharing of insights between SIAGI and DSI4MTF. The authors, thankfully, acknowledge the inputs from the CDHI team especially Joy Dhananjay, Subrata Majumdar and Mitali Ghosh.

[3] Scheduled Castes (SCs) and Scheduled Tribes (STs) are officially designated groups indicative of historical disadvantage, Minorities have a distinct category in the caste system which denotes religions that represent only a small proportion of the populations. In Uttar Chakowakheti this refers mostly to Muslims and Christians.

There are many issues and challenges in maintaining an ethical engagement process (see **Box 3**), which takes place in a dynamic socio-cultural and political environment, and has different perceived and real benefits. There may be competing interests and opportunities, which act negatively in bringing the members together to pool their resources and efforts. In a collective consisting of members with unequal land holding or unequal social power, there can be a tendency to maintain status quo or promote self-interest.

Ethical community engagement helped neutralise apprehensions, build constructive relationships, foster interpersonal trust, and embed the spirit of collaborative learning, important conditions for impact and scaling (see **Box 4**).

Box 3 Issues and challenges

The process of ECE raised issues and challenges, which affect effectiveness and scaling of the approach.

- There was a defining moment in ECE at Uttar Chakowakheti. DSI4MTF's social mobilizers and agriculture experts from Uttar Banga Krishi Viswavidyalya University (UBKV) made several visits to the village to interact with the community, understand the village and introduce the project. Each visit proved a non-starter and villagers presented an indifferent face. It was the issue of entitlement, more specifically, the issue of a caste certificate, that caught the community's attention and provided a trigger for ongoing reflective discussion. Galvanizing them around the issue proved easier, and through a series of sessions, provoking and challenging them, they proved a catalyst for further change.
- ECE requires perseverance, understanding of the context, listening to the community, knowledge of government functioning and skill to mobilize the community and encourage them to persist.
- Having empathy and belief in the wisdom and capabilities of the community, and willingness to collaborate with them is essential. Such values and belief depend on the institutional culture of the facilitator(s). These skills are not necessarily linked to formal qualifications. A committed facilitator without a formal degree can also be effective. Training of key staff involved in the implementation of the project is critical to develop a common vocabulary and understanding around engagement. CDHI has much experience working with marginalized communities in the region and ECE evolved under such an environment. Design of projects require radical thinking to offer space to such individuals and organisations.
- Facilitation of ECE does not follow a fixed menu. Community has its own undercurrents and moods, not easy to capture and work with. Facilitators need to be aware of the social dynamics, be flexible and positively manoeuvre their strategy and tools during the process. Facilitation needs to be considerate but also needs to provoke and challenge. Once basic trust is built, the provocations are considered constructive.

Resulting Outcomes

There have been a number of positive outcomes from the ECE process at Uttar Chakowakheti.

(a) *Trust and confidence in the community to re-engage with governance and development processes.* In general, while the tribal community is collective in nature and orientation, many years of isolation and marginalization has rendered them indifferent and subdued. State and non-state interventions have remained notional and cosmetic. As a result, communities developed cynicism and distrust. When DSI4MTF was proposed the community considered it as one of several such interventions which were 'launched and completed' without much impact. The first few visits, therefore, failed to attract interest. These visits, however, helped the project team to understand the context of the community's 'indifference and silence'. Causes, as identified, were several – notional projects, indifferent state and non-state functionaries, irrelevant policies and programs and top down mechanical planning.

The engagement was focused on listening, understanding, reflection and collective analysis. Spending time in the village, sharing food and accommodation, visiting various institutions together and hand holding were some of the activities, which proved quite helpful in building trust and confidence. The first stage of opening up helped thematic reflections spread over various sessions – why the community is what it is? Why the ponds are dry and agriculture fields barren and how the menace of animal attack could be reduced? The themes extended to children's education, employment and future career. Community meetings assumed vibrancy and some of the more articulate individuals started questioning themselves. Statements such as – '*who can help us if we don't act ourselves; why we cannot visit the government offices for our entitlements'?* The emerging voices proved quite discerning, the community received its caste certificates after a prolonged wait; the officials visited the village and the biophysical systems of the community were managed more sustainably. Women groups' meetings were regular, farmers decided on the management protocols and the farmers club became a reality.

Local challenges not withstanding, ECE assisted communities to access officials and local governance systems for their entitlements. Initial success resulted in the earlier cynicism being replaced by determination to set and achieve new goals. Service providers developed trust in the ability of communities to pay for services offered and the government officials recognised farmers as reliable groups. Inputs to accelerate agricultural activities were provided by government line departments. The tribal community were previously not trusted for their skills and capability to demonstrate success in agriculture and wore the stigma of being on the – 'forest fringe', to live on minor and discarded forest produce. The community for the first time experienced integration.

(b) *Strengthening community institutions.* The Uttar Chakowakheti community has tasted the fruits of collectivisation. Irrigation facilities have ensured timely irrigation, protected farming has enhanced opportunities for niche crops and increased income, and they have been able to regain their tribal identity with caste certificates. There has been a strengthening and consolidation of their collective position. Building on this enthusiasm, existing self-help groups have strengthened and discussion has been initiated around building inclusive institutions such as farmers clubs and farmer' producer organisations (FPOs).

ECE has helped communities to build evolving institutions with a clear vision, mission and governance structures. Various iterations led to strengthened commitment for transparency and justice - '*no free riding to be allowed –this is non-negotiable*'. Meetings are regular and well attended and there is financial discipline, which has improved their financial bargaining power. National banks and local agencies all demand credit worthy institutional entities. The community and their institutions are gearing up to satisfy this. Engagement has brought in the necessary responsibilities and discipline.

(c) *Adoption and adaptation of technologies.* Initially the community received DSI4MTF in a very stoic way – '*something has come!*' DSI4MTF had social and bio-physical elements which the community had to participate in. There was a need to jointly implement and manage new technologies such as new cropping systems, shallow-tube wells and solar pumps. Initially, the response was lukewarm. Under collectivisation, the technology experts and community facilitators started introducing the technology carefully encouraging them with – '*it is simple, much simpler than what you have been dealing with'* narratives, followed by training, demonstration and ongoing support. Measurement units were used and discussed following the local nomenclatures and lingua franca. ECE created willingness for collaborating and resulted in appropriate crop choices and installation of irrigation facilities, evolving management and operational protocols and increased appetite for risk. Successes and failures were closely analysed and failures were recognised as inevitable and were followed by subsequent corrections.

(d) *Trust in scientists and advisors and risk acceptance.* The community and scientists collectively deliberated and selected cropping systems. Engagement helped build and consolidate a bond between the farmers and the participating scientists. Intensification is as much a matter of technology as it is cultivating mutual trust, respect and appreciation between the scientists – representing academia, state departments and practitioners on the one hand and the community on the other. ECE, catalysed this important bridge!

(e) *Entrepreneurship and engagement in the supply chain.* When members of a women farmer's collective in Uttar Chakowakheti were asked about the performance of the protected farming structure (polyhouses or green houses), they responded without a pause or murmur in a clear collective voice – *'We now have off season spinach, capsicum, broccoli, beans etc which we ourselves take to the market, sell it, get a better price and return happily with some household consumable and gifts for our children and other family members. Feel so happy when the crisp notes [of currency] pass through our palms and the happiness…don't ask –cannot explain in words'.* One can feel their inner state, reflected through the above conversation, the women might have had within'.

There is evidence of important engagement in value chains. It began with the choice and cultivation of niche 'off season crops'- the spinach, capsicum and broccoli. They strengthened the chain at the selection of the crops and selection of the market. Another important aspect of the value chain can be seen in the trust the women farmers have been able to carve out in the market. When asked how they felt about going to the market, they responded: '… *our regular visit to the market has enhanced our self-esteem. We can compare our product and the price. Seeing demand for our produce we are able to ask for different [higher] price. And the growing demand is reflected in some of the local people looking for and inquiring about us if*

we skip a visit. They [the customers] know that we do not use much pesticide and our produce are fresh and taste better'. On dimension of grading the women informed- '*our product enjoys a different quality grade which is self-certified –a growing trust in us!'*

The special status of the value chain has emerged owing to a number of factors –facilitation by the scientific community which helped grow off-season niche crops, timely marketing, building trust with and among the market community, care and maintenance of the protected structure and constantly trying new methods and products. Engagement has been critical in evolving the special status.

One can see the extension of their growing innovation and entrepreneurship in the women groups participating in the district level innovation award contests in which they were declared joint winners. ECE helped evolve an enabling environment offering a level playing field for the community to ideate, incubate and innovate.

(f) Self-efficacy and agency. Farmer groups have shared that they have learned to manage risks based on their experiences through this process. Failures of crops, in a season, did not deter them from trying alternate crops and methods. What is most important is the growing confidence among the tribal farmers, that they could retrieve the lost ground by taking controlled risks. This is a reflection of their growing efficacy at individual and group levels.

Pivotal Lessons

Ethical community engagement has offered important lessons:

- *Engagement has not only helped the community in personal terms but has led to the development of a culture characterised by a value of cooperation, trust and risk taking*.

  When the open polyhouse structure collapsed there was no 'hush-hush' blame but a quick decision to rebuild it using their own savings. When the mustard failed, last year, they did not hesitate to sow mustard again - and this year mustard did not fail. The lentil has failed this year, but they are planning to do it again. '*The failures need not stop us but we should learn from them'* is the emerging conversation.

- *Influencing a communities' value and belief system is most likely when they have successfully addressed a key challenge*.

  Uttar Chakowakheti's positive response to engagement is attributed to the challenges posed by 'caste certification', an aspect of identity. Once they achieved this priority goal, one they had been struggling with for a long time, they believed they could achieve other challenging goals, such as crop diversification.

- *Engagement can lead to broader changes in how key institutions view, and interact with, the community*

  'Spending time and resources on the tribal is total waste' used to be the narratives of the state and non-state institutions. Now the narrative has changed to – '*they have shown incredible grit to stand against adversities.'* The university and the local institutions of governance look to Uttar Chakowakheti as a credible destination and tribal community as partners to be engaged and relied upon.

- *Uttar Chakowakheti also shows that one significant way to influence the policy and practice of government agencies is to create credible examples and convey the outcome to the local governance partners.*

  Many government schemes emphasise communities' involvement but do not have clarity about what this implies. Coming face to face with such examples catches their (officials) attention. This may create stronger ownership and subsequently, offer reference for policy integration. In Uttar Chakowakheti the local government agencies showed interest in the collective-based implementation of irrigation systems. The role of the facilitating institutions, in this context, becomes crucial as they are important channels to spread the examples. UBKV and CDHI presented examples from Uttar Chakowakheti at different levels and the government line departments recognised them as opportunity for replication elsewhere.

Box 4 Scaling ECE in the context of farmer collectives

This example from Uttar Chakowakheti provides the following insights for scaling of ECE, and scaling of the technical and institutional practices promoted by the project.

Scaling out:

As a result of the success of engaging through an ECE lens in Uttar Chakowakheti:

- Two new collectives have been established in surrounding villages, with more farmers cultivating dry season crops based on learning from project demonstration sites.
- The local department of agriculture have provided support such as through provision of seed and training to expand cropping areas.
- Farmers have developed better linkages with supply chains and government line departments and knowledge partners.

Scaling up:

- Policy integration takes time. Notwithstanding, the project's ECE perspectives have been shared with the Government of West Bengal, to impact further programs.
- Top down governance structures are not easily influenced. Lower levels of bureaucracy are more accessible, have the time and willingness to see the outcome of different interventions, and can integrate findings into their processes and programs. They can share the impact of their work, as their own, and through their bureaucratic channels, learnings can travel up to the policy level.

Scaling Deep:

- It takes time for communities to adopt and adapt to the emerging perspectives and impacts of an intervention, such as new irrigated cropping systems. People reflect, evaluate, compare, integrate and adopt various learning which align with their existing frame of reference, socio-cultural norms and practices and belief system related to the issues.
- Community beliefs, value system, norms and practices may be dysfunctional in dealing with the issues, which the intervention seeks to address. Scaling out and up may add to the volume and quantity but may not attract attention and commitment in the face of non-compatible values and cultural beliefs. ECE helps reflection on these and mediates cultivation of such values and beliefs, influencing the behaviour of the community in a proactive manner.
- The ECE process of deep reflection and engagement has resulted in Uttar Chakowakheti communities adopting and adapting to new perspectives of dry season agriculture. Change is evident in the values and beliefs of the community, from indifference to active participation, and from dependency to self-help. This shift signifies scaling deep.

Part 2 Scaling Ethical Community Engagement

The purpose of this section is to set out definitions, strengths, risks and implications of scaling ECE approaches as part of various development efforts. The paper is intended as a discussion piece to be developed and refined collaboratively, over time, with our development partners.

Section 5 draws on the literature to set out definitions, mechanisms and risks of scaling. Section 6 considers scaling specifically in the context of SIAGI and scaling ECE and sets out possible strategies aligned to SIAGI's impact pathways.

5 Scaling Ethical Community Engagement

5.1 What do we mean by scaling?

A key challenge for development is that many projects and programs are 'all too often like small pebbles thrown into a big pond: they are limited in scale, short-lived, and therefore without lasting impact' (Hartman, 2012 p.2). Scaling – scaling out, scaling up, or scaling deep – refers to a set of strategies to ensure that benefits from a project or intervention spread beyond the project, to more people, to new places, and that these benefits are sustainable even after direct support from the project stops (IIRR 2000).

At the core of this concept is changing or influencing behaviour: whether it be encouraging farmers to change farm management practices; or breaking down customs and institutions that exclude marginal groups – scaling is about provoking or enabling behaviour change, rooted in a pilot, or proof of concept that suggests ways this might be possible, and demonstrates the benefits of the change.

Traditional approaches to scaling have tended to draw on replication, or transfer of technology approaches, which over-simplifies the complexity of social change processes that are inherent in the goals of scaling (Williams, 2018). A more realistic conceptualisation of scaling is as a process of adaptation and learning, in recognition of the fact that people do not simply accept new information, but that it is integrated, re-interpreted, and adapted to suit their conditions, values, aspirations and constraints (Long, 2001). This learning process extends to all actors involved in scaling strategies – policy officers, NGO practitioners, households, researchers – as scaling implies that each actor changes an aspect of what they are doing.

Understanding scaling as a process of learning and adaptation also recognises that programs and interventions, particularly those that emphasise community empowerment and participation, must be adaptable to the diversity of communities and places in which they work.

There are a range of different terms used to describe strategies designed to achieve this sort of influence and change (Figure 2).

- **Scaling out** is concerned with strategies to disseminate information and encourage wider use of a technology or practice, such as replication of a program in new areas, or informal spread such as family and kin networks sharing information (Millar and Connell 2010). It usually refers to increasing numbers at the local level – like more and more farmers adopting a technology, or a resource governance approach being successfully implemented in more communities. Strategies in scaling out relate to the need for people to have access to information and resources as part of changing their behaviour.

- **Scaling up** is concerned with influencing institutions, policies and programs as part of creating enabling conditions for behaviour change at the local level, such as through engaging with policy makers or the private sector (Carter and Currie-Alder 2006). In practice this may mean partnerships with other organisations integrate an intervention into their programs, or policy changes to encourage or incentivise particular actions. As such it contributes to wider scale of impact.
- **Scaling deep:** refers to the need for people to have an understanding of the impetus for change, and benefits of change, as part of their decision making process. For example, where a project defines success by productivity increases, whereas the target beneficiaries may be more concerned with ecosystem health. It recognises that people may have values and aspirations that are diverse, and that this may impede scaling. Scaling deep refers to processes of learning, adaptation and cultural change as part of behaviour change, and requires a degree of advocacy (Ridell and Moore, 2015).

5.2 How to take impact to scale

Scaling takes time, and many aspects of scaling (eg. if and how other actors will respond, adapt and implement changes promoted by a project) are well beyond the control of project teams. Much of the literature on scaling has focused on trying to establish key design features to support successful scaling – which emphasise developing strong relationships, shared vision and a sense of ownership across stakeholders (IIRR 2000, Hartmann and Linn 2008). Key success factors in the agricultural research for development literature on scaling out and up mirror many principles of participatory research, and include (Williams, 2018):

- Ensuring the goals of the project match the needs of stakeholders across scales, but are still relevant to the local context;
- Scaling technology or practices that are easily adapted to local context, relatively simple to implement, and demonstrate benefits quickly;
- Developing strong partnerships and networks with a range of stakeholders at the outset of a project
- Developing the capacity of individuals and organisations to implement changes
- Planning and preparing for scaling from the outset of the project, and ensuring adequate funding for continued expansion.

However achieving these is challenging. For example, aligning an intervention to the needs and values of stakeholders across scale, while retaining local relevance assumes that the needs of stakeholders are either aligned, or at least not in conflict. Any multi-stakeholder engagement (whether it be across scale or not) brings together a multitude of different values. Even where a broad goal may be shared (eg. improving livelihoods), the priorities of different stakeholders on how to achieve that goal and which pathway to take may be entirely in conflict (Williams, 2018). Navigating these differences is challenging and time

consuming, and in some cases, may result in trade-offs or compromises in the package being scaled. Deiglmeier and Greco (2018) note that while collaboration across sectors is essential for scaling, the greater complexity that comes with engaging across sectors (and values) is also often an impediment to scaling.

The second dot point – locally adaptable practices that show fast results – is valuable for SIAGI in terms of demonstrating the potential impact of an ECE approach – but on the whole is most relevant in cases where interventions are seeking technical solutions to simple problems, rather than structural and systemic change.

With a long-term structural change agenda (for multiple stakeholders) partnerships, stakeholder engagement, and capacity building will be essential for SIAGI's scaling ambitions.

5.3 Risks, challenges and limitations

Many efforts to scale technology or programs struggle to succeed, and there are particular challenges and risks in the scaling of participatory approaches that are relevant to ECE.

- Participatory approaches, such as ECE, are successful in pilots because they have been carefully designed and adapted to the needs of the communities involved. These 'pilots', have had the resources and time required to test and adapt a local process. There is a risk that the act of translating these inherently local, and community-based experiences into generic principles, or a large-scale process undermines or loses the local, participatory nature of engagement that made it work in the first place (Sachedina 2010). That is, in the rush to scale, and scale quickly, we lose the integrity of the original process, which is what made it successful.
- How a community-based process unfolds is inherently driven and influenced by the context of that community – its history, power relations, local leaders, access to resources, and information etc. As a result, it is unlikely that the community engagement process will unfold in the same way in any two communities. Because these processes are contextually bound, it can be difficult to presume a simple scale-out strategy – what works in one community may not work in another; the same approach will unfold differently in different places (Wigboldus et al., 2016). Scaling processes need to account for the local context, and in the context of ECE this means tailoring the engagement and capacity building process to the needs of different communities, which may be difficult depending on the time and resources available.
- There is a risk that efforts to scale participatory processes, such as ECE, results in a tokenistic approach, and that such tokenistic approaches are inadvertently legitimised as inclusive and participatory (Cook and Kothari, 2001). One strategy which may mitigate this risk is to articulate the 'minimum specifications' or non-negotiable requirements as part of applying ECE while maintaining the integrity of the process (Ridell and Moore, 2015). However, though minimum standards may provide a basic framework that is able to be adapted to circumstance, it likewise

risks being restrictive, formulaic, inappropriately applied, or tokenistic, rather than creating a conducive environment for cultural and behaviour change.

- One of the most significant risks is 'elite capture,' where processes (and benefits) that are initially grounded in ECE are subverted and used to reinforce existing power structures (or used to create a new power imbalance). There is no one approach that can protect against this. In SIAGI, partners have suggested a range of strategies, such as: development of constitutions that ensure community review processes and transparency and accountability for governance structures; allowing reasonable timeframes for groups and constitutions to form; seeking to foster potential leaders within the community that demonstrate empathy and a commitment to making a difference; and ensuring leadership and growth opportunities are provided to a range of community members. Understanding the community dynamics and building relationships to be able to support inclusive or empathetic leaders in the formation of WUAs or SHGs requires a deep knowledge and good relationship with the community which takes a lot of time and is not supported by project timeframes.
- ECE seeks to change power structures and beliefs within communities (challenging existing hierarchies) and within the development industry (challenging donor/government – beneficiary structures and relationships). Scaling ECE is therefore most realistically seen as a long-term process of change, learning and adaptation. Individual team members can be champions for this change, however there will be limits to what can be achieved within the remaining time in SIAGI. Setting up relationships, champions and processes for continued engagement post-SIAGI will be a challenging but necessary step.
- ECE, like other participatory processes requires significant investment. Snapp and Heong (2003, 68) argue the 'requirement for quality interaction and considerable investment at a local level poses barriers to scaling out and up.' Snapp and Heong write in the context of scaling community-based natural resource management, but their insights are of key relevance to SIAGI and ECE, which requires intensive investment to develop relationships, understanding, human capability with local communities but also the broader array of development actors.

Reflecting on the rapid push to expand the use of participatory rural appraisal methodologies, Chambers (2005) compares the risks and trade-offs between the following approaches:

- Small and secure – slower scale out, but ensures quality and integrity of the process, focuses on intense local engagement.
- Extended engagement – engaging with targeted organisations at district or regional scale, to foster organisational and cultural change.
- Rapid scaling – involving less control or oversight by experienced practitioners, with high risk of perverse consequences.

Chambers reflects on how the increasing popularity of the participatory methods spiralled, with rapidly evolving train-the-trainer models provided by people further and further away from their original development. This resulted, in some cases, in the application of the methods, without the deeper philosophy of empowerment and community-driven development. Yet Chambers mused that all three approaches above were necessary and complementary. Acknowledging the risks of rapid scaling, he argues 'the benefits to poor people can be greater from doing less well on a wide scale than from doing better on a small scale' (Chambers, 2005, 122). Whether this applies to ECE in the same way is open for debate, however what is clear is that for ECE (and for that matter participatory rural appraisal) to truly deliver on their intentions for inclusive, community-driven development, systemic change, that targets donors, governments and others involved across the development spectrum, is required.

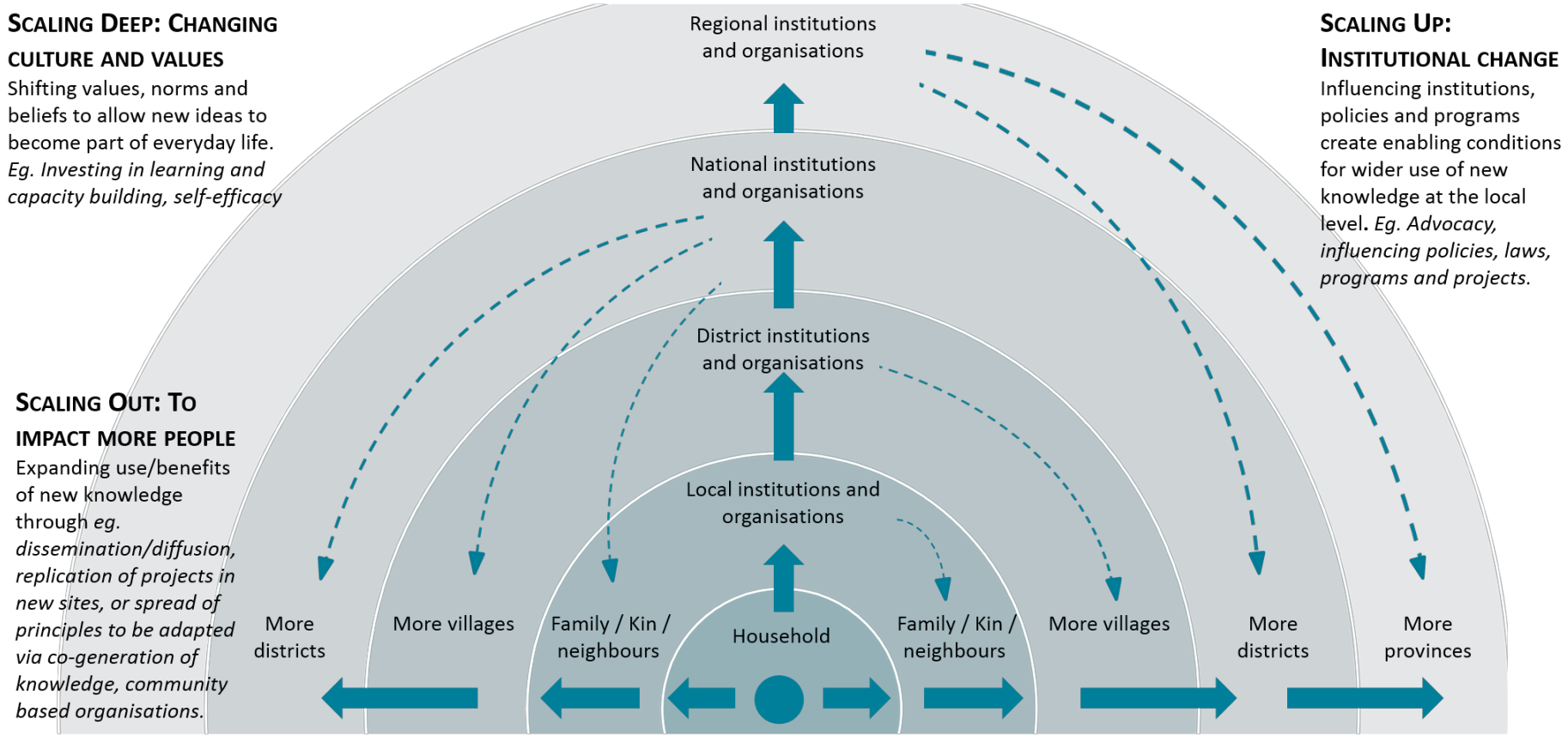

Figure 2. Scaling deep, out, and up as complementary and related processes.

Source: Adapted from Menter et al., 2004 and Ridell & Moore, 2015

6 SIAGI impact pathways and scaling of ECE

The aim of this section is to discuss strategies to scale ECE in the context of existing impact pathways. It deals with deliberate strategies by the team to promote the use of ECE, and though it doesn't preclude other forms of organic spread (eg. from community to community[4]) these are not dealt with directly here.

Though impact pathways are well defined for the project, recent team discussions have highlighted a disconnect between the team's impact pathways and how we understand and discuss scaling the impacts from SIAGI. These concepts are inherently linked: an impact pathway outlines how the project activities and outputs lead to impact; strategies to support scaling outline how this impact goes to scale. In SIAGI, the impact pathways already plan for systemic change, and as such, scaling strategies are embedded in the impact pathways.

Discussions within the team have tended to focus on replication/dissemination aspects of scaling through external stakeholders, which although crucial, miss some of the other strategies and ongoing efforts to support 'scaling deep' within our own organisations.

The strategies listed here represent our understanding and focus at a point in time (March 2019), and we acknowledge that these may change or be adjusted depending on key events and the interest of stakeholders. At the core of scaling lies a need to influence the behaviours and actions of individuals and institutions: some strategies may fall away while new opportunities emerge.

6.1 What are we scaling?

Conventionally in agricultural research for development, scaling efforts have at their core a tangible set of technologies, practices or programs, for example expanding the use of improved seed varieties and associated management practices. This is true more broadly in rural development also: ensuring wider roll out of health programs (eg. vaccinations, school nutrition programs) or infrastructure (eg. installing wells or sanitation).

Within the activities of SIAGI, there are a range of different components that could be actively scaled:

- Proven agricultural technologies and practices (eg. Irrigation, improved dry-land cropping techniques, polyhouses)
- Approaches that frame or guide interventions for livelihood benefits (Nutrition Sensitive Agriculture, Equitable and Inclusive Value Chains)

[4] SIAGI case studies suggest that, once benefits of ECE are evident in a community, nearby villages and communities show a strong interest to apply the same in their communities. The key limitation for this self-driven spread or dissemination is the resources to facilitate and support ECE processes. The scaling strategies in this document aim to address some of those limitations.

- Methods and processes for participatory research (eg. bio-economic modelling, integrated assessment)
- Community governance arrangements for collectivisation, empowerment, and resource management (self-help groups, farmer collectives, and water user groups).

However, the fundamental, over-arching methodological framework or philosophy of SIAGI, the thing that drives the implementation of the approaches and technologies listed above, is **Ethical Community Engagement**. The methods, technologies and governance models listed above are really a tangible expression or method of ECE in SIAGI however could each be applied in the absence of ECE with very varied results. Though the scaling strategies do not exclude these more tangible aspects of ECE, scaling of ECE represents the 'bigger, hairier' challenge, and **the one that would potentially lead to the greatest impact for marginal households**. This document will therefore focus on scaling of ECE.

6.2 Considerations

To plan for scaling ECE, we must consider what it would look like. The focus on scaling of ECE is based on a shared belief within the team that equitable R4D requires a different approach. Based on this belief, scaling of ECE would mean that it guides the action of development actors in how they engage with communities; it would mean communities aware of, and demanding, a different process of engagement; and it would mean donors valuing, encouraging and recognising the value of ECE in sustainable and equitable development.

The scaling of ECE, in other words, represents a fundamental change in how a diverse range of development stakeholders conceptualise and implement their roles in the R4D process – from donors, researchers, government, community and individuals. For example, an NGO may want to embed ECE as part of their organisational practice, but be constrained by donor priorities and preferences that are inconsistent with principles of ECE (scaling deep). Scaling ECE is a long-term, and delicate change agenda, one that may be seen as threatening or unnecessary to some, and one that requires significant changes in how agricultural research for development projects are framed, designed, funded, and evaluated.

The SIAGI team must be (and is) realistic about our capacity to influence this kind of change, and our role in doing so. The aim within SIAGI can only be to try and influence how we (as individuals, and within our organisations) approach community engagement, to link with others to share and discuss our experiences, and to contribute to conditions (empowering others) to foster longer-term change.

Another consideration is the 'loss of control' of how ECE is applied and used through the scaling process. For example, should SIAGI be successful in promoting ECE within another NGO or government agency, how ECE is applied or what ECE looks like within that organisational context will, most likely be adapted and adjusted to reflect the institutional context. The more successful SIAGI is at scaling ECE, the less influence and control we will have in how it is applied. A key factor in how we go about scaling is therefore to consider the 'minimum standards' required to apply ECE, and to work with stakeholders across scales and sectors to consider how to apply ECE in acknowledgement of the organisational context and constraints. This process of co-learning is important to foster cultural and institutional change.

6.3 Impact pathways and scaling strategies

SIAGI has 4 intersecting Impact Pathways defined by the key change agent or stakeholder with whom the project seeks to influence, noting that these exchanges are in the spirit of shared learning and reflection (rather than one-way information exchange).

SIAGI's activity plan, structured around the impact pathways, articulates the activities that support and contribute to progress along each pathway. In this section, we document how these activities contribute to scaling of ECE.

It is important to note the strategies listed here are not exhaustive. For scaling to be effective, it is likely that multiple strategies with different goals and involving a range of actors will be needed. For example, 'scaling deep' or fostering deep changes in culture and values is not just relevant to how funders and NGOs undertake their business, it is also fundamental to the communities that ECE aims to benefit (and in line with Principle 6). Supporting the self-efficacy and agency of communities to confidently engage in, and direct, processes of development is an important part of ECE. It should not be assumed that these changes will occur – changing self-perception and self-belief of individuals and communities means unravelling belief systems reinforced over generations. SIAGI partners have highlighted the important role of collectives and SHGs in fostering this change.

Impact pathway 1: Working with NGOs

Building interest, awareness, and capacity of other NGOs in ECE principles and practices, with the aim of more widespread application of ECE and more empowered communities.

This impact pathway starts with the codification or mapping of what it means to apply ECE, based on the practice of SIAGI NGO partners. The definition of best practice or guidance material through this process is then used as the basis of engagement with a range of stakeholders to promote the value of ECE, and foster understanding and cross-learning as to how it can be applied and adapted to suit different circumstances.

Scaling strategies, their risks and considerations are listed in Table 2. The ultimate aim here is to expand or replicate the coverage of NGOs applying ECE to empower communities – multiplying the same ECE process in a greater number of locations in parallel. The main constraint to this approach is that it is resource intensive, and there may not be enough service providers (NGOs and/or GOs) with the necessary depth of skills or number of people to scale out delivery (note this may partially be addressed through learning and capacity building strategies).

Broad strategies include (see Table 1):

- Building capacity of other NGOs as ECE service providers – which is part of SIAGI's current activities
- Replicating/expanding the work of CDHI, Shushilan, and PRADAN to new areas – possible only with engagement of other donors, and limited by staffing
- Community leaders trained and mentored to lead ECE within their communities – currently being tested by PRADAN.

By applying ECE in more sites, there are more opportunities to: a) learn and adapt the process across sites, b) contribute to changes in values and culture and a larger scale, c) provide evidence and learning sites for others to consider the approach. However, this strategy alone is unlikely to contribute to the systemic change required to foster ECE (eg. in donor expectations). The resources developed as part of this impact pathway form the basis of influence with other stakeholders also (pathway 2 and 3).

Table 2: Scaling strategies to foster broader application within NGOs

Mechanism	Strategy	Requirements / led by who	Strengths	Risk/weakness
Scaling deep / Learning and capacity building	***Build capacity of other NGOs as ECE service providers*** **ie. embedding principles and practices of ECE into other NGO institutional cultures and operating procedures**	Additional NGOs with interest to be involved. SIAGI-NGOs as trainers/mentors?	Contributes to systemic change in how development agenda is pursued. Develops network/partnerships for ECE and could enable learning across organisations.	Interest, willingness, and capacity of other NGOs to apply ECE. Requires alignment/shared value with existing organisational culture (which may be lacking). Ongoing training / accreditation and oversight to ensure integrity of ECE. Lock-out NGOs with limited resources?
Scaling out/Replication	***Expand the work of PRADAN, Shushilan and CDHI to new areas.***	Funding (eg. ADMIP) and capabilities to run the process in more communities simultaneously in CDHI, Shushilan and PRADAN.	Opportunity to learn and adapt across sites. Provides body of evidence/demonstration of benefits of the approach. Contributes to culture/value change.	Resource intensive. Strain on resources/capabilities of NGOs risks undermining work.
Scaling deep/Learning and capacity building *Scaling out/Replication*	***NGOs conducting distributed train-the-trainer with community leaders*** **ie. train community leaders in ECE in each village as the multipliers of the ECE process in their village**	Requires NGOs for training and initial support. Community leaders trained in ECE to lead the process in their village – requires willing community and leader with capacity/interest.	Evidence/examples where this has been applied. Could be underpinned by ongoing support from NGOs as they establish/grow in experience. Community-driven scaling process	Risk reinforcing current power dynamics and marginalisation within community / elite capture of process. Burden on community leader. Risk of disconnection of leader / professional from community.

				Risk lack of suitably skilled staff to provide training and support
Replication	***Shorten ECE process - codifying and shortening process to speed up process of community capacity building for application by SIAGI and others***	Consideration / testing of how to shorten process by SIAGI.	Reduced costs/per community Allows NGO to move to additional community more quickly	Significant risk to undermining core principles of ECE – timeframes of engagement should be community driven. Shortened process may not have the same depth/sustainability of impact. No previous experience in shortened process.

Note: 'greyed text' indicates strategies with high risk that the SIAGI team is uncomfortable pursuing

Impact Pathway 2: Engaging with the research community

Fostering understanding and capacity within the research community of the value and benefits of ECE, with the aim of more researchers engaging with communities consistent with ECE principles.

This impact pathway is really about sharing lessons learned with the broader research community as a way of contributing to discussion and behaviour change in how researchers engage with communities. SIAGI's activity plan provides an overview of the research communities we are engaging with, including sister projects and related project in the region (**CSI4CZ, DSI4MTF**); and partner research organisations in Bangladesh (**BAU**) and India (**IIT**). There is equally an opportunity to engage with researchers and research managers within Australian-based research organisations in SIAGI (**CSIRO, ANU, ECU)** who work in similar contexts with similar goals, as well as through research networks such as the Research for Development Impact Network and the Australian Council for International Development.

Broad strategies may include:

- Workshops, meetings and conferences to promote understanding and discussion of ECE (BAU, CSIRO, IIT, others)
- Identifying champions within each organisation to continue discussions after SIAGI
- Build understanding and capacity in ECE in the next generation through curriculum development (BAU, IIT)

This pathway is really about creating a different set of values within the research community that drive how we scope, design and implement research for development, which enable and promote ECE. It represents a slow process of change, and within the life of SIAGI it is highly unlikely that the change would be completely embedded. Different organisations have different starting points and different institutional constraints. For example, though parts of CSIRO have a long history of participatory research, there is a more limited experience and awareness of inclusivity in different parts of the CSIRO, where the inclusion of social science as a starting point is still contentious. Similarly, in BAU, promoting and legitimising the role of social science as a starting point for ECE may be a more appropriate starting point.

Table 3 Scaling strategies targeted to foster change within the research community

Mechanism	Strategy	Requirements / led by who	Strengths	Risk/weakness
Scaling deep / Learning and capacity building	**Workshops, meetings and conferences to promote understanding and discussion of ECE (BAU, CSIRO, IIT, others)**	Scope within event to promote work; pitch needs to meet people where they are starting.	Allows engagement tailored to needs of an organisation. Opportunity for learning across contexts. May foster discussion and understanding across different levels of academia (junior through to senior researchers) Starting point / precursor to more 'concrete' steps, eg. Consideration for ECE in design of new CSIRO projects?	On-going dialogue is required – need to ensure workshops/ meetings etc are not the end of the discussion.
Learning and capacity building *Supports scaling up / deep*	**Identifying champions within each organisation to continue discussions after SIAGI (All)**	Requires champions with understanding of ECE (capacity building) and ability to influence/take advantage of opportunities to influence organisational discussions.	Personal, flexible approach not dependent on resourcing.	Champions need allies – risks of burn out and or giving up in difficult organisational contexts. Champions may move on before change is embedded.
Scaling deep/learning and capacity building	**Build understanding and capacity in ECE in the next generation through curriculum development (BAU, IIT)**	Requires curriculum design, acceptance within faculty/course of relevance and value.	Targeting next generation of researchers and longer-term change.	University system / social context may constrain students' ability to take an ECE approach. Requires change/support by senior researchers.

Impact pathway 3: Working with donors and government

Creating enabling conditions for ECE by influencing programs, projects, and the institutional environment.

This pathway has two aspects:

- Directly influencing various projects/programs within India and Bangladesh to apply ECE
- Engaging with donor organisations to try and develop project guidelines /operational conditions / monitoring and evaluation frameworks that are more enabling of ECE.

As with impact pathway 2, there is a long-term change process that underpins pathway 3. Broad strategies may include:

- NGOs (and SIAGI more broadly) partnering with key stakeholders to embed ECE in current projects and programs (eg the World Bank's ADMI program in India)
- Building capacity of donor and government agencies (culture and values) in selecting appropriate ECE service providers
- Influencing donor program requirements to support application of ECE.

Fostering a greater awareness and acceptance of the principles of ECE among donors or implementing agencies is predicated on a recognition that timelines, targets and outputs inherent in program logics to a large extent determine whether a particular program is likely to achieve equitable and inclusive development outcomes or not. Hence more appropriate design of future programs becomes a critical prerequisite for scaling. This would represent a shift in how the development agenda is pursued, however there is already some evidence of donors taking greater interest in less-tangible outcomes such as empowerment and inclusion.

This strategy represents a slow process of change involving multiple actors. It requires a change in donor perception regarding costs and timelines for development impact. There is a risk that, as with other methods and approaches which are mainstreamed into donor practice, they lose the inherent qualities that made them successful and become more 'tick the box' exercises.

Though it may be possible to get some 'quick wins' (eg. WB-ADMI program applying ECE with PRADAN and CDHI) there are many institutional, operational and capacity challenges that will constrain the extent to which this translates throughout the ADMI program. For example, the standard monitoring and evaluation metrics often do not recognise the less tangible outcomes that are part of a process like ECE. Developing metrics for this type of M&E can be complex and potentially burdensome if implemented and risk being unable to capture the deeper changes required.

Similarly, even if SIAGI were successful in developing guidelines around inclusivity as part of ACIAR's project proposal process, as can be observed in the case of gender requirements more broadly; such an achievement is just a first step to a much broader cultural and capacity change – guidelines may incentivise a new approach but the capacity to successfully apply it will still need to be built (IP2).

Table 4 Scaling strategies targeted at fostering change within donor/government community

Mechanism	Strategy	Requirements / led by who	Strengths	Risk/weakness
Scaling deep / Learning and capacity building	**Engaging with donors (ACIAR, World Bank) to build understanding of ECE and its value / contribution to inclusive development**	Donors interested; ongoing engagement to facilitate discussion. Key donor contact with agency to influence.	May contribute to wider scale out.	Donors may not be 'convinced' yet of ECE metrics/success.
Scaling deep/ Learning and capacity building *Scaling out/replication* *Scaling up/enabling environment*	**Partnering with Donors to apply ECE in their programs (ADMIP)**	NGOs have capacity/resources to expand their work as part of partnership.	Contributes to donor understanding of challenges/benefits of ECE. Contributes to learning of ECE application in different contexts.	Program requirements (eg. timeframes) may constrain ECE. NGOs over stretched.
Creating an enabling environment	**Ensuring program design, implementation and evaluation metrics support ECE approach** Influencing donors and others to ensure program requirements allow for practice of ECE (eg. timeframes, targets, outputs, monitoring and evaluation are aligned to ECE).	Donors / funders with capacity/willingness to take risks in changing metrics.	Creates enabling conditions for ECE to be applied at the local level. Contributes to systemic change in how development agenda is pursued.	Slow process of change, multiple actors. Risk of perverse outcomes. Requires parallel capacity building within NGO/Researcher/Community. Developing MEL systems for this kind of change risk being burdensome and/or inadequate to capture deeper change.

Mechanism	Strategy	Requirements / led by who	Strengths	Risk/weakness
Scaling deep / Learning and capacity building	**Strengthen donor and government agency capacity (culture and value) in selecting appropriate ECE service providers**	Will vary depending on donor/government. May require development of guidelines and manuals to help decision makers select appropriate service providers.	May contribute to wider scale out by creating incentives for implementers/NGOs.	Organisational culture change is a long-term uncertain process. Need to ensure the value and aspiration for ECE that is held by leadership is shared across the organisation. Depends on deeper commitment to equitable and inclusive community engagement and development. Risks tokenistic response to get access to funding.

Impact Pathway 4: Working with the private sector

Working with the private sector (including collectives) to reduce risk, and increase knowledge and transparency of value chains.

This pathway is closely linked to Pathway 1, and focuses on working with community organisations to become intermediaries, or boundary partners to empower household access to value chains, acknowledging the multiple and different values that exist within a chain (ie. not just monetary). The community organisations in this case are often the self-help groups, farmer producer organisations, collectives or water user associations that have been established as part of impact pathway 1. As such, scaling of this impact pathway is closely linked to expanding the application of ECE more broadly (see Table 1).

There is a potential to further scale ECE with the private sector in terms of changing how corporations engage with farmers and ensure inclusive value chains beyond Corporate Social Responsibility. There is an emerging body of literature that considers how to grow inclusive agri-business and finance in input and output markets, which SIAGI could engage with, and contribute to, in terms of influencing business practices to consider aspects of ECE. This area one that SIAGI will continue to explore.

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Report 2: Inclusive Value Chain Assessment

Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh (SIAGI)

FULL REPORT

Inclusive Value Chain Analysis

Frameworks and methods for socially-inclusive agricultural intensification

Synthesis by Lilly Lim-Camacho (CSIRO)

December 2019

Contents

Abbreviations

BAU	Bangladesh Agricultural University
CDHI	Center for Development of Human Initiatives
DG	Dhaloguri
DSI4MTF	The ACIAR sister project, Improving water use for dry season agriculture by marginal and tenant farmers in the Eastern Gangetic Plains
ECE	Ethical community engagement
FPO	Farmer producer organisation
FR	The SIAGI Final Report
IA	Integrated assessments
IA4VC	Integrated assessments for inclusive value chain analysis
IIT	Indian Institute of Technology
NGO	Non-Government Organisation
PRADAN	Professional Assistance for Development Action
SHG	Self Help Group
SIAGI	The ACIAR project Socially Inclusive Agricultural Intensification in West Bengal and Bangladesh
UC	Uttar Chakowakheti
UNIDO	United Nations Industrial Development Organization
VCA	Value chain analysis

This report is a synthesis of work conducted by SIAGI partners. It is drawn from reports and other project outputs by teams from IIT Kharagpur, CDHI, PRADAN, Bangladesh Agricultural University, Shushilan, Australian National University, Edith Cowan University and CSIRO.

1 Value chain analysis for the poor

With agriculture considered as the best opportunity to alleviate smallholder households from poverty (Seville et al., 2011), linking smallholders to markets through well-functioning value chains remains to be a critical development intervention (Berg et al., 2008). Altenburg (2007) highlights that overall, economic growth is good for the poor, in that it generally increases income in the context of a highly competitive agricultural sector. Increasing exposure of agriculture to international markets and competition means that there are greater risks to low-functioning actors, of which many smallholders fall under (Lee et al., 2012). 'Upgrading' of value chains has then been an agenda for many (see Devaux et al., 2018), with most interventions focused on collectivisation or the formation of farming cooperatives, value-adding through processing and packaging, and enhancing market information and relationships.

In India, fruit and vegetable value chains, of which many smallholders participate in formally and informally, are faced with challenges of fragmentation (a large presence of intermediaries), co-option (taking over or appropriation), lack of integration (disconnect between backward and forward linkages), poor infrastructure (storage, cold chain facilities, roads to farms, processing), poor adoption of technology, and inadequate knowledge and awareness (Negi and Anand, 2015). It fair to assume that these challenges are not particular to only fruit and vegetables but can also be seen across many other commodities in India and Bangladesh. In light of these known challenges, the instinctive strategy is to address them through economically-viable interventions. Value chain analysis has long been recognised as an approach that allows researchers and development practitioners to identify such interventions. Essentially, value chain analysis aims to identify:

1. where in the chain value is created, gained and lost,
2. how value is created, and
3. areas where improvements in this value creation process can be made.

In order to achieve this, most value chain analysis will run under the assumption that 'value' is an outcome of economic activity, realised by meeting consumer needs. Any inefficiency in the process of creating this value translates to 'waste' or a loss of value (i.e. product loss, reduction in quality, increased transaction costs, increased time or distance), and as such increased cost. Parallel to the value creation process are relationships between the various actors in the chain; actors who are expected to have shared visions and goals. Given this premise, there is also the assumption that some should not and cannot participate in a value chain because they may not share the same vision nor resources, therefore do not 'fit'. Lastly, the functions of the chain are underpinned by supporting mechanisms in the form of policy, finance and infrastructure – activities or governance mechanisms that are outside of the control of chain actors.

However, it is also acknowledged that there may be a disconnect between traditional business priorities and pro-poor development interests (Abdulsamad et al., 2015). This is the challenge faced by inclusive value chains. It is recognised that a balance needs to be struck between competitiveness and equity if we are to make value chains inclusive (Haggblade et al., 2012; Altenburg, 2007). For poor farmers to participate in value chains, we need to understand what the poor value and what their context is and support a wide range of visions and aspirations which may be different to priorities that we tend to focus on.

Table 1 elaborates on how we may contextualise the usual assumption around value chain analysis to shed light on appropriate approaches for inclusive value chains. What this points to is that the concept of 'value' for the poor needs to be re-considered. Therefore, 'value' chain analysis needs to be re-oriented if the overall 'value' sought by the poor is different to what we have traditionally defined it to be. Key questions

for value chain analysis for the poor should include, ‘what do the poor value?’, ‘what is the chain of this new value?’ and ‘what are the different entry points for supporting the poor in achieving this?’

Table 1 How are the poor placed against the usual assumptions around value chain analysis?

Usual assumptions	Context of the poor
Value as an outcome of economic activity	The poor draw different forms of value from participation, and not necessarily from economic activity alone
Value is realised via consumer needs	The poor are also consumers of their own crops
Inefficiency is a problem	How the poor contribute may come across as inefficient in the context of the whole chain, because efficiency is not their goal, nor do they have the resources to achieve it
Different forms of relationships	The type of relationship that the poor can benefit from needs to be assessed and not assumed
There needs to be a ‘fit’	The visions and aspirations of the poor are likely to be different to others in the chain, driven by the value they want out of participation
Presence of support functions	Support functions are also crucial in creating an environment for participation

The reconsideration of value in value chain analysis is not exclusive to the poor. There are now more perspectives of value chain analysis, and analysis is not always centred on profit-making objectives, but a balancing act of several objectives. The proliferation of work in sustainable value chains (i.e. Fearne et al., 2012), climate risk exposure (i.e. Nidumolu et al., 2018) and nutrition sensitivity (i.e. Morgan et al., 2019; Ridoutt et al., 2019) show that we are now investigating chains with new dimensions in mind. Equity and inclusion are at the forefront of these new dimensions of value chain analysis.

2 Defining an inclusive value chain

Inclusive value chain development has been defined by the United Nations Industrial Development Organization (UNIDO) as:

> *"positive or desirable change in a value chain to extend or improve productive operations and generate social benefits: poverty reduction, income and employment generation, economic growth, environmental performance, gender equity and other development goals"* (UNIDO, 2011, p.1)

It is an all-encompassing definition, with a strong focus on the value chain as the primary entity by wherein development needs to take place. The UNIDO definition also sheds light on the goals of an inclusive value chain, which is broader than traditional definitions of value chains. This supports our earlier points on differences between traditional value chain analysis and value chain analysis for the poor.

Box 1

Redefining value

The consideration of new dimensions of value for value chain analysis in SIAGI came through during a visit to Bankura in February 2017. The visit was intended to explore the interface between nutrition sensitive agriculture and value chains, as well as continue understanding community aspirations. During this visit, the team conducted focus group discussions with men and women and asked them how they go about making decisions around what to farm, how to sell produce and how income is spent. We visited the mango plantation that was run by the local women's self-help group.

It was during this trip that we began to understand that the rationale behind crop choice and income expenditure was all based on what individuals prioritised. In discussing the benefit gained from mango production with women groups, the timing of income in relation to small, but important expenditures (such as tuition fees and gifting for festivals) made this activity important for them. While men aimed to generate as much income as possible from crops, women were focusing on timing of income and their ability to control it. Small incomes meant they had some control, while higher income activities were often taken over by men. This meant that if we wanted to engage with women, we needed to understand their reasons for participation. These reasons were not always immediately apparent, and current value chain analysis methods were inadequate.

In contrast, inclusive value chains have been defined by Devaux et al. (2018) through the lens of key benefactors - the participation of small and marginalised actors. An inclusive value chain therefore is created not only through the initiatives of one actor, but by the combined efforts of multiple actors in their operating context – the value chain. It relies strongly on how the different actors interact and create a

dynamic that benefits smallholders. One can envisage that inclusion is not an end point, but an on-going process, much like information management and logistics are, in a value chain.

We therefore propose the definition:

> *An inclusive value chain is a chain that provides an environment where actors can exercise choice on whether to participate, and how, based on what they see are the benefits from participation. It does not lock a participant in nor out but choice of, and options for, engagement.*

This definition strongly aligns with the reflections of Mitali Ghosh and Subrata Majumdar on women in value chains following the first value chain capacity building workshop in August 2016. In their reflections they state:

> "If a meaningful value chain has to be developed the first step is to collectivize the women and strengthen engendered inclusive institutions. This would help building reflective clout to break social and cultural barriers and develop necessary skills."

Their reflections clearly highlight the environment in which women operate in as having a significant influence their ability to challenge and address barriers they face. In this instance, the environment is enhanced through collectivisation, or groups.

'Value' derived from an inclusive value chain therefore lies in what a participant wants to gain from participation. This nuanced perspective of 'gain' or 'value' enables the consideration of multiple actors – smallholder farmers, poor, marginalised, landless, women, youth, labourers, traders, agribusiness – as valid contributors to an inclusive value chain. It also means that the method by which we analyse value in chains need to be adjusted to encompass this broader perspective.

The definition proposed also relies on a nuanced understanding of what contributes to the decision to participate, which may reflect on an actor's agency. Ingrained disadvantage may lead to the perception that options for participation are not available. Therefore a broader, environment-oriented approach is critical for inclusive value chains.

3 Research approaches for inclusive value chain analysis

Farming communities and their value chains operate within a broader food and fibre system comprising of economic, social and natural environments (Nguyen, 2018). The consideration of this broader system is critical in understanding inclusive value chains. This presents a challenge of scope and focus for VCA in SIAGI. Should it begin with specific crops? If so, which crops? Should it look at what the community wants to grow? Or should it look at possible chains that the community engages with? Who defines what is of potential?

Initial steps to define a scope for value chain analysis in SIAGI involved identifying a range of crops that communities currently grow and have the potential to grow based on what is available in neighbouring farms. Community engagement activities, however, showed that the agronomic capability of farmers in the communities varied significantly, alongside their capacity to engage in 'efficient' and 'productive' farming systems. This meant that starting with crop-based value chain analysis could be premature and become an inefficient use of resources.

This dilemma has been recognised by other researchers (Ridoutt, et al., 2018) in light of nutrition-focused value chain interventions, where the intended outcomes require interventions at multiple points in a food system, and where commodity-specific interventions may be inadequate for delivering those outcomes. The solution employed by Ridoutt and team was to look at the food environment – where communities source their food - alongside food choices and nutritional gaps – how individuals and families choose and consumer their food. They took at an iterative 'in-out' approach which eventually led to specific commodities where value chain analysis for nutrition could be focused upon.

In the case of SIAGI, analysis of value chains with inclusion in mind requires:

- The consideration that various participants in the chain have different priorities and objectives behind participation
- The acknowledgement that the definition of value may be different, stemming from these differing priorities and objectives
- An understanding of the different ways that actors can participate, in order to uncover options for participation
- An understanding of the economic and social context of communities, so that any opportunities or barriers to participation can be pursued or addressed

The solution therefore was to develop an approach that takes into account community aspirations of participation and value, while scanning the market for opportunities for access and participation. A revised value chain workplan was developed in August 2017, underpinned by ethical community engagement principles and informed by activities already completed by the project (Figure 1).

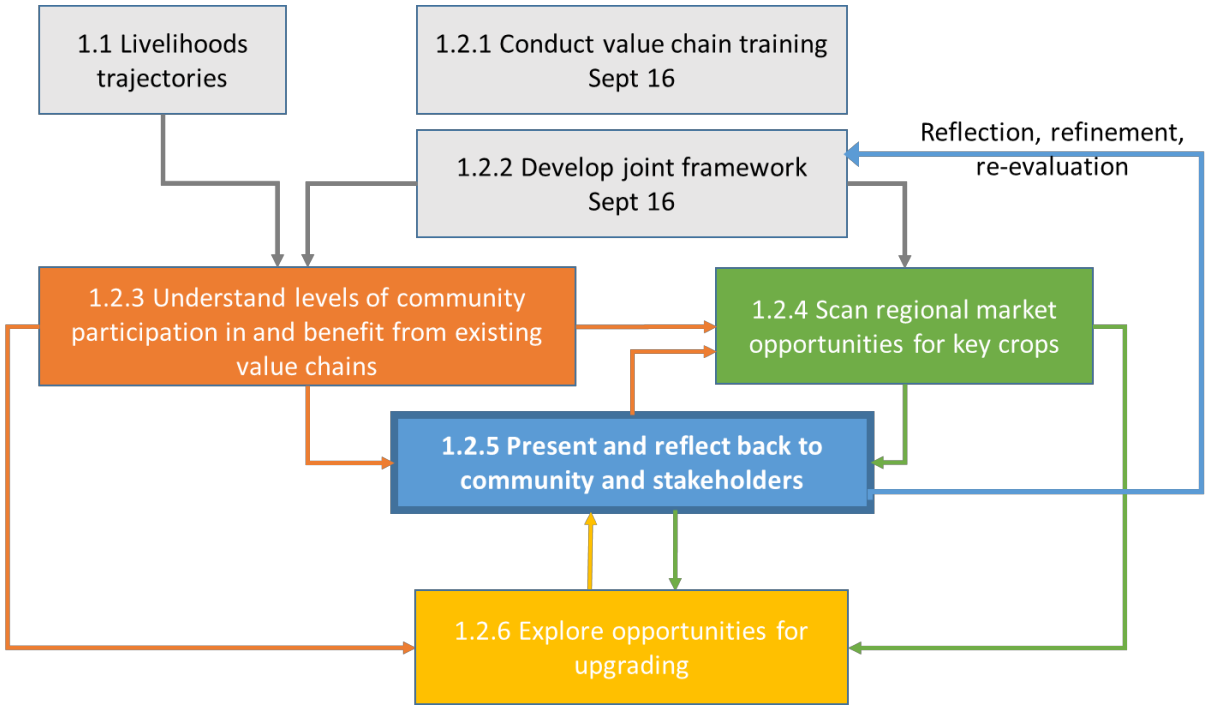

Figure 1 Value chain work plan, re-developed in August 2017

The approach taken by SIAGI for VCA acknowledges that our conceptualisations of value chains (activity 1.2.2) need to be refined and re-evaluated as informed by insight from other project activities and based on reflections with communities. It also relies on the premise that engagement with the community (1.2.3) informs all other activities, including which markets and crops to evaluate (1.2.4), what opportunities there are for upgrading (1.2.6), and where they are at in their trajectory of livelihood development (1.2.5). Together, these methods allow us to explore the conditions for and against inclusive value chains, in a manner that integrates multiple priorities with multiple pathways for interventions and development.

Based on this workplan, the results of four key value chain research activities are presented in this report:

1. Ethical community engagement: Uncovering priorities and drivers to decision and action
2. Market assessments in West Bengal
3. Rapid value chain assessments
4. Integrated assessments for value chain analysis

3.1 Ethical community engagement: Uncovering priorities and drivers to decisions and action

Ethical community engagement (ECE) is a critical step in understanding the extent of participation, aspirations and priorities of poor and marginalised households in SIAGI communities. It relies on the expertise, connections, relationships and trust built by our NGO partners PRADAN, CDHI and Shushilan to effectively partner with communities towards a journey of reflection, discovery and development. ECE is vital in ensuring that value chain interventions do not exclude the very poor and marginalised (Carter, 2018), as value chain interventions for research for development inadvertently can.

The benefit gained from ethical community engagement for value chain analysis are:

1. Identifying and understanding motivations behind participation in value chains, and related economic activity
2. Identifying and understanding barriers to participation
3. Understanding the gains and losses associated with participation and non-participation
4. Understanding the extent of contributions when participating, and
5. Understanding the shared value of participation

In addition, community engagement also uncovers the potential contribution of policy environments, institutional support and access to participation and benefit from value chains.

Engagement with communities was not solely for the purpose of informing SIAGI value chain activities, but more focused on what the communities needed at the time. Insights relevant for value chain activities surfaced rather than sought. Engagement was tailored to the context of the communities, and 'data' (in the form of reflections from NGO partners) was mostly unstructured.

3.1.1 Shushilan: Stimulating value chain activity through water management

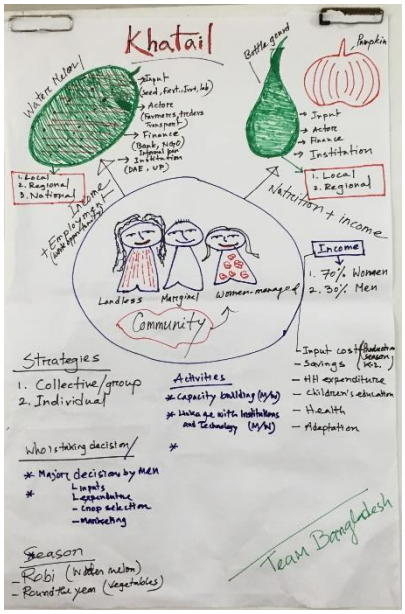

Figure 2 Understanding requirements for and value from crop diversification for the poor and marginalised in Khatail *(Value chain training workshop, Mymensingh, August 2017)*

Access to and management of water for irrigation during the Rabi season is critical for SIAGI communities in Bangladesh (see the report, XXX for further detail). The communities' transition of the landscape from shrimp-based, saline systems to mixed cropping largely based on fresh water systems has uncovered differing opinions on how water should be managed, and who should benefit and gain from it.

Continued engagement with communities in Bangladesh by the SIAGI team highlight the importance of access and management of water resources for poor and marginalised farmers (Figure 2). Overcoming the hurdle of inadequate irrigation during the Rabi season allowed farmers, including landless farmers, to pursue crops that they would not have previously considered. The engagement efforts led by Shushilan, and supported by the BAU team allowed communities to uncover the criticality of water use management in engaging with high-value crop production and their subsequent value chains.

Further assessments of markets and value chains, alongside engagement with the private sector, supported farmers in trialling new. The combination of availability of water for irrigation, seeds from Lal Teer, enhanced information on potential markets (such as a sunflower oil processing plant), and ongoing encouragement and facilitation by

Shushilan provided the community with the courage to take risks. From what seemed to be an under-utilised Rabi-season landscape, diverse crops can now be observed in the villages. While this does not mean that successful value chains have been established, it does signify a willingness to step out of the norm and engage with stakeholders beyond those whom they typically work with. It signifies the importance of ethical community engagement in creating an enabling environment for inclusivity, in this case through water management, in order to pursue broader goals. It was underpinned by a strong awareness that crop diversification as a value chain intervention is not only about pursuing market opportunities, but providing the support for the community to build on what is required in order to diversify.

3.1.2 CDHI: The role of awareness, identity and agency in pursuing value chain opportunities

A precursor of participation is the recognition of abilities and a sense of agency that allows individuals to exercise the option of participating or not. However, there are certain conditions that can prevent individuals from recognising their own abilities, where human capital is very low. This was the context by which the SIAGI team encountered the community in Uttar Chakowakheti, where some members of the community did not feel they could really do much about their current situation apart from continuing what they were already doing. This was not an ideal 'baseline' to work from for a value chain activity; the minimum conditions for pursuing a value chain was not met.

However, it became evident, in the case of one Self Help Group (SHG), that one significant barrier to access of government services was the lack of identity cards. CDHI's engagement with the community facilitated this activity, and this spurred a flow on effect that stemmed from a sense of awareness of their current condition, to a recognition of their identity, and eventually followed by a sense of agency.

Having an identity card, while seemingly so disconnected from any value chain intervention in research for development, was the spark that was needed in order to get to the minimum condition for participating in a value chain. Identity was the value gained and pursuing activities that enable them to engage in value chains were a progression of this value.

This story of empowerment through participation is also evident in Dhaloguri. An extract from the CDHI report highlights the sense of empowerment that awareness can bring, challenging social and individual norms on identity, and building agency to make decisions.

> "We had an interaction with the women farmers from UC who, for the first time, visited the market with their produce. They had no clue about the price they should ask for and looked bemused for their newly introduced broccoli. The first visit, however, helped them sensing the market. Rita (name changed), the women leader from UC, informed that she felt lost during her maiden visit but soon gained confidence. She considered the visit and profitability as secondary but her confidence and growing appetite to face the market and her act of negotiation as something extra-ordinary.
>
> Rita further revealed that the local market and some of the selected customers awaited her arrival, now, with her special produce. Her leafy vegetables are liked and preferred for the taste and aroma. Rita said she did not need any advertisement. With her growing familiarity and contact she also identified seeds for future and they are really guaranteed for quality."

Rita's successful participation in the market (in value chain terms, 'enhanced market linkages' and 'addressing information asymmetry') is no longer adequately measured by the price and volume that she is able to sell her produce for. Another measure of value for Rita is the change in her confidence, and the desire to continue engaging in the market. Her growing negotiation skills are likely to be applied in other

aspects of life, and, over time, what she gains from her market interactions will likely change as her skills and awareness evolve.

3.1.3 PRADAN: Unpacking participation of men and women in livelihood activities

For many years, PRADAN has been working with communities in Bankura district in order to uplift the status of women in the community. One pathway they have pursued is connecting the community with livelihood options, such as growing mangoes. Women are particularly targeted through the formation of self-help groups.

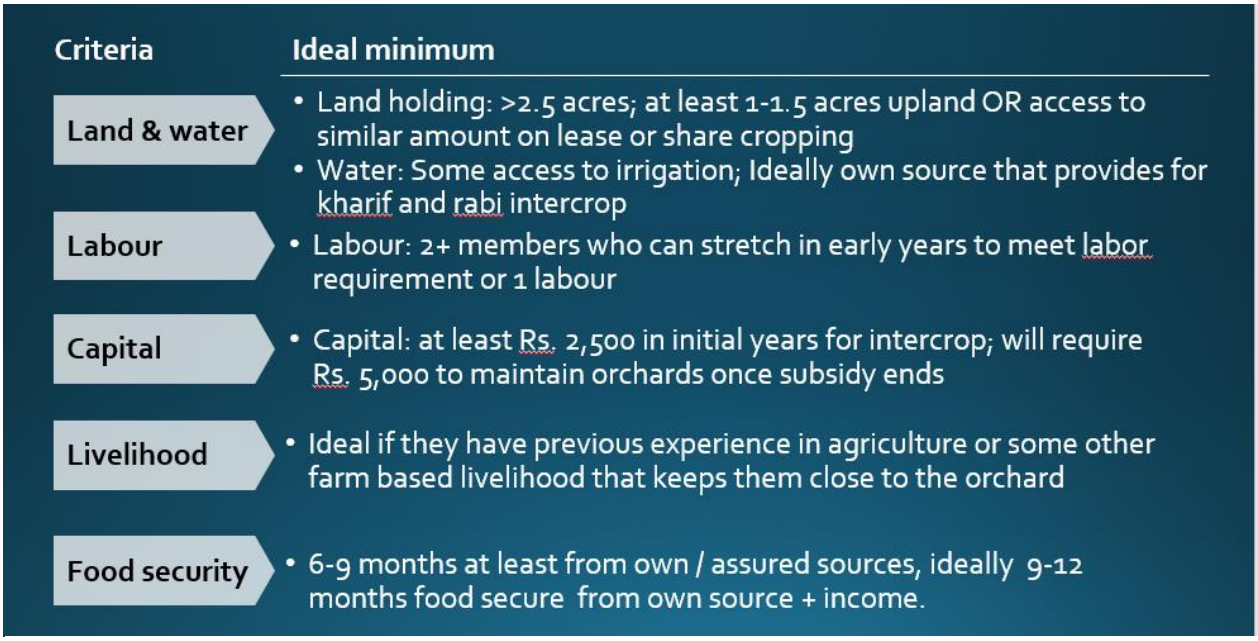

Figure 3 Minimum family requirements for successful engagement in mangoes. *Jana, A. et al (2017) Mango Value Chain: as we understand from our experience & scope of work, SIAGI Bankura immersion, PRADAN.*

One of the key activities conducted by the PRADAN team is to assess what is required to successfully engage in mango production (Figure 3), as well as identify opportunities for upgrading the mango value chain.

This baseline understanding set the scene for further exploration and engagement with the community in Bankura in 2017, primarily to unpack why women and men choose to participate in certain activities, and what they gain from that participation. The premise was if we can understand benefits gained by men and women from participation, then we can better support value chain interventions that deliver to those benefits.

This engagement resulted in the realisation that value drawn by women from livelihoods can be different to those drawn by men. Men in the community of Bankura tend to prefer to work on crops that had high yields and therefore gave them higher returns. Women on the other hand, focused on crops that had lower returns, in this case mangoes. This was for several reasons. When women earn from livelihoods themselves, they become responsible for how that money is spent. Men usually are responsible for higher income earning activities, so having a low-income activity means that women have the opportunity to earn. The timing of the mango harvest and its sale aligns with specific expenditure needs, such as tuition fees and festival gifting. Having control over a small income means that the women are able to spend on their priorities, which may not necessarily align with how men in the community may want to spend returns. This experience set the scene for our thinking on redefining value in value chains (Box 1).

In November 2019, the PRADAN team conducted a study with women and men in Chakadoba, with the aim of understanding how women participated in farming activities. Their objectives were:

1. To better understand the system wherein farming decisions are made by men and women

2. To explore how farming decisions are made by men and women and what influences them
3. To utilise a farming systems approach to identify value adding opportunities for men and women

The team conducted extended focus groups with men and women (separately); something that was new to the team because their engagement focused on women, and not so much on men. They explored in detail 'who does what', from seed preservation, ploughing, seed procurement, input arrangements, manual operations, post-harvest measures, post-harvest consumption and use of income. Behind each these activities, they attempted to uncover drivers and motivations behind decisions and behaviour.

PRADAN's investigation can be aligned to Porter's value chain model (Figure 4) which looks at the set of activities that a firm engages in to deliver value (Porter, 1985). In doing so, the PRADAN team considered the community as a firm, and was able to identify specific activities that women and men contributed to. The looked into the 'primary activities' associated with farming and handling of crops, and also investigated the 'support activities' behind these. In the case of the Chakadoba community, these were equity and justice drivers that enhanced or limited the ability of women to actively participate in primary activities.

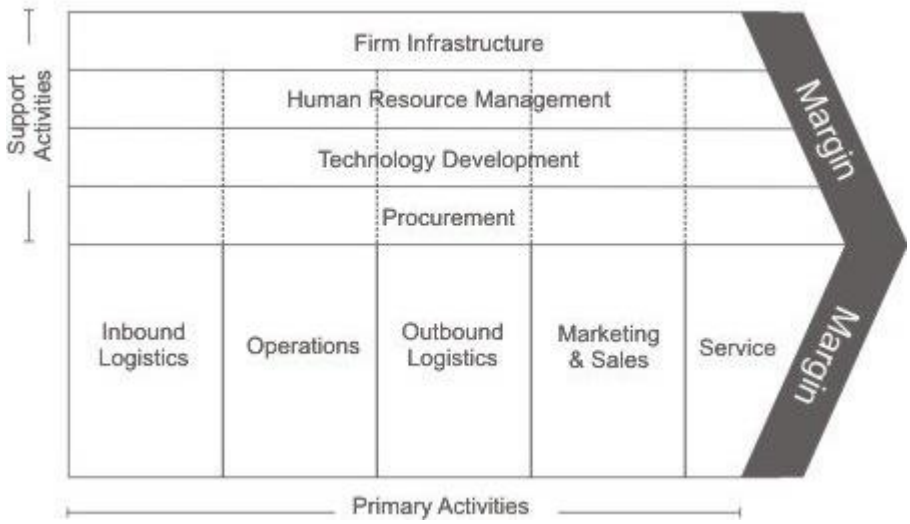

Figure 4 Porter's Generic Value Chain

What became evident from their engagement with the community is that the role of women is sometimes underplayed or under-recognised, and that women make more decisions that initially stated and thought. Overall, there was an under-recognition of how women participate, even amongst women. This indicates a lack of awareness of the criticality of their contributions and the activities themselves. It can also mean that without in-depth engagement, there is a risk that value chain interventions aimed at lifting women's status and livelihoods can add burden and oversimplify the existing roles that women have in farming.

3.1.4 Key insights from community engagement for inclusive value chains

Through ethical community engagement initiatives of SIAGI partners, there are some key lessons to be derived relating to the conduct of value chain related research and analysis for the poor and marginalised members of rural communities.

- ***Care needs to be taken when selecting who should be involved in discussions about value chains***; sometimes, self-selection may be inadequate. First, there is assumption that value chains, being driven by economic priorities, are men's business. More often than not, when we visited communities with the purpose of having value chain discussions with farmers, focus groups are dominated by men in both numbers are well as opinion. Second, conversations are dominated by farmers who are better off than others. If women are involved, they often fall under this category of being lead farmer or a lead member of the community. This is not surprising, because farmers with higher incomes are more likely to be able

to engage in markets, and therefore, have an interest in markets and have something to say about it. Selling and marketing are roles often taken by men in a farming household. This can lead to bias, as well as an inadequate understanding of value and participation. Conversations about value chains, in the first instance, rarely interest women. The term 'value chains' are often linked to markets, which is a space considered for men. To engage women in value chain conversations require introductions and topics beyond the usual 'who do you sell your produce to?', 'how much?' and 'what information about the market do you receive?' If we are to explore participation, equity and inclusivity, we must explicitly engage with women, landless, poor and marginalised farmers even if they seemingly do not have a role in what is commonly termed a value chain (Image 1).

Image 1 Subrata facilitating a group discussion (left) about value chains in Dhaloguri, August 2016 as part of SIAGI's initial value chain capacity building activities. A breakout group for women facilitated by Mahanam was then set up to ensure their voices were heard (right). *Photos by B.Kanta*

- Sometimes, ***the use of terms relating to value chains can limit discussions and exclude some members of the community***. These terms include 'markets', 'trading', 'selling', and 'value-adding', even in local languages. This is linked with the previous point, as it can predetermine who will choose to participate in a discussion about value chains. In some instances, we engaged with community without stating that the topic of discussion is around value chains. The most enlightening discussion I personally had about value chains was when we talked to women about nutrition and eating habits.
- ***Priorities change, influencing the 'value' of a livelihood activity***. Rural communities are in a constant state of change. When we first visited the SIAGI communities prior to commencing the project, some members were not in a position to engage in economic activities. In West Bengal, it was hard to entertain the idea of discussing 'value chains' with tribal women who did not have identity cards, and therefore could not send their children to school, access finance, and take on additional jobs around the village. In Bangladesh, the lack of safe drinking water in the community meant that while irrigation water was important for the community, for some households, water was a matter of health, sustenance, and energy to keep going throughout the day. Value chains were far from their mind. However, over time, as engagement with community uncovered aspirations and empowered action, priorities started to change. Over time, discussions about what products would be of high value to nearby markets became easier, and more top of mind. This shows that we need to be prepared to act when the community is ready, with the recognition that there is a chain of changing values that will allow them to get there.

Our experience has shown that ECE underpins the ability to understand what is of 'value' when considering value chain analysis for poor and marginalised farmers. Engagement with community occurs at a much deeper level, and allows researchers to focus on what is critical in order to participate in more traditional chains. Without ECE, there is a significant risk that intended outcomes of projects who target poor and marginalised farmers may not take place, because value chain analysis is more likely to lead to benefits for those who already participate.

3.2 Market assessments in West Bengal

A key consideration for inclusive value chains is the presence of a market conducive to participation of the poor. Markets, as part of the institutional environment of rural communities, stimulate economic growth of communities, as well as provide avenues for individual empowerment (Mendoza and Thelen, 2008). They provide a myriad of *opportunities* by which poor or marginal farmer can improve their livelihoods.

But there are many barriers that prevent poor and marginalised farmers from successfully engaging in markets. Some of these barriers are economic in nature – stemming from the transaction involved in producing and selling produce for the market (see for example Minot and Vargas Hill, 2007). Examples of these include not being able to sell in a market because of minimum volume requirements, or not being able to afford stall fees charged by market authorities. Others are more deeply rooted in culture and social norms and interface with institutional influences (Mair et al., 2011), such as women not being allowed to enter markets unless in certain circumstances (i.e. they are widowed), not wanting to go to markets because it is not a comfortable place to go to (i.e. there are no toilets for them), or have less bargaining power than men. In some instances, barriers are as seemingly simple as not being able to reach them because of distance or a lack of infrastructure.

Observations from visits to wholesale and retail markets in India and Bangladesh by the SIAGI team support these statements. They point to the challenge of *access* to markets, as well as *risks* faced by marginalised and poor farmers when engaging in markets.

Together, opportunities, access and risks have been identified as key variables by which markets can assessed against with inclusivity as a goal. Table 2 summarises the considerations for each of these variables.

Table 2 Variables for inclusive market assessments

VARIABLE	CONSIDERATIONS
ACCESS	*Can I engage in this market?* Distance, norms, rules, information
RISKS	*What risks do I face in engaging in this market?* Resource exposure, price fluctuations, assurance of demand, market acceptance (in respect of crop type and crop quality), being locked in, people running away from farming
OPPORTUNITIES	*What opportunities does engaging in this market present me with?* Able to grow, diversify, add value, adaptability, future potential

As a step in our analysis of inclusivity in value chains in SIAGI, multiple market assessments were conducted, focusing on markets around the project communities in West Bengal. Broadly, this step aims to understand the possibilities for small and marginal farmers including women to gain sustainable income from agriculture through existing markets. More specifically, the market assessments address the following questions:

1. Where and how are agricultural produce sold?
2. What are the conditions for engaging in these markets?
3. What insights on inclusivity can we draw from these conditions?

3.2.1 Synthesis of results

Eight markets were evaluated by the IIT team on February 2019. These include Bokalir Math, Baneswar, and Dodear Haat which are 2-12km away from Dhaloguri and Alipurduar, Palashbari, and Mathurar Haat

which are 8-18km away from Uttar Chakowakheti. Two regional markets, Haldibari, and Dhupguri, were also included in the assessment. These markets are 127km and 65km away from Dhaloguri, respectively. The findings of the assessment conducted by the IIT Kharagpur team are tabulated in Appendix A.

Descriptions of the various markets were made according to their geography, hours of operation, formality (available infrastructure, rules and governance), demand drivers (strength, consistency, assurance, potential to value add, competitors) and inclusivity (marginal and women farmers). Together, these characteristics enable us to understand whether a market is accessible to marginalised and poor farmers, what risks it might pose, and what opportunities it might present.

Access

Local and village markets are within a 18km radius from the communities in West Bengal. Regional markets are more distant – up to 127km away as is the case of Haldibari – requiring higher transportation costs for produce. The approximate locations of the markets against the communities are found in the map below (Image 2). Both villages have geographically accessible local markets that operate daily (Bokalir Math and Baneswar for Dhaloguri; Alipurduar for Uttar Chakowakheti), with some operating bi-weekly.

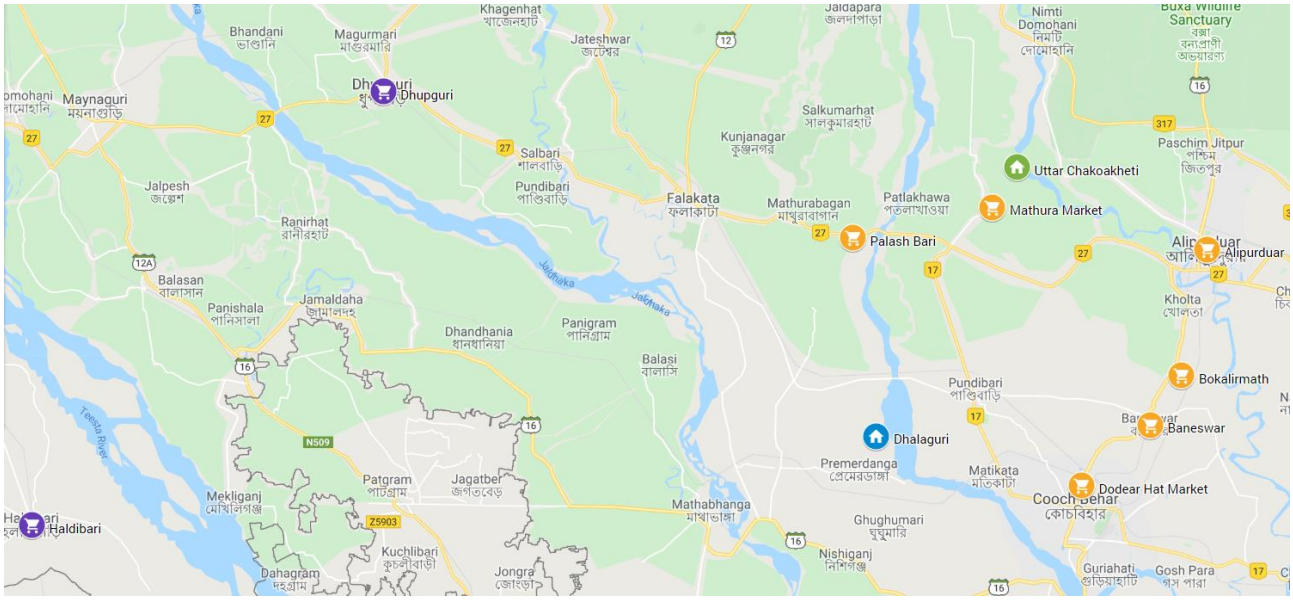

Image 2 Approximate location of markets (shopping icons) against villages (house icons). Orange markets are local markets within an 18km radius from the villages of Dhaloguri (blue) and Uttar Chakowakheti (green). Purple markets are regional markets up to 127km from the villages. *Image sourced from Google Maps.*

All markets have some form of governance mechanism which allows for rules to be enforced. Some require a fee in order to sell their produce, from as little as five rupees per day in some local markets, to 100 rupees per week for others. Higher fees can serve as barriers to participation for very poor farmers, particularly for products that are grown in very small amounts (i.e. excess vegetables primarily grown for subsistence purposes).

While the markets are regular and governed, there is inadequate infrastructure available for smaller sellers. Concrete flooring and cover is often only available for larger traders; in some instances, the market space is only roadside. There was no indication of standardised information sharing from the market to the sellers. It is likely that market information only flows through informal channels on the day, and as the day progresses.

Sellers with small amounts of produce, often marginalised and poor farmers, can be observed in both local and regional markets. Most arrive very early in order to secure a space to sell their produce, finishing by 9am. Others sell their produce to larger traders. In all markets, there are very few women selling produce.

This is a common occurrence; women's participation in the markets was observed more as buyers (in local retail markets) or as labourers (grading for traders).

Risk

The markets around the two communities in West Bengal are highly competitive, with a high number of small sellers, a small number of larger traders, and a high number of buyers. Some markets have higher clearance rates (sellers are able to clear their stocks by end of day) than others; regional markets are more likely to clear than local markets.

Traders are key competitors for small farmers, as they tend to stock a wider range and a higher volume of produce. Higher volumes of stock enable them to secure stalls that allow them to present their produce better, as well as potentially store produce if they are not sold (see Image 3). These economies of scale and access to infrastructure enable them to profit even with lower prices compared to small sellers. Some markets, such as Dodear Haat, allow traders to purchase produce on-farm as well as at the market. This enhances their bargaining capacity with small farmers who sell their produce to traders at the markets, as their benchmark pricing is set by purchases on-farm which are often cheaper. In other markets such as Haldibari, this practice is not allowed which somewhat protects small farmers.

Image 3 A trader's stall (left) with shelter and storage above, in comparison to spots for smaller sellers (right) in Dacope, Bangladesh. *Photos by L. Lim-Camacho*

Prices fluctuate throughout the day, often dictated by the volume of a product that is available on the day, and what will drive purchasing on the day. As a general rule, prices are higher earlier in the day as produce are considered 'fresh'. Over the course of the day, prices drop or fluctuate, with discounting taking place later in the day as demand drops, and produce left are of lower quality. There is some evidence of 'distress selling' in some markets, as sellers with small amounts of produce feel the need to clear their stock in order to generate income for the day.

There are no immediate indications of being sellers being 'locked in', as most transactions and engagements are informal for poor and marginalised farmers. Markets that charge weekly fees are likely to be less attractive for smaller farmers, since those fees are higher (100 rupees) than daily rates (5-10 rupees).

As with any social system, markets present social risks for certain groups. Women may not be inclined to participate in certain markets due to social norms. Certain exceptions apply, such as women who are widowed (Image 4).

Image 4 A woman selling her produce at a market in Jalpaiguri, West Bengal (left). She is one of two women visible in a market dominated by men (right). *Photos by L. Lim-Camacho (left) and M. Haque (right)*

Opportunities

A few markets are more suited to high value vegetables crops than others, as is the case of Dodear Haat (local market) and Haldibari (regional market) which show high demand for high value vegetables such as broccoli, capsicum and green peas. These markets are closer to demand centres such as Haldibari and Cooch Behar. Most other markets show low or variable demand for high value vegetables, so the opportunity for increased returns from such crops is minimal.

Value adding is most commonly seen through grading; products can be sorted by size, shape and freshness, and occasionally by origin. In some instances, grading is completely avoided as there is no consumer demand to justify higher prices for higher grades. Washing and packaging are also evident in some markets such as Palashbari and Mathurar Haat. However, these value adding activities are often conducted by traders and commission agents, and rarely by farmers. In Dodear Haat, women were observed as labourers responsible for these tasks.

These observations show that on face value, the markets do not present significant opportunities for marginalised and poor farmers to grow income and expand their livelihood potential. Women in particular have limited opportunities to engage, though labour requirements may improve if consumers start to demand higher quality produce. However, involvement in markets present such farmers with the chance to engage with a wider community, and as such build capacity through interactions with business, seeing new products, and gaining market information.

3.2.2 Key insights from market assessments for SIAGI

While the presence of local markets provides opportunities for marginalised and poor farmers to sell produce, there are barriers to successful participation. The most significant barrier for women farmers are socio-cultural norms surrounding the role of women in markets – markets are ‘male spaces’. While there are no strict institutional rules about women participating, there are also no incentives. Simple needs, such as toilets, are often not met. This is layered by the lack of infrastructure available to small farmers to effectively present and sell their produce that would encourage value-adding. While fees are small, the high

number of sellers in these markets indicate a highly competitive and fragmented market that is very much at the mercy of supply and demand forces throughout the day. The uncertainty of pricing presents a high risk for marginalised farmers to engage in distress selling, particularly if there is a high urgency for income at the time.

However, markets are institutions where information can be exchanged, and social bonds can be made outside of those in communities. The opportunities for capacity building, enhanced social capital, empowerment and agency are present for marginalised farmers if they are able to effectively participate. Exposure to farmers from different regions, to new crops and food products, have the potential to enhance other aspects of a farmer's livelihood above the act of selling a product.

Overall, barriers to access and risks presented by local and regional markets for marginalised and poor farmers indicate that they are not attractive channels for marketing produce if the goal is to have secure and reliable income, accessible within their means. In recognition of this, the IIT Kharagpur and CDHI teams also assessed[1] the role of Farmer Producer Organisations[2] (FPO) as a potential channel for farmer's produce to reach more distant and higher volume markets through improved business processes, higher productivity, access to infrastructure and risk mitigation (Bagchi et al., 2018).

The study showed the potential of FPOs to mitigate risks for small farmers through enabling access to finance and insurance products, as well as enhancing their production knowledge. Through their marketing functions and the ability to consolidate large volumes of produce, FPOs also allow small farmers to access high volume and distant markets that they would previously not have access to. They also have the potential to take smaller collectives another step further towards commercial operations if that is their intent to do so. The study cautions however that for marginalised farmers to benefit from FPOs, a closer investigation of their culture and constitutions is needed.

[1] The detailed report can be accessed on the SIAGI website. https://siagi.files.wordpress.com/2018/07/siagi-report_farmer-producer-organisations_final_july-2018.pdf

[2] FPOs are large organisations of 400 to 1000 farmers, built through the aggregations of farmer clubs and self-help groups. They are registered under government acts and enable members to access incentives and schemes. They are intended to facilitate commercial agriculture, and not to support subsistence farming. Through FPOs, members can access finance, share and gain technical knowhow, purchase discounted inputs and access markets that require high volumes of product. FPOs may undertake certain value adding activities, such as grading, packaging, processing and marketing to benefit its members.

3.3 Rapid value chain assessments

Detailed value chain analysis requires a significant amount of resourcing and time. It also requires a clarity of focus and scope, so that attention is devoted to the most critical elements of a value chain and its system. In the case of SIAGI, this focus and scope had to be developed. Conducting rapid value chain assessments, which require less resources and time, and a broader scope for exploration, has been an important step in progressing the value chain activity for SIAGI. Drawing from rapid rural appraisals (RRA), rapid value chain assessments assists in understanding the problem situation in sufficient detail so that subsequent activities can focus on critical issues (Collins and Dunne, 2008).

In the case of SIAGI, rapid value chain assessments involved brainstorming for potential candidates, evaluating these products, value chain mapping, and preliminary analysis. Value chain mapping provides a snapshot of key chain actors, their functions, and the flow of a product at a particular point in time (Haggblade et al. 2012). It is an approach that attempts to make a complex system accessible. Value chain maps can assist in defining the scope of value chain analysis and is a step towards focusing in-depth analysis towards specific areas where gaps are found. Mapping can take different forms, though the most common approach is to depict functions and actors in a chain.

Mapping however, can serve to distract from efficient use of resources if it is used for the sole purpose of describing a system (the value chain) in a manner that does fit the purpose of the study. It is not uncommon to find maps that are linear, which can inaccurately portray the realities of how value chains operate. There are many opportunities to harness mapping to shed more insight into how a chain works; mapping relationships, information flows, value distribution, risk and risk sharing can provide users with a different level of understanding of chains.

The assessments and mapping help us to understand the functions involved in delivering a product to the consumer, and the actors that serve these functions. The approach taken was to evaluate whether a crop and its value chain presents opportunities for the poor and marginalised members of communities to participate. Consistent with the market assessment activity, a focus on understanding access, risk and opportunities for poor and marginalised farmers, including women, was made (Table 3). These have been tailored to take into account the value chain perspective, as opposed to a market perspective.

Table 3 Variables for rapid value chain assessments

VARIABLE	CONSIDERATIONS
ACCESS	*Can I participate in this value chain?* Marketing channels, labour intensity, current levels of participation
RISKS	*What risks do I face in engaging in this crop?* Pricing, productivity, climate and input requirements
OPPORTUNITIES	*What opportunities does engaging in this value chain present me with?* Value adding, employment, high value markets, off-season cropping

The following section draws out the key insights across all the assessments conducted in SIAGI. The assessments were conducted by the IIT and CDHI teams in India, and the BAU team in Bangladesh. This report does not provide detailed results from their work, rather analysis here focuses on how effectively rapid value chain assessments can uncover issues around value chain inclusion and participation for poor and marginalised farmers.

3.3.1 Synthesis of results

An initial assessment of potential crops to study was conducted in August 2016 during the first value chain training workshop in Jalpaiguri. The team nominated several crops. For Bangladesh, this include: shrimp, rice, aquaculture, sunflower and watermelon (see Table 4). For India these include: potato, rice, vegetables, tea, citrus, organic citrus, mangoes and tomato (see Table 5). These crops were then evaluated by the team according to their competitiveness, potential for inclusion, and resilience to environmental risks. In addition, the team also assessed the crops against the team's capacity to implement a study on these crops and whether they can be produced feasibly in the communities. This activity informed the crop assessment and value chain mapping activities that feature here, though these were adjusted as new opportunities arose.

Table 4 Evaluation of crops for Bangladesh

Criteria	Shrimp	Paddy (Rice)	Aquaculture	Sunflower	Watermelon
Competitive	y	y	y	y	y
Inclusive	y	y	y	?	y
Resilient	y	y	y	y	y
Implementable	y	y	y	y	y
Capacity	y	y	?	?	?
Village scope	Y	Y	Y	Y	Y

Table 5 Evaluation of crops for India

Criteria	Potato	Paddy (Rice)	Vegetables	Tea	Mirik oranges	Sikkim organics	Mangoes	Tomato
Competitive	y	y	y	y	y	y	y	y
Inclusive	y	y	y	y	y	y	?	y
Resilient	?	y	y	y	y	y	?	y
Implementable	y	y	y	y	y	y	y	y
Capacity	y	y	y	y	y	y	y	y
Village scope	Y	Y	Y	Y/N	N	N	N	N

Four crops were evaluated in Bangladesh, namely rice, shrimp, sunflower and vegetables in general. Rice and shrimp were included because they were existing in the landscape. Sunflower and vegetables were explored later in the project because of interests from community and other stakeholders. The studies were conducted by the BAU team, supported by Shushilan.

In West Bengal, eight crops were evaluated, namely: rice, chilli, potato, mango, citrus, onion and tea. The studies were conducted by the IIT team, with majority of the data collection conducted by student interns and post graduate students. The results of the assessments are shown in Appendices B and C.

Access

One of the key aspects of exploring access to value chains is understanding available marketing channels for a particular crop. This has allowed the project team to understand selling options for farming communities, the types of actors in the value chain, and the types of relationships that are required for participation. An example of this approach can be seen in the work that the Bangladesh team conducted in mapping the value chain for sunflower oil in Sekenderkhali (Hossain, et al. 2018). The mapping (Figure 6) describes three channels by which sunflower seeds are handled and transformed into oil prior to reaching the consumer. Some of these channels are shorter (channel 3) but require more organisation in the form of

a farmer's club or a community group, while others are longer and more fragmented (channel 1) but provide opportunities for small and marginalised farmers to participate.

A simple map such as this can highlight how seemingly inefficient channels can provide opportunities for poor and marginalised farmers to participate in value chains. This channel presents many opportunities for further development, including reduction of duplication from handling and middlemen, as well as identifying activities where farmers can add further value. In addition, overall, the sunflower chain needs to improve quality standards in order to better serve consumer requirements for oil.

In contrast, the value chain for rice (Figure 7) starts off as having multiple channels for participation, but then funnels into a single common channel for trading. The chain has many middlemen, some of which are formal, long-standing institutions.

The rice value chain mapping implies that there are few options to consider when engaging in the chain. It is likely that opportunities for improvement are likely to be incremental because of the nature of institutions in the chain, and the number of intermediaries present. Value chain maps of the commodities analysed in SIAGI can be found in Appendix C.

A second aspect that contributes to the ability of poor and marginalised farmers to access a value chain is labour intensity. If the activity requires a significant amount of input, there is a possibility that certain groups may not be able to participate, particularly if they have other significant roles within the household or within the community. Women farmers are particularly impacted. Onion for example (see Appendix B) has been identified as providing scope for participation by women because it is less time consuming to grow. Mangoes were also positive, as work is often required when labour for rice is not required.

Current levels of participation in a value chain by poor and marginalised farmers is also a clear indication of ease of access. Onion is a crop that is grown by small farmers, while cluster farming (groupings of small farmers) are evident for tomato and citrus. Mangoes are often grown on land leased by landholders, which enables landless farmers to engage in the crop.

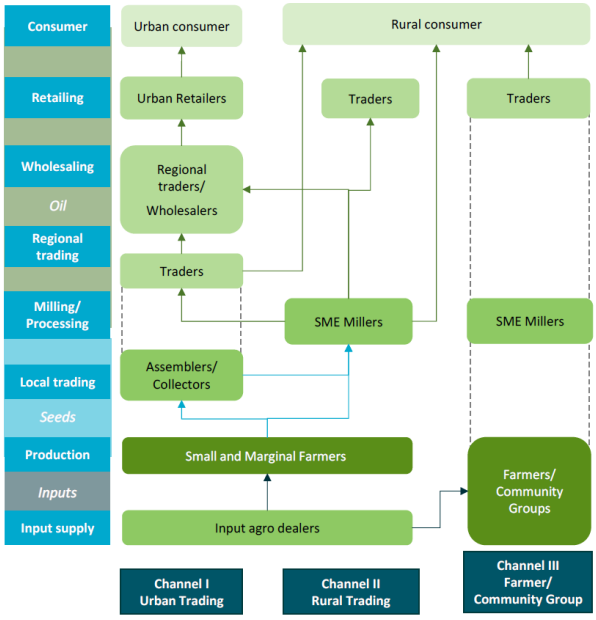

Figure 6 Value chain map for sunflower oil in Sekenderkhali village, *Hossain, et al. 2018*

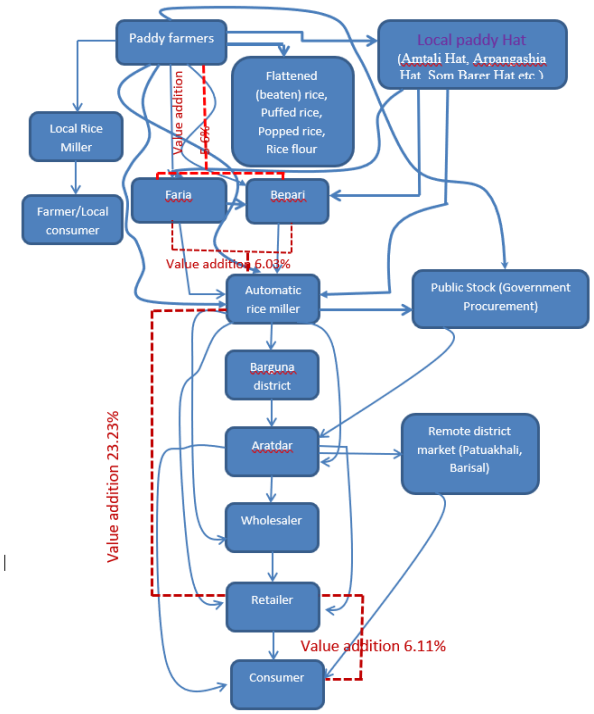

Figure 6 Value chain map for Aman paddy/rice, *Hossain, 2017.*

Risk

Poor and marginalised farmers have a higher vulnerability to risks largely because of their inability to recover quickly from shocks given their low capital base. Risks around pricing (fluctuation, decline,

unpredictability), productivity, climate and inputs are heightened for poor and marginalised farmers. This discourages them from taking advantage of new opportunities due to low tolerance and aversion, as well as prevents them from investing for the near and long-term.

Many of the crops analysed in India show declining productivity, combined with the perception that more inputs are required to compensate for this. Pricing is also volatile across all crops, and a lack of storage facilities, or access to it, prevents farmers from protecting themselves from these fluctuations. Pricing is also perceived to be controlled by middlemen and wholesalers, who are predominant in fragmented, commodity chains. In some instances, accessing alternative channels such as processing and exporting, enables farmers to access better pricing. However, these channels have particular standards which poor and marginalised farmers are often not able to meet at this stage.

Other cross-cutting risks identified across the value chains are lack of cold storage facilities, which impact on quality and pricing of products, the inability to access financing to support purchase of inputs and investment into management, and the lack of capability in terms of quality control.

One key risk that has been overlooked in the analysis is the level of knowledge that poor and marginalised farmers have of how markets work for these crops. The lack of awareness of governance mechanisms and market dynamics presents them with transactional as well as longer term risks.

Opportunities

Lastly, opportunities for growth and development are critical aspects to consider when evaluating value chains. The potential to value add, employment opportunities, the potential for off-season cropping, and the presence of high value markets are indicators for these opportunities.

All crops evaluated in India showed opportunities for value adding in terms of processing into sauces, jams, purees and powders. These are often considered to be positive forms of value adding and opportunities for women to engage, although caution needs to be placed in making these assumptions. Some crops, such as tea (harvesting), potatoes (storage facilities) and citrus (pharmaceutical industry), provide employment opportunities for those who are not able to directly engage in farming.

Mangoes, as demonstrated in the visit in Bankura, provides a low-resource intensity opportunity for women in engage in a livelihood that men are less likely to take over. However, the long-term investment into an orchard can lock them into the activity, and the risk of landholders taking back leases and controlling irrigation facilities is always present.

3.3.2 Key insights from rapid value chain assessments for SIAGI

Rapid value chain assessments took place in the earlier stages of the project, when our understanding of what drives value for poor and marginalised farmers had not yet been well developed. However, the team was aware that there was a need to understand the environment that farmers operate in, and how this can vary depending on the crop that they engage in. Over time, as a framework for assessing markets and value chains for inclusion developed, our understanding of the contribution of rapid appraisal approaches also developed.

On their own, they will not provide the depth of insight required to understand inclusion in value chains and identify opportunities for inclusive engagement. However, combined with ethical community engagement approaches, and a framework designed to uncover access, risk and opportunities for poor and marginalised farmers, they can shed light on key risks that need to be addressed in order to unlock access and opportunities.

Lessons derived from applying a rapid value chain assessment are:

- Selecting and evaluating crops to study is a critical activity prior to engaging in rapid value chain assessments, as it enables researchers and stakeholders to explore characteristics of crops and value chains that are most important for their objective – in this case, inclusion.
- Inclusion can be hard to uncover in a rapid assessment, but it should not be avoided regardless. There are several aspects of how a value chain operates that can be observed or explored with participants that can point to inclusivity or at the least, participation.
- It is important that biases are raised and discussed at design phase. Being 'rapid' in its approach, researchers can draw on what is obvious, apparent, or at the surface. These can be very much influenced by bias. In the case of this activity, the assumption of processing as a role for women can be a form of bias.

3.4 Integrated assessments for value chain analysis

Integrated assessments for inclusive value chains analysis (IA4VC) aim to structure thinking around value chain interventions while mindful of the complex context that marginal and poor farmers operate in. Co-developed under the integrated assessment (IA) activity, it was one of the first points of integration between IA and another SIAGI activity. This is largely due to the common systems concepts that IA and VCA depend on. A more detailed overview of the Integrated Assessment frameworks developed by SIAGI is provided in section 8.5 and an in-depth presentation is given in Report 4 of Vol. 3 of the FR.

IA4VC attempts to create a model that depicts the process by which value chain interventions meet (or fail to meet) aspirations of specific groups, in this case, marginalised farmers. Moving beyond a sole profit-maximisation objective, it acknowledges that profit is a means to achieve outcomes that vary on the basis of individual priorities, aspirations and objectives. It aims to avoid the narrow focus on financial gain, thus better capturing the needs of, and constraints faced by, certain marginalised groups. In worst case situations, some may end up worse off from interventions, for example through reinforced social exclusion or increased exposure to production or market risks. A broadened analysis may better identify causes of value chain inefficiency and help develop intervention strategies that address the needs and constraints of the target groups.

IA4VC draws from classic economic principles of the interaction of supply and demand, from the perspective of the farmer. In a traditional sense, it depicts a short value chain – one that does not necessarily reach actors that farmers may be unfamiliar with. It considers produceability and marketability as key pathways linking interventions to improved income-related outcomes. However, it doesn't stop at profitability, and further considers how profit is used, and the aspirations that match this.

For farmers, goals might be consistent income, money for children's education, reduced need to seasonally migrate for work, or profit maximisation. Examples of non-income outcomes include improved diets and food security, and reduced labour or work hours. Different actors will have different values, goals and preferences, and it is expected that interventions may result in trade-offs of outcomes (both trade-offs among multiple objectives of individual actors and trade-offs between actors). Once these variables are considered, the concept of supply and demand no long suffice in understanding value chain decision-making. Values, social norms, beliefs, urgency of need, agency and empowerment become influencing factors.

This approach makes VCA inclusive – because it takes it to account the nuances of value that would otherwise be lost in traditional value chain analysis. It draws heavily from principles of ethical community engagement and relies on the ability to converse with communities and farmers about their aspirations and goals. The framework intends to enable those who want to develop value chain interventions with a step towards inclusivity, by clearly mapping out how such interventions can influence risk exposure and access to opportunities, given the resources and capital that farmers have.

3.4.1 Applying the guiding principles to value chain analysis (VCA)

In applying the general IA framework to VCA (see Figure 7 and the SIAGI IA report), we draw on learnings from the SIAGI and DSI4MTF project activities to define the variables, outcomes and conditions in Figure 8. We use *Profit*, *Produce for subsistence*, *Engagement in Production* and *Engagement in Market* as the generalised outcomes, as they are the outcome pathways evident in all SIAGI case studies, across locations, household typologies and crops. Three intermediate outcomes are defined: these are produceability, marketability and selling price. The Desired / Desirable Outcome variable considers whether the profit and

non-monetary outcomes gained allows the actor to meet their underlying goals. Produceability and marketability act as key pathways to achieving *generalised outcomes (b)* and align with classical economic theory of supply and demand. They also align with more current thinking by Haggblade et al. (2012) around changes in supply and demand as two main forces that can shift value chains.

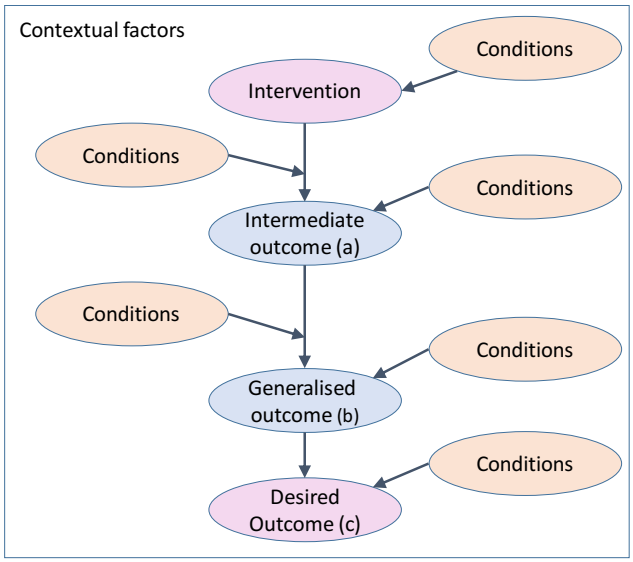

Figure 7 Guiding Principles of SIAGI Integrated Assessment, drawn from Merritt and Hamilton's (2019) report on SIAGI Integrated Assessment Frameworks.

Taking the perspective of a farmer, *Produceability* encapsulates the question of 'Can I grow it?' and it is a function of the farmer's available resources (*Agricultural Inputs*), given the requirements of the crop, and their production know-how. *Produceability* influences the yield (volume), quality of product and production costs.

On the other hand, *Marketability* encapsulates the question 'Are the market conditions favourable for me?' and is a function of the presence (or absence) of entry barriers, yield produced by the farmer, the demand for the product and the farmer's market know-how. *Marketability* affects the selling price as well as selling costs. *Financial capital* – access to savings or credit – is important for addressing entry barriers and meeting agricultural input requirements. *Production know-how* considers the question 'Do I have the capacity to engage in production?' while *Market know-how* asks 'Do I have the capacity to engage in the market?'.

Engagement in either might be as an individual or as part of a group, whilst capacity includes skills, knowledge and actual capacity to engage. Know-how is influenced by the farmers access to good information, their formal or informal relationships with others (e.g. with other farmers, shop owners, traders or extension agents) and their skills, abilities and knowledge (i.e. their *Human Capital*). Access to good market or production information is determined by three criteria: the reliability, adequacy and relevancy of information. Reliability concerns the farmers' perceived credibility of the source of data (e.g. market information from a local trader is more reliable than information from someone outside the market). Adequacy captures the timing, format and completeness of the information. Relevance is the pertinence of the information given the conditions experienced by the farmer (e.g. production information relevant to the given climate and soil type) as well as their objectives and capacities (e.g. production information involving expensive high-tech inputs won't be relevant to a poor farmer). *Social networks* are key to mitigating the production and market-related challenges facing farmers and building their capabilities and confidence to take and create opportunities.

At the centre of the framework is the selling price of the product which may be affected by a number of factors: the marketability and quality of the produce, the presence of other suppliers, the capacity to aggregate product to take to the market (e.g. through farmer collectives), and how urgently the farmer needs to sell the product (*Urgency of Need*). The selling price, together with production costs, selling costs and yield, determine the *Profit.*

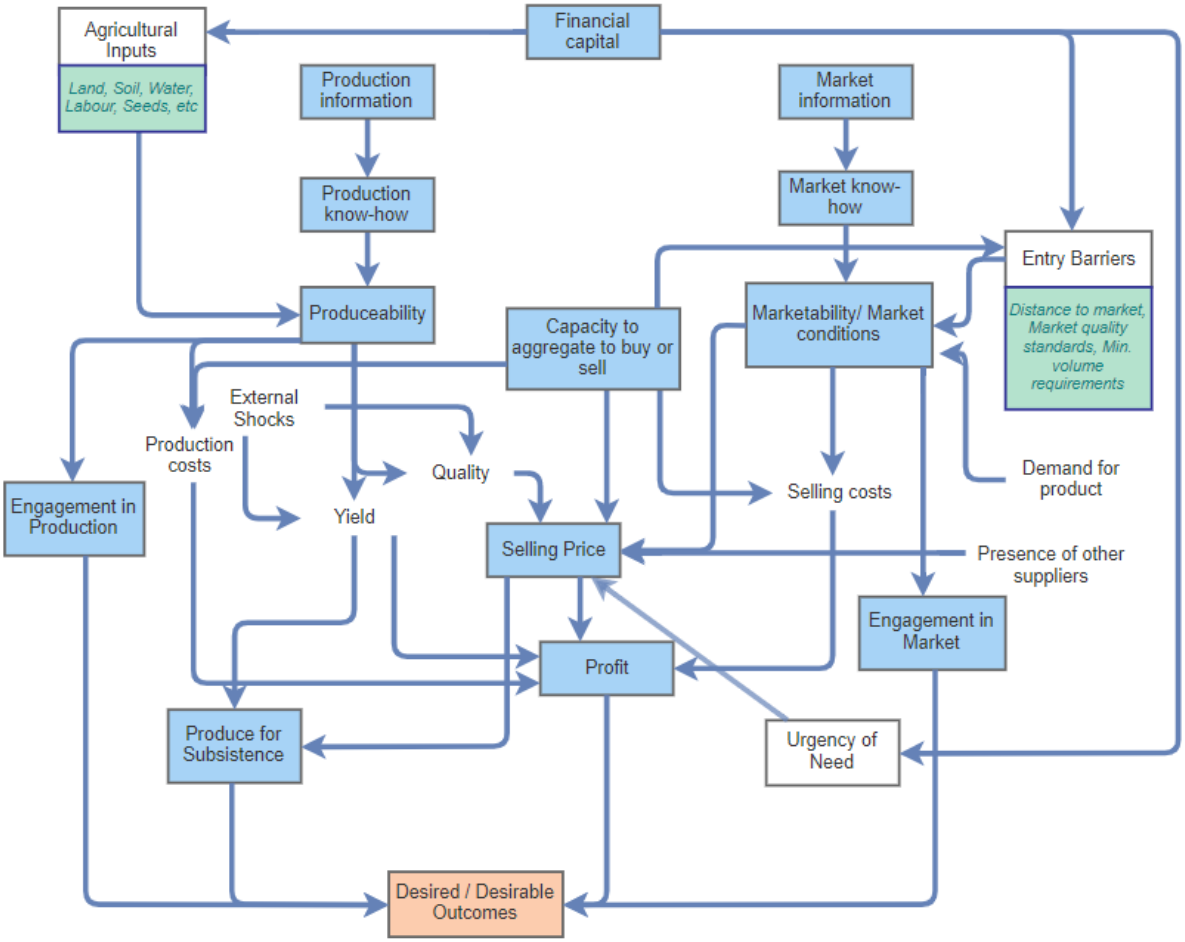

Figure 8 Application of the guiding principles of IA to value chain focused interventions, drawn from Merritt and Hamilton's (2019) report on SIAGI Integrated Assessment Frameworks.

The one-way link between profit and Desired / Desirable Outcomes relates to whether the profit gained allows the actor to meet their varying underlying goals. 'Desired' implies that an outcome was the objective of the actor, whilst 'Desirable' reflects outcomes or benefits that were unintended or unplanned (gaining the respect of others); both desired and desirable outcomes have been observed across the SIAGI project. Desired outcomes are also shaped by (and in return shape) produceability, relationships (via values and social norms), urgency of need, and 'aspirations'. The link from produceability and desired outcomes also capture non-income outcomes from agricultural production, including produce for household consumption or given to neighbours or relatives.

How were value chain interventions evaluated?

Several value chain 'upgrading' strategies or interventions took place throughout the life of the project. These interventions were not directly developed by SIAGI, although through NGO partner resourcing, some support was provided. Collectivisation, diversification and information enrichment to ensure market access and produce better crops were observed across the communities.

Interventions were evaluated using the IA framework in its early stages of development. These included diversification into high value cropping in Dhaloguri and taking advantage of local market opportunities for sunflower oil in Sekendarkhali. The IA team explored these interventions initially through narratives from the communities and the SIAGI partners, which were then 'translated' into models reflecting the IA4VC framework. Fuzzy Cognitive Mapping (FCM) was used to create a model structure and further analysis was conducted to arrive at measures of key variables. For further information on the method used, as well as full analysis, see the SIAGI Integrated Assessment Frameworks report.

The full analysis of these interventions can be found in the SIAGI Integrated Assessment Frameworks report by Serena Hamilton and Wendy Merritt.

Box 2

A better grasp of what there is to gain

In December 2018, Wendy Merritt, Lilly Lim-Camacho and Sumana Sarah Bhuiyan visited the Dhaloguri community to engage with the community around their experiences on growing and marketing off-season spinach as a high-value commodity. The product is grown in shadehouses (image c), owned and/or managed by collectives in the community. There were different types of structures depending on the availability of resources to each group. The women's self-help group had their own structure. Around it, there was a strong sense of pride and a hive of activity. Home gardens were neatly maintained and had ornamental plants; machinery strewn around as if stopped in the middle of work.

We had the privilege of commemorating the operational guidelines of the newly formed Water Users Associations and as well as that of the Alordishari Farmer Producer Organization (images a & b). The guidelines were developed by the members of the organisations, with the support of CDHI. The documents, and the processes by which they were developed highlight the capacity of collectives to not only serve to reduce production or selling costs, nor to access markets and capital through product volume, but to provide members and their leaders with a sense of agency and empowerment through leadership opportunities, connections with others, and learning and development. Traditional value chain analysis would not have captured these dimensions, but integrated assessments for inclusive value chains can.

3.4.2 Key insights of IA4VC for SIAGI

For value chain interventions to impact social inclusion outcomes, there needs to be understanding of the various pathways between an intervention and the desired outcome as well as the constraints to achieve, and opportunities to enhance, these outcomes. This IA4VC approach is intended to lead to better informed interventions based on the objectives and context of actors. It provides a systems perspective of assessment to ensure that the broader needs and constraints of the target groups are taken into account, so that social inclusion outcomes can be improved. Our experience with IA4VC has taught us that our current metrics and benchmarks for successful agricultural intensification may be inadequate because they do not capture all perceived 'successes' by those whom we want to benefit. The IA4VC approach enables us to more broadly conceptualise the different types of value chains that the poor and marginalised engage with – including subsistence chains (production for own consumption or use).

IA4VC has the potential to more explicitly consider 'do no harm' principles to value chain interventions, beyond the usual SWOT (strengths-weaknesses-opportunities-threats) analysis. The approach presents a step forward for complex monitoring and evaluation methodologies, by bringing together broader livelihood priorities and individual aspirations within the context of value chains.

4 Inclusive value chain analysis: Insights for agricultural intensification

Conducting value chain analysis for the purpose of enhancing inclusion from agricultural intensification is not a simple matter. While previous work exist, it has been mostly focused on participation, which in the context of SIAGI, seemed inadequate. The journey to developing an approach that was coherent, relevant and ethical was not easy.

The SIAGI team, in its entirety, were involved in the value chain activity – not just value chain experts. This is because of the acknowledgement of the need to integrate diverse perspectives in order to understand inclusion. We had to design our own way of conducting value chain analysis, because the context at hand was vastly different to what we had previously used VCA for. As researchers, we had to draw more strongly on reflection, observation and engagement, rather than methodological design, data collection, analysis or applying an intervention. If we were to depict our time and effort spent on a clock, a full twelve hours would have been spent reflecting, and only half on actually traditional data collection.

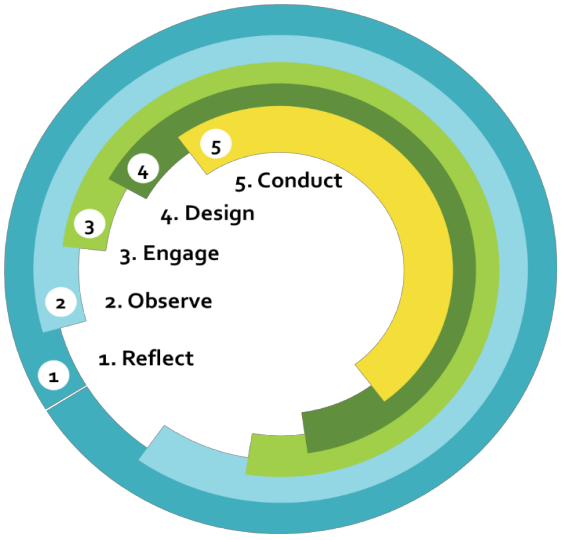

Figure 9 SIAGI VCA activities: Not a ticking clock

This approach was not the original intent of the activity. It was one spurred by a questioning of whether we as a research team were acting in a manner that reflected what communities want – whether we were engaging ethically. This realisation resulted in a pivot – a significant shift in our intent, as well as our approach.

While it was challenging, it presented a real opportunity to question our intent as well as integrate. The definition of inclusive value chains being based on a co-constructed environment by multiple stakeholders was shaped by this. Without the ability to integrate across disciplines and roles, SIAGI would not have made the significant steps on this understanding. This is evident in how easily (relatively) it was to make the leap from value chain analysis to integrated assessments.

Another key contribution of this pivot was the ability to redefine value based on what the poor and marginalised defined it to be. As mentioned earlier, this came through engagement with communities as led by our NGO partners, and not by researchers. The embedness of our partners in communities, and their ability to engage in a manner that suits communities was a critical part in uncovering this. That said, our realisation took place after most of the rapid value chain assessments were conducted. This meant that observations and interviews were not based on a more nuanced definition of 'value', rather the more traditional definitions of value in terms of quality and price of a product. However, this did not stop us from questioning what a value chain can contribute to a poor and marginalised farmer. In the end, this disconnect allowed us to again reflect on the opportunities to enhance current methods so that they allow us to conduct inclusive value chain analysis.

Overall, SIAGI has contributed to an every growing body of work to re-envisage value chain analysis in the context of sustainable development. The perspective of inclusion is a difficult one to tackle, but one that we have begun to.

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Appendix A. Market Assessments

Inclusive market assessments for Dhaloguri and Uttar Chakowakheti, compiled by Niladri Sekhar Bagchi and Bidur Paria (IIT Kharagpur), February 2019

MARKETS	BOKALIR MATH	BANESWAR	DODEAR HAAT	HALDIBARI	DHUPGURI	ALIPURDUAR	PALASHBARI	MATHURAR HAAT
DISTANCE	2 km from DG	6 km from DG	12 km from DG	127 km from DG	65 km from DG	12 km from DG and 28 km from UC	18 km from UC	8 km from UC with 3km shortcut
TYPE OF MARKET	Village level retail market	Village level wholesale cum retail market	Local town	Regional market for wholesale trading	Regional and APMC.	Urban wholesale cum retail market for fruits and vegetables	Village level wholesale cum retail market	Village level wholesale cum retail market
TIMING	Both weekly and daily	Both Weekly and daily	Weekly	Daily	Daily and weekly. Tuesday and Saturday weekly market.	Daily	Weekly market - Wednesday and Saturday	Weekly market - Monday and Thursday
INFRASTRUCTURE	There is no infrastructure as such for the market. Sellers sell just beside the road.	Most of the traders own a well-developed space in the market. The government built the selling infrastructure for local farmers long ago in 2002.	The spaces for farmers' selling lack infrastructure. Traders and middlemen or commission agents have better infrastructure, i.e. concretized pavement and overhead tin shed. Some farmers who sell garlic, onions etc. have access to those sheds. Only big traders have storage facilities for potato, onion, garlic etc.	It is well connected with different parts of the country by road through the national highways NH27 and NH31. There is also railway connectivity that links Haldibari to other places of the country.	The infrastructure in the market including road, shed, pavement and power is good. The total market area is divided into separate spaces for different crops like rice, jute, cabbage, cauliflower, banana etc. and livestock. New building and sheds are being built with government support.	The space available for farmers to sell their produce is too small, narrow and congested. Market space and infrastructure is not good enough for creating large market opportunities.	Most of the market floor is concretized and there are parmanent sheds for retailers. The space shortage for loading and parking of big trucks is the main hindrance for the foreign (Assam, Bhutan etc.) traders to trade with local farmers and creates a better opportunity for middle man to make money.	Infrastructure in the market is not so good. There is lack of shed and concrete platform for selling agricultural produce. Some sheds are newly built but they cannot fulfill the necessity of the majority sellers. Space available in the market is large enough to accommodate large number of sellers.

MARKETS	BOKALIR MATH	BANESWAR	DODEAR HAAT	HALDIBARI	DHUPGURI	ALIPURDUAR	PALASHBARI	MATHURAR HAAT
INCLUSIVITY - MARGINAL FARMERS		Apart from the traders, there are a number of marginal sellers in the market.			Small and marginal farmers including women have equal access in the market.	Small and marginal farmers bring their produce in the early morning by bicycles or motorcycles and occupy a space on first come first serve basis. They sell to market agents and other buyers at wholesale rate.	Mostly marginal and small farmers of the local area come to sell their output in this market.	Mostly small and marginal farmers bring their produce in the early morning and by 9 o'clock in the morning they are almost finished selling their stock.
INCLUSIVITY - WOMEN	There is hardly any women participation in selling of vegetables. All the shops are operated by men. There are a few marginal women sellers with no permanent space.	No individual woman farmer or women SHG group come to sell vegetables to the traders.	Women and landless people are engaged as labourers in different value adding activities such as grading and packaging of produce. There are very few women farmers and retailers who sell in the market.	Most of the workers engaged at Haldibari market are male except only two to four women working in one of the syndicates. Conditions in the market are not suitable/conducive for engagement of women workers. These women are generally engaged for sorting and packaging of the produce.	Women participation in selling is low. There are some women buyers also.	Participation of women is negligible. We saw only 3 to 4 women sellers in the entire market.	This market is not much inclusive in terms of women participation and only a few women come to sell as farmer or retailer.	Very few women come to sell in the market.

MARKETS	BOKALIR MATH	BANESWAR	DODEAR HAAT	HALDIBARI	DHUPGURI	ALIPURDUAR	PALASHBARI	MATHURAR HAAT
GOVERNANCE	The traders have to pay Rs. 100 per week as a charge for the weekly markets of Tuesday and Saturday.	They need to pay a nominal subscription amount to the Bazar Samity (market association) for maintenance and regulation of the market in a proper way.	Although there is a market association for traders, there is no restriction on them regarding where they can buy the produce from farmers – market or farming fields. As a fall out, farmers who bring their produce in the market lose the scope for a better bargaining power and price.	According to the rule of the local traders' association, no trader is allowed to buy produce directly from the field.	This market is controlled and regulated by the government appointed market regulation committee, and so it is called 'Dhupguri Regulated Market'.	Farmers have to pay Rs. 5 to 10 to the market committee as charge for the day.	The farmers have to pay Rs 5 per day to the market committee as charge for the day if he can sell his produce	The market association charges Rs. 5 per farmer and seller as charge for the day. Sellers are not part to the decision making process of the market association.
ASSURANCE OF DEMAND	The amount bought from local farmers is as low as about 20% of total vegetables bought.	About 30% of total vegetables bought by the traders are from local farmers and the rest is sourced from other markets.	Due to large market size, there is better capacity to absorb supply leading to better market assurance.	Due to large market size, there is better capacity to absorb supply leading to better market assurance.	Due to large market size, there is better capacity to absorb supply leading to better market assurance.	Whatever farmers bring here for selling, they are able to sell the entire stock in a single day. But these farmers bring small size stock by bicycle or motorcycle. Unsure of large volumes.	Being a village level market, the absorption capacity of the market is limited such that farmers with large stock of supply may not be able to sell their entire produce in a single day.	Market assurance is medium here. Sometimes farmers are not able to sell their entire stock of supply.

MARKETS	BOKALIR MATH	BANESWAR	DODEAR HAAT	HALDIBARI	DHUPGURI	ALIPURDUAR	PALASHBARI	MATHURAR HAAT
STRENGTH OF DEMAND	Local brinjals of Dhaloguri and Ambari villages are tastier than those from Alipurduar and they are longer in shape compared to the latter. That is why local brinjals sell more than other brinjals. Vegetables like spinach, cabbage, cauliflower, potato and chili from Alipurduar market is considered better and they sell more than local varieties.	Low demand for high value crops.	Due to proximity of the market to Coochbehar town, there is demand for high value horticulture crops such as capsicum, broccoli etc. For off-season high value horticulture there is good demand for coriander, tomato, broccoli and capsicum. But consumers do not prefer cabbage, cauliflower and spinach in summer and rainy season.	Demand for high value crops like green peas is very high. This market is famous for tomato, chilli, green peas, cucumber etc.	There is good demand for each and every type of vegetables.	The supply of vegetable in the market is very much diversified and there seems to be no dominance of a single crop. It consists different leaves such as lafa, rai, spinach, bottle gourd leaves etc. and vegetables such as cabbage, cauliflower, squash, eggplant and many more. High value crops such as capsicum and broccoli have acceptance in the market.	High value crops such as broccoli, capsicum, green peas and beans do not have good demand in this market.	High value crops like broccoli and capsicum are not sold in the market as there is no demand for such vegetables to the rural consumers in the market. Cherry tomatoes are sold alongside tomatoes at higher price than that of the latter. Cherry tomatoes are in high demand due to its preferences to the tribal people in the area.
VALUE ADDITION	Vegetables like potato and tomato are graded according to their freshness and shapes. There is a price difference of at least Rs. 5 per kg between good potato and bad potato. Eggplants are also graded according to one without any pest attack sign and one with signs of pest attack.	Vegetables like potato, onion, eggplant and tomato are graded according to their freshness and shapes.	Grading is not mostly done by farmers, as this is expected of retailers who know consumers' preferences better. But in case of garlic, farmers grade and sell various grades at different prices. For potato and onion grading is done by traders or commission agents by employing labourers.	In case of tomato, the tiny and overripe categories are sorted out. In case of chilli, no grading is done.	Retailers of fruits, vegetables and cereals do grading according to size, quality, variety and source of origin etc.	Buyers in this market demand some value adding activities such as washing, grading etc. for some vegetables like carrot, onion sprout etc.	Value-added activities like washing, grading, packaging etc. are not done by the farmers because the middle men do not want graded products as they earn a profit by doing it and selling to the foreign traders.	Value adding activities such as grading and packaging are not done by the farmers. Even retailers here do not grade produce like tomato, eggplant etc. as consumers prefer to buy at cheaper rate.

MARKETS	BOKALIR MATH	BANESWAR	DODEAR HAAT	HALDIBARI	DHUPGURI	ALIPURDUAR	PALASHBARI	MATHURAR HAAT
PRICE FLUCTUATION	Due to a very small market size, price here starts at lower level and then fall further with the passing of the day. So overall fluctuation is lower than big markets.	Price fluctuation is more in the weekly market days than the regular market days as the weekly market days more buyers and sellers interact with higher relative demand than regular days.	Most farmers are in a hurry to sell off the total amount they have brought to the market and often agree to lower price offer by buyers who take all or most of the produce of the farmer. Prices drop with the passing of the day. Farmers are not allowed to sell directly to consumers as retailers in the market.	Traders are required to send the collected produce to the destination markets by 10 am. This forces them to offer higher prices in the early morning to meet their supply orders in right time, which is very crucial for credibility in markets and also for perishable products like vegetables. Then prices become lower in the latter half of the day.	Price fluctuation is more in the weekly market days than the regular market days as the weekly market days more buyers and sellers interact with higher relative demand than regular days.	Price of vegetable fluctuates on daily basis depending on relative demand. Generally the price is higher in the early hours and then start falling throughout the day.	The price starts at a higher level in the very early morning when the demand remains high due to the presence of dealers from outside. By the midday price for the farmers drastically fall down and the last unsold stock of the farmers are sold at throw away price or sometimes remain unsold.	The price remains good in early hours of selling when dealers who come from outside buy from the farmers. After their departure the price gets lower.
INTER-STATE TRADE	Not done.	Not done.	Big traders buy through middlemen and sell to distant markets both inside and outside the state of West Bengal.	Tomato from Haldibari market is generally supplied to Assam, Meghalaya, Agartala, Uttar Pradesh, Punjab, Andhra Pradesh, Tamil Nadu (mainly to Chennai), Karnataka (mainly to Bangalore), and Kerala.	Import of seeds and export of output is done all over India.	Interstate trade of vegetables does not take place. There are some wholesalers of fruits who do interstate trade of fruits.	No interstate trade is done in this market. But intermarket trading takes place with markets like Alipur, Falakata, Dhupguri and nearby markets.	No interstate trade is done in this market. But intermarket trading takes place with markets like Alipur, Falakata and nearby markets.

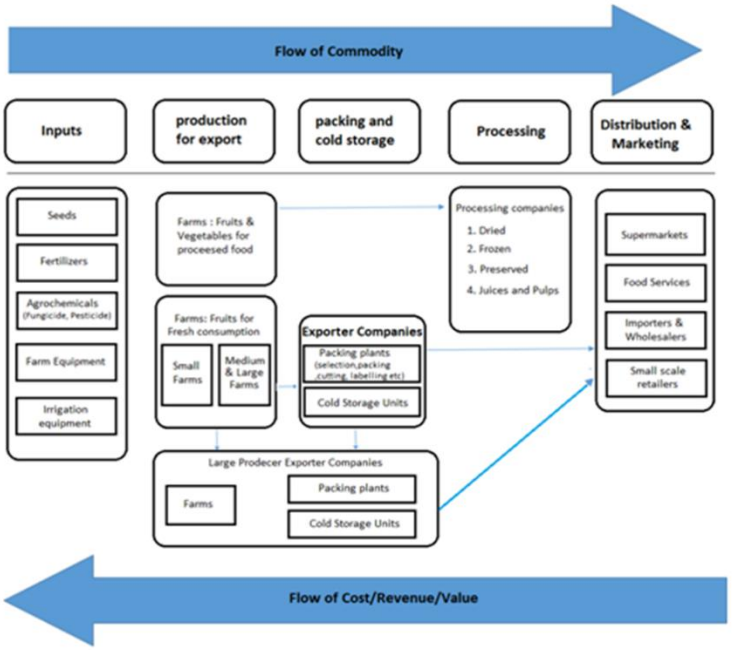
Appendix B. Crop Assessments – West Bengal

Results from value chain analysis conducted by IIT interns Shivraj Kotkar, Tarang Khairkar, Shakti Singh Mukker, Kamlesh Yadav, Mukul Sankula and Adarsh Updahyay, supervised by Profs. Pulak Mishra and Bhagirath Behera.

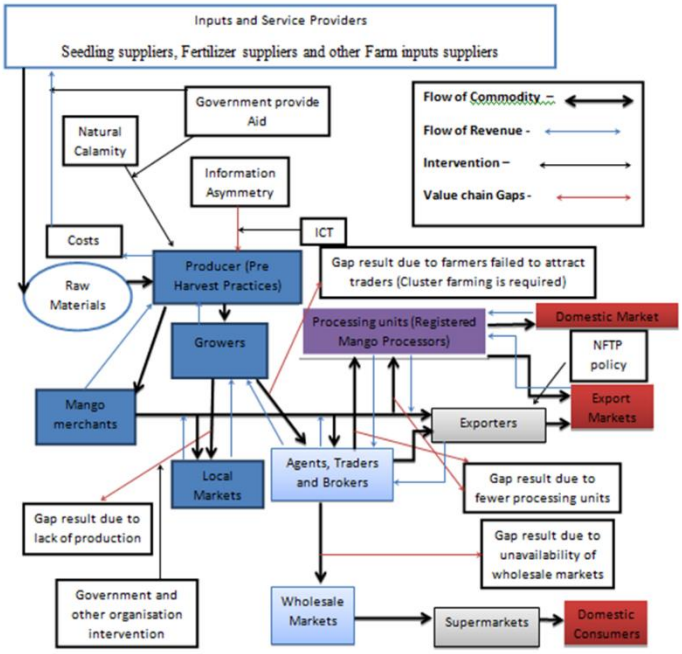
	TOMATO	POTATO	ONION	CITRUS	MANGO	TEA
SMALLHOLDER POTENTIAL	Follows cluster farming – scope for inclusion of small & marginal farmers	Generally cultivated by large farmers	Suitable for small farmers	Not suitable for independent small & marginal landholdings	Generally cultivated on land lease contract – has scope for inclusion of women and landless farmers	Large –scale presence of small tea growers
LABOUR INTENSITY	Highly labour intensive – livelihoods for rural workforce	A major Rabi crop cultivated by a large number of farmers	Labour intensive	Practice of 'Cluster farming' - scope for inclusion of small & marginal farmers	Cultivation and selling of mango - provide seasonal livelihoods	Large scale engagement of women and marginal farmers as labourers in plantation as well as in processing
OPPORTUNITIES FOR WOMEN'S PARTICIPATION	Farming considered time consuming – less scope for engagement in farming by women	Opportunities for engaging in processing for chips	Not considered time consuming – potential for women engagement	Opportunities for engaging in processing for juice, jam and jelly		Very few women are owners among small tea growers
VALUE ADDING POTENTIAL	Processing for tomato sauce, jam and puree	Processing of potato chips, etc	Processing for onion paste and powder	Processing for juice, squash, powder, livestock feed; Can be used in pharmaceutical and cosmetic industry	Processing for juice, jam, fruit leather, etc.	Requires processing
OFF-FARM LIVELIHOOD POTENTIAL	Longer and multiple value chains – larger scope for employment, especially of women	Large network of cold storages - employment of many in the supply chain				Large number of independent tea stall owners and mobile tea vendor
PRODUCTIVITY TRENDS	Decreasing productivity	Increasing productivity over years	Rising costs with no increase in yield	Increasing productivity	No decline in productivity	Decreasing productivity and quality
PRODUCTIVITY CHALLENGES	Higher use of chemical fertilizer and pesticides and lower use of micronutrients – continuous decline in soil health	High extent of climate sensitivity and fluctuations in production	Farmers in onion belts of Maharashtra shifting to other crops due to continuous losses	Amount & quality of production – sensitive to weather	Amount & quality of production – sensitive to weather	Soil erosion in plantation slope – adverse effect on growth of plants
PRICING CHALLENGES	Farmers are forced to sell at lower price due to no storage facility	Very low price during harvest - loss for small farmers due to non-	Wide fluctuations in retail price > Rs. 15/kg to Rs. 80/kg		High fluctuation in prices	Small tea growers unable to take part in auction

		affordability for cold storage				
	Middlemen and wholesalers control the market price	Affordability of large farmers for cold storage - scope for earning good profit when the price rises	Small farmers sell produce to the traders based on prices in local markets, but traders sell at higher prices at national and export markets	Processing units earn much higher margin due to high demand in national and international markets	Exporters get higher price, but their cost is relatively higher due to application of organic method	Increase in retail price of tea over the years with increase in costs of plantation (with price of green leaves remaining largely the same)
INFLUENCE OF OTHER SUPPLY CHAIN ACTORS	Processing units buy waste and bad quality tomato at throwaway price	Contract farming by processing firms at prefixed price > scope for gains by small farmers		Farmers sell produces directly to the traders at lower prices to avoid risks of perishability	Most of the farmers sell their whole orchard to retailers/traders at negotiated price to avoid wastage and market uncertainty	
SUPPLY CHAIN CHALLENGES	Lack of cold storage facility	Lack of transparency in allocating cold storage space among farmers	Lack of climate smart co-operatives	Lack of financing facilities to small and marginal farmers	Legal issues between land owners and lease holder SHG members	Lack of quality control facility and training facility
		Cost of storage - constraint to inclusion of small & marginal farmers		Lack of quality control facility and training facility		
SUPPLY CHAIN OPPORTUNITIES	Setting up processing units by SHGs	Contract farming by big MNCs and retail chains > helpful for small farmers	Setting up export-oriented climate-smart farmers' co-operatives	Setting up processing units by SHGs	Setting up processing units by SHGs	Setting up microfinance institutions for small and marginal farmers
	Linking up small farmers' collectives with big traders in metro cities			Setting up more training facilities in PPP mode	Linking up small farmers' collectives with big traders in metro cities	

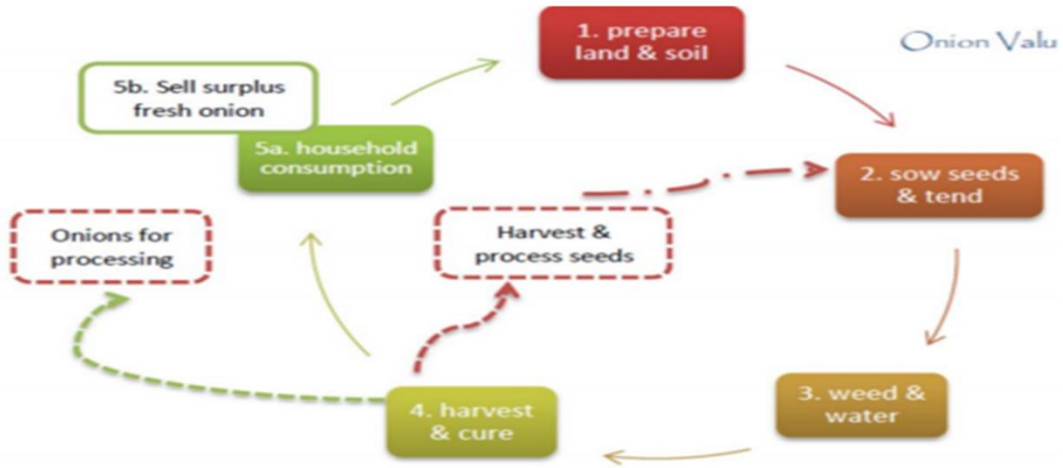
Appendix C. Value Chain Maps – West Bengal and Bangladesh



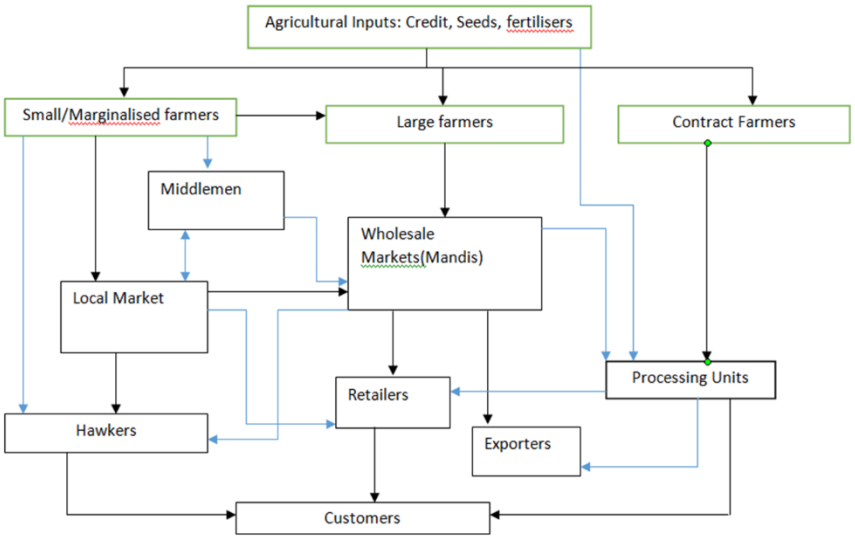
VC Map 1 Citrus, West Bengal by Shivraj Kotkar, IIT Kharagpur. July 2017



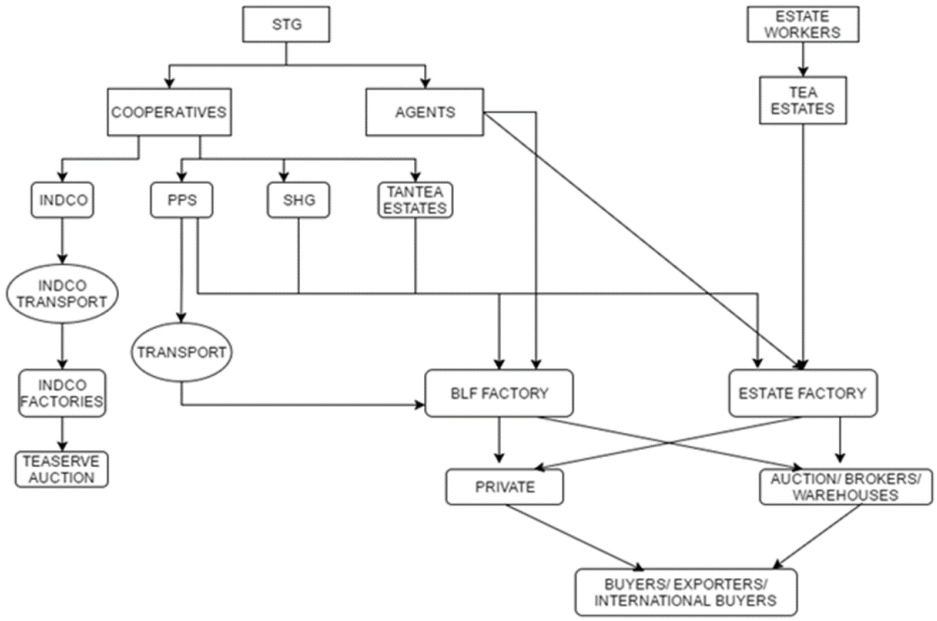
VC Map 2 Mango, West Bengal by Tarang Khairkar, IIT Kharagpur. July 2017



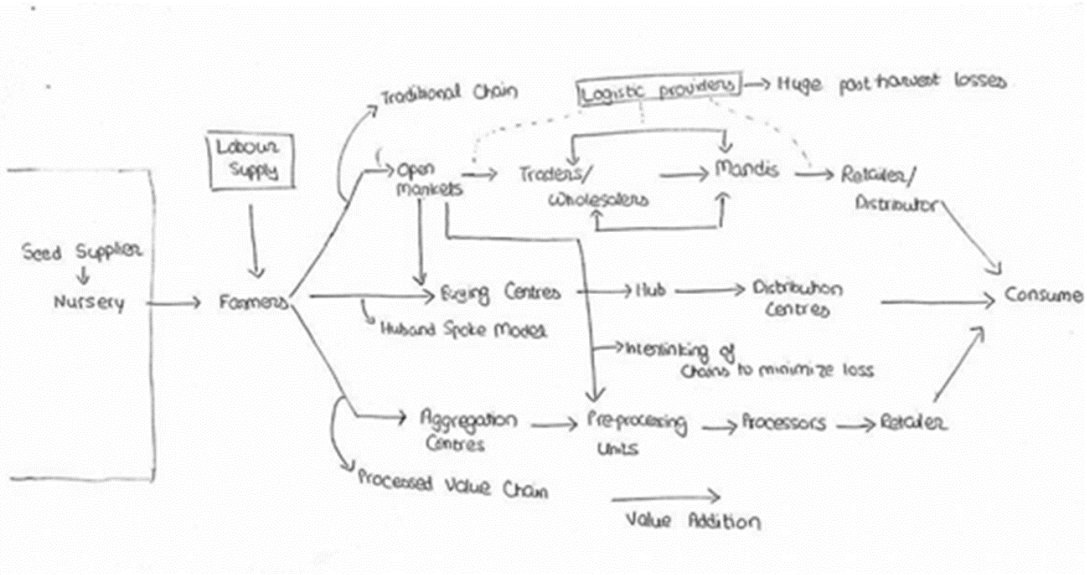
VC Map 3 Onion value chain, West Bengal, by Shakti Singh Mukker, IIT Kharagpur. July 2017



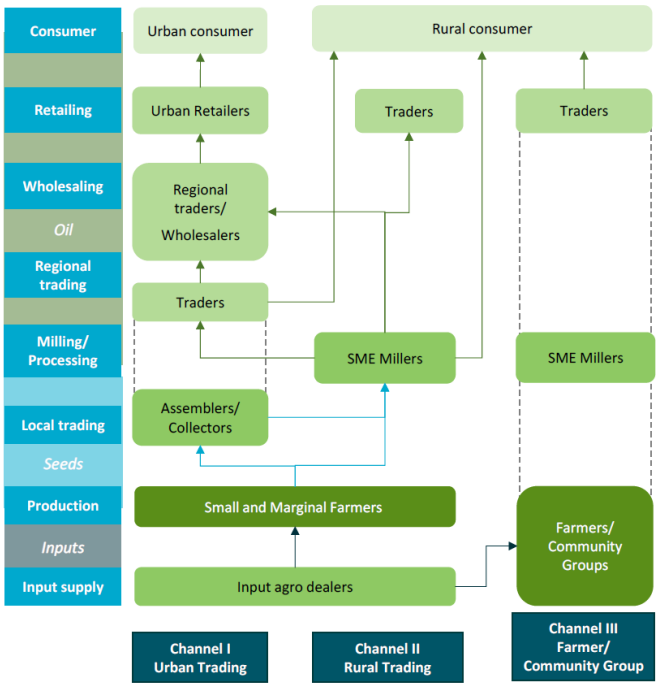
VC Map 4 Potato value chain, West Bengal, by Kamlesh Yadav, IIT Kharagpur. July 2017



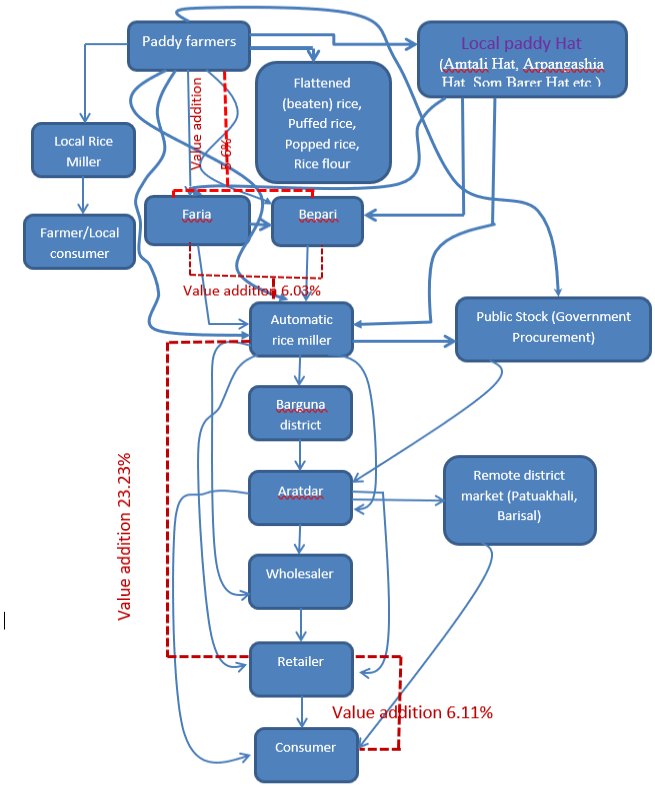
VC Map 5 Tea value chain, West Bengal, by Mukul Sankule, IIT Kharagpur. July 2017



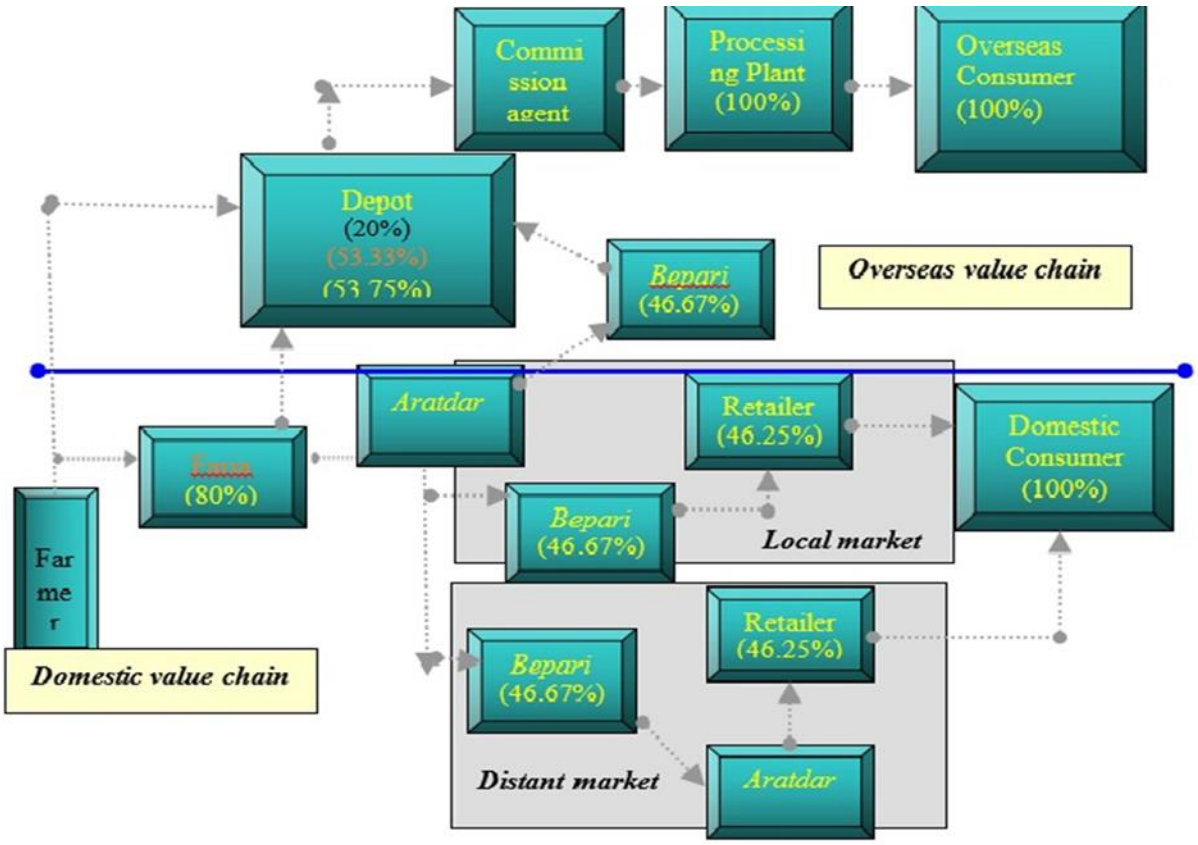
VC Map 6 Tomato value chain, West Bengal, by Adarsh Upadhyay, IIT Kharagpur. July 2017



VC Map 7 Sunflower oil value chain, Sekenderkhali village, by M.I. Hossain et al. 2018



VC Map 8 Aman paddy/rice value chain, Bangladesh, by M.I. Hossain. June 2017



VC Map 9 Shrimp value chain, Bangladesh, by M.I. Hossain and G.M. Amzad Hossain, BAU. June 2017

Report 3: Bio-economic modelling

Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh

Stakeholder-driven discussion support tool for agricultural development through suitable crop (Rabi) choices

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Australian Government
Australian Centre for International Agricultural Research

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Stakeholder-driven discussion support tool for agricultural development through suitable crop choices

1. Context

Intensification of agriculture by use of high-yielding crop varieties, better animal breeds and animal husbandry, aquaculture, fertilization, irrigation, and pesticides has contributed substantially to the tremendous increases in food production over the past 50 years. In aggregate terms, agricultural intensification is undeniably increasing food production and ensuring food demand is met. In broad terms it is also helping alleviate poverty. However, this has come at the cost of an increasing social dichotomy between more affluent land holders and socially disadvantaged groups such as landless or marginal smallholders, women-headed households, and tribal minorities. This is because affluent land holders and landlords are in a stronger position to capture the benefits of agricultural intensification. Consequently, these marginal groups are much more exposed to unintended consequences of agricultural intensification.

In response, ACIAR funded the Socially Inclusive Agricultural Intensification project (SIAGI, www.siagi.org) to study the drivers and implications of agricultural intensification, how they affect marginal farming households, and what options there are to achieve a greater level of social inclusion as agricultural intensification is pursued by development agencies and governments.

Accordingly, the aim of SIAGI is to understand drivers, apply tools, develop opportunities and provide policy options to promote more socially inclusive and environmentally sustainable agricultural intensification in West Bengal and Bangladesh. This is being addressed through the following project objectives:

1. To understand how key social, institutional, economic and environmental factors affect livelihood risks, social exclusion, adverse incorporation and environmental degradation in agricultural intensification
2. ***To identify opportunities to manage risk and promote social inclusivity and equity under different agricultural development scenarios using scenario and trade-off analysis***
3. To promote the development of socially inclusive, equitable and sustainable agricultural intensification policies and engagement processes

The bioeconomic Rabi crop choice modelling component reported here primarily targets objective 2 above, focussing at a village rather than an individual farming household scale.

2. The rationale for using a bioeconomic modelling approach

Agricultural policies aim at directing agricultural development in such a way that it leads to attaining several socio-economic goals, e.g., increased agricultural production, employment, profit, environmental sustainability, and pollution abatement. A feasible development objective must consider all these goals. Modelling tools should enable analysis in such a way that possibilities and limitations, relationships and interdependencies become explicit. It is especially important to identify conflicting goals and to explicitly quantify the trade-offs among the multiple goals that contribute to sustainable agricultural intensification. Interactive Multiple Goal Linear Programming (IMGLP) is one such modelling technique that has been widely used to integrate different types of information and to generate different agricultural development pathways. An important contribution of the participatory model development process has been the building of 'social capital' (Coleman, 1988) and 'social learning' (van der Wal et al., 2014) around agriculture intensification and crop-choice among the farming community in the case study village. We adopted a reflective learning process based on the Plan–Do–Observe–Reflect of the Kolb learning cycle (Hayman et al., 2013; Kolb, 2004) highlighting that the modelling is not an end in itself but supported a co-learning process among researchers and the farming community (Nidumolu et al., 2007; Nidumolu et al., 2011; Nidumolu et al., 2016). The objective of IMGLP approach is to indicate the *Pathways- Scenarios* and explore

consequences of each of these, it is not prescriptive or predictive and it is up to stakeholders to make the decisions.

One pathway for intensification discussed earlier, is increased rabi season cropping with availability of irrigation. Rabi crops are an important source of income and food security/nutrition for the target communities in the SIAGI case study regions. This option then raises the question of what are the crops that are feasible in the region, what are the consequences/trade-offs, preferences with farmers, markets, labour requirements, profitability among others. Also, specific gender perspectives and choices of marginal farmers typically are often not considered when decision on what crops to grow are made. While the NGOs and extension have been engaging with farming communities on selecting suitable crops, this has been in the absence of quantitative tools to discuss trade offs and *what if* scenarios to support an informed discussion or in other words a systematic trade -off analysis in crop choice is an underdone area in the SIAGI study sites. SIAGI decided in Oct 2016 to redirect its modelling and develop a bio-economic modelling tool that supports discussion and decision making around crop choices for women and men marginal farmers. The bioeconomic modelling tool was developed to provide assistance to the researchers, NGOs and farming communities for their crop choice discussions.

3. Methodology

3.1 Modelling framework

The crop choice model was developed within the General Algebraic Modelling System (GAMS) that utilises an Interactive Multiple Goal Linear Programme (IMGLP) approach (Fig. 1). The basic structure of the linear programme (LP) model has the form of a standard linear programming model, as given by Berentsen & Giessen (1995) and discussed by Van Calker et al. (2004):

$$\text{Maximize } (Z = cx) \qquad (1)$$

$$\text{subject to } Ax \leq b \text{ and } x \geq 0 \qquad (2)$$

where x is a vector of activities, c is the vector of gross margins per unit activity, A is the matrix of technical coefficients and b is the vector of constraints. The constraints, as given by Eqn (2), consist of resource and policy constraints. The objective function (Z) maximizes returns on inputs (capital, labour, etc.). Z is maximized at the village scale considering the village as a whole farm.

Using the resources, recognizing constraints and based on the objectives and questions from the stakeholders a number of scenarios could be generated. These scenarios form the basis of the discussion with the research team and the farming community. Small and marginal farmers have been the focus of this modelling exercise consistent with the objectives of the SIAGI project.

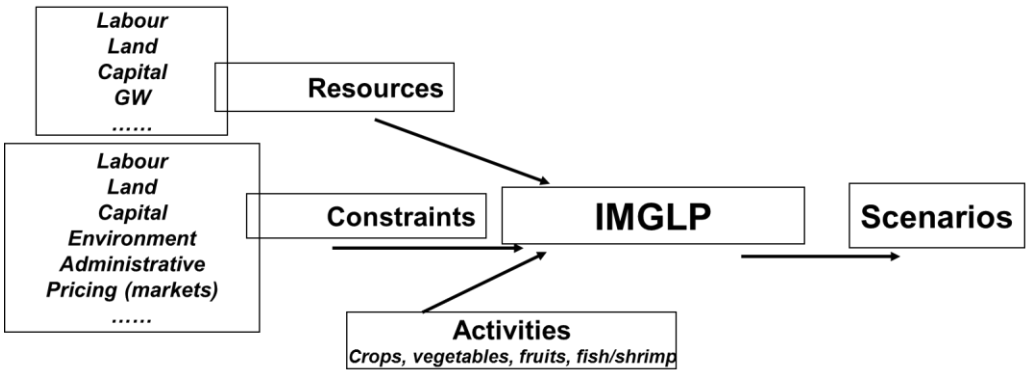

Figure 1: Schematic of the IMGLP approach.

This modelling approach has been used to develop a discussion support tool that enables the stakeholders (in this case farming community and research team, the possibilities and limitations, relationships and interdependencies of different crop choices become explicit (Zander and Kachele, 1999).

The model framework is given in Figure 2 below.

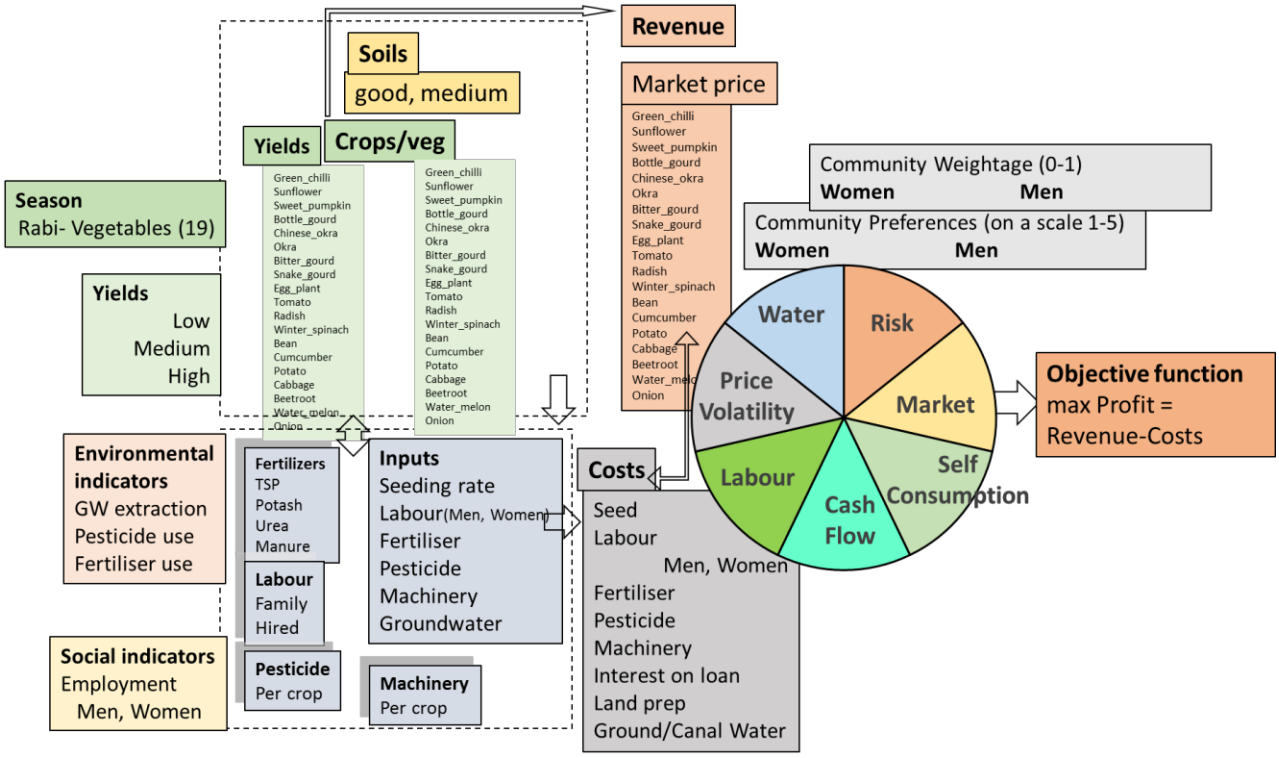

Figure 2: Model framework.

The model at its core chooses an optimal set of crops and area to be planted based on a set of resources and constraints. Area to be planted and crop type are exogenous to the model which means these are 'chosen' by the model. However, the model can be constrained to choose a min or max area of a certain crop. Multiple objectives can be set such as profit maximisation, max or min labour use (by gender), max or min ground water use etc.

The key innovation in this modelling work is including **gender-based community perceptions** to influence crop choice. This has been achieved by seeking women and men to score separately on their preferences for each crop (on a scale of 1-5) on seven different variables viz., labour (preference based on labour intensity), market (access to market), risk (of production), self-consumption, cash flow, water (requirements by crop choice) and price-volatility. These scores have been used in the model to skew (lean) towards certain crop choice. In addition to these scores women and men farmers can provide a 'weight' (0-1) across these variables (not by crop) that will influence how their score by crop influences the ultimate crop choice.

This approach by combining the classic optimisation with community preference weights connects this work to SIAGI's general ethical community engagement process. This is underpinned by modelling that uses community-provided data and provides equal weightage to preferences of women and men farmers.

This modelling approach uses a set of objectives to drive the model. The objectives could be maximising profit for example while producing enough for family self-consumption. A set of modelling objectives were defined initially in consultation with the project team. This was followed by discussions with the farming communities in Dhaloguri (see section 3.1) to validate the objectives.

The shortlisted objectives are:

- Maximising farm income
- Maximising/minimising labour use; male/female labour
- Minimising pesticide use
- Minimising ground water depletion
- Minimising risks (with respect to both production and income) of farming through crop diversification
- Maximize N use efficiency or minimize N surplus or N losses

Based on these objectives, several questions that the model is able to answer have been developed in consultation with the project team and the participating farming community.

Some of the questions that may be addressed by the modelling tool include:

- What is the optimal crop choice combination for maximising profit in rabi
- What is the trade-off between maximising income and minimising pesticide use and maximising fertiliser /efficiency?
- How does minimising or maximising labour use impact crop choice?
- How does crop choice impact male vs female labour use?
- How does access to mechanisation influence crop choice (labour, costs, efficiency etc)?
- How can resources be managed (eg water, nutrients) to maximise profit and minimise environmental impact?

While these objectives and questions are part of the 'wish-list', achieving these from a modelling perspective depends on the data availability in the first instance and the quality of data. Therefore, the modelling activity has been matched to the data available, either as primary data collected from the participating farming community or from secondary sources such as those published in the District Statistics handbook or other references.

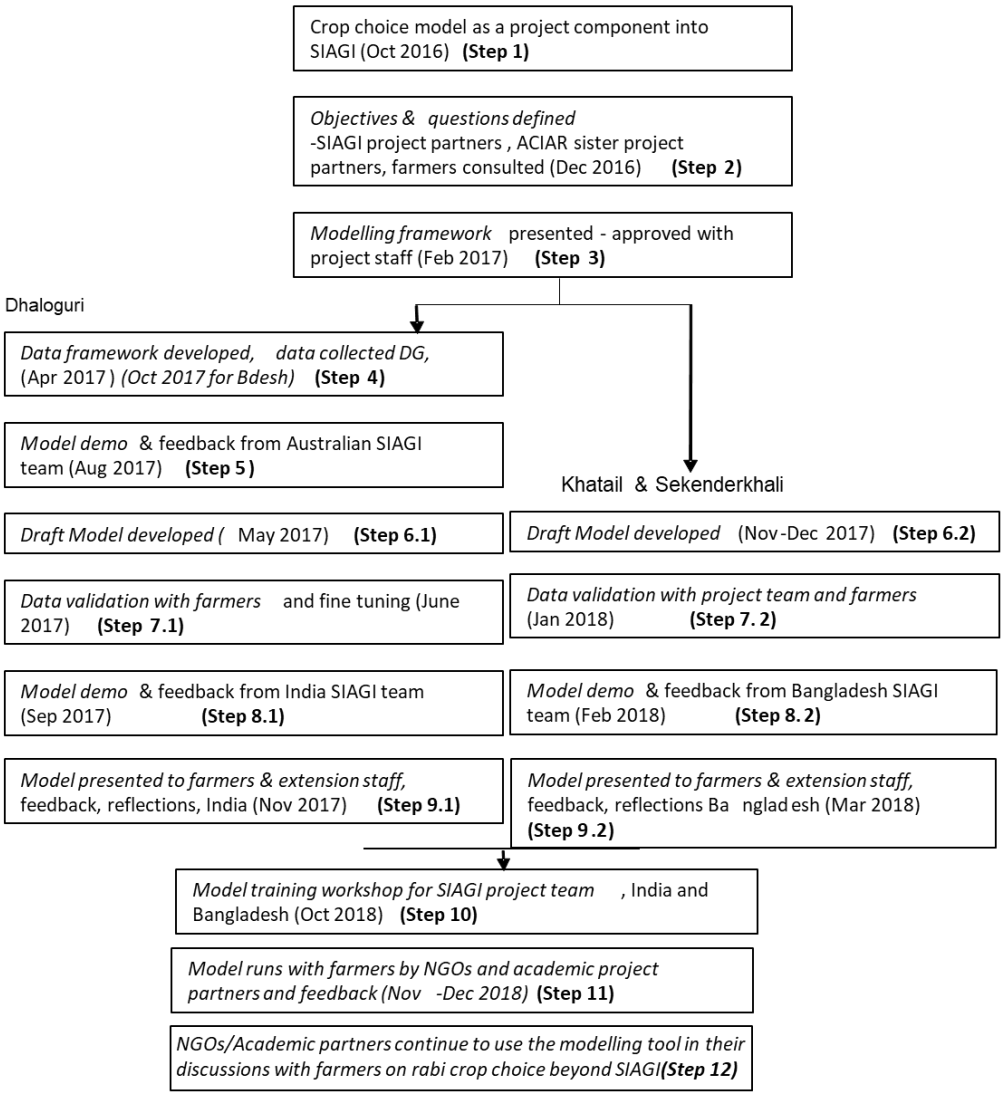

Figure 3: Chronology of model development and key stakeholder input to model development and testing.

3.2 Study sites

The work presented here was conducted in case study villages at two of the three SIAGI study sites:

i. Eastern Gangetic Plains - northern West Bengal: Dhaloguri village in Coochbehar district and Uttar Chakuakheti village in Alipurduar district
ii. Coastal Zone, southwest Bangladesh: – Khatail village in Dacope upazila and Sekenderkhali village, in Amtali upazila.

3.3 Data

Data on different crop and vegetables (cost of cultivation, yields), ground water use and related yields (for Rabi), input use (fertilisers, pesticides) have been collected from the marginal category farmers. This data was collected on a data frame work that was based on the objectives and questions that have been developed via an iterative process with key stakeholders (Figure 3). Data was collected over a two-part survey conducted during March and April 2017 for Coochbehar sites and August to October 2017 for the Bangladesh sites. Data variables (technical coefficients) are:

(i) Land area (good and medium soils)
(ii) Crop yields
(iii) Ground water use by crop (Rabi crops)

(iv) Cost of ground water (northern West Bengal only; ground water data from sister project DSI4MTF)
(v) Crop prices
(vi) Land preparation cost
(vii) Fertiliser use and cost
(viii) Pesticide use and cost
(ix) Seeding rate and cost
(x) Labour available, labour use by crop/vegetable and cost
(xi) Machine use and cost

All the above parameters are for crops/vegetables that have been included in the model.

For Rabi season farmers listed the following crops:

- Northern West Bengal villages: cabbage, cauliflower, chili, potato, tomato, brinjal (eggplant), spinach, coriander.
- SW Bangladesh villages: green chilli, sunflower, sweet pumpkin, bottle gourd, Chinese okra, okra, bitter gourd, snake gourd, eggplant, tomato, radish, winter spinach, bean, cucumber, potato, cabbage, beetroot, watermelon, onion.

Farmers have also defined soils in their village as good and medium in the northern West Bengal villages and high and low in the SW Bangladesh sites and have provided data on yields for different crops on these soils.

3.4 Community scores and weightage by gender

As part of the data survey, men and women farmers were asked to score Rabi crops on seven variables on their preference. Labour (preference based on the labour time required and difficulty), risk of production (factors such as incidence of pest and disease, climate etc have been considered), access to market, self-consumption, water (water use by crop), cash-flow and price volatility. They have scored on a Likert scale of 1-5. Women and men farmers scored these variables in separate FGD meetings organised by the collaborating NGOs. A weight factor on profit and the seven variables is included where the farmers can score between 0-1 (total across all the 8 variables including profit should add up to 1). These weights along with the scores will influence the objective function to reflect the preferences of crops gender-wise and the weight they place on these versus profit. For example, they may score on labour higher for a crop (i.e. it is less labour intensive) but when they must weigh between labour and profit, they may preferentially score profit higher.

3.5 Model formulation

The model was coded using the General Algebraic Modelling System (GAMS). The model reads the data from an excel spreadsheet. The outputs are written into a comma delimited text that can be read into a spreadsheet. A simple Excel based interface has been developed to input and output data. The model has been designed to be generic so data can be easily changed or modified, and new or additional parameters can be included. An option for including several constraints has been provided. For example, minimum and maximum area for crops can be defined if required so the model is constrained to choose a minimum area (for self-consumption for instance) or to respond to market signals (while price can be the other influence). Weights can also be used as a lever to skew the model towards a crop based on the risk perceptions scored by the farmers.

3.6 Farmer engagement in model development

3.6.1 Northern West Bengal sites, November 2017

The objective of the visit was to discuss the crop choice scenario tool. Before that, since February 2017, farmers had participated in the development of the tool by providing cost of cultivation data for various Rabi crops as well as sharing their preferences (gender specific) on crop choice, based on markets, labour, self-consumption, price-volatility, cash-flow and risk. The visit in November 2017 was to present the interactive tool to the farmers and validate the data/information collected and the findings of bioeconomic modelling on the basis of reactions/reflections of the farmers of the village. Seven farmers participated in this engagement. This small group of farmers was purposively selected as this was a first validation exercise with the famers and we wanted an intensive feedback and reflection session, which was more likely with a smaller focused group.

We emphasised that the tool was developed as a discussion support tool in order to have a 'structured discussion' on crop choice with farmers, NGOs and researchers. The tool is not prescriptive and is designed to develop "what if?" scenarios for implications of different crop choices.

After the initial introductions of the team and the participating farmers, Subrata Majumdar from CDHI outlined the purpose of our visit and requested that the farmers engage with the project team and provide feedback on the tool. Before the data and tool were presented, there were interactions with the farmers about their current decision making process and the underlying factors on their crop choices such as what to cultivate (choice across crops across types, varieties, etc.); how they cultivate (choice of techniques, input combinations, etc.); for whom they cultivate for (for market versus self-consumption).

Following this discussion, a presentation was made on the basic framework of the model, its various components, and data collected by Uday Nidumolu with translation into Bengali by Pulak Mishra (IIT) and Subrata Majumdar. This was followed by a display of the findings of the tool on how crop choices can change across gender under different scenarios by Uday and explanation of the same in Bengali to the farmers by the West Bengal partners. The team then discussed the data used in the model and sought confirmation on consistency of data and findings of the models by the farmers. We then recorded farmers' reactions/reflections on results of the models and utility of such an exercise for them.

The key observations from this interaction were that farmers are making crop choices from a variety of Rabi crop options such as potato, tomato, cauliflower, cabbage, garlic, broccoli, chilli, spinach, coriander etc. The underlying factors influencing choice vary across crops and include:

- Cultivation of potato for high returns (though with high risks), greater market opportunities, getting bulk returns at a time and use of the same for asset creation;
- Cultivation of crops for self-consumption and meeting daily cash requirements;
- Emergence of potato as the most preferred crop across farmers to maximize returns.

Farmers are trying to distribute land into growing different crops to minimise input costs as well as production and market related risks. Though farmers said they have ideas on what crops to grow, there is no regular practice of recording various costs of and returns from cultivation in a systematic way. Farmers agreed with the data on cultivated area, costs of cultivation for different crops. This was an important validation as the model is reliant on the accurate data from the farmers and all model scenarios will be based on this primary data.

As an illustration of the model, we presented two scenarios for the farmers (that incorporate male and female preferences). The first scenario was maximising for profit without preferences and weights. The model selected most of the area of the cultivated land of the village for potato and a small area for cabbage (in medium soil). Farmers agreed that this would be the outcome if profit was the only motive. We then ran a model scenario that included the weights they would place on one among the six variables (risk, market, self-consumption, cash-flow, labour and price-volatility). As a start, the women farmers placed a weight of 0.9 (on a scale of 0 to 1) on 'labour' (ease of growing a crop labour-wise), while men farmers placed a weight of 0.8 on 'market' (ease of access to market). The model selected a large area for spinach and

cabbage as a result of female farmer's preference weight on labour, while the model selected potato and tomato in relation to male farmer preferences. The response from the farmers to this sample demonstration was that it was realistic and that is what they also would have chosen with those preferences. We ran only a few scenarios as a demonstration of the model, as a more detailed engagement was planned for subsequent months. Farmers clearly showed their interest in using similar tools for farming decision-making, especially for crop choices.

An important result of this initial exercise with the farmers was more than just discussing scenarios. Participating farmers said that before we presented this tool and discussion, they had had many visits from different project teams, who interacted with them to collect data and information. Farmers were uncertain why data was being collected and often wondered if it was waste of their time. After the tool was presented and the discussions, their impression was that their data was being used to develop tools as discussion support (as demonstrated to them in this meeting). They said they realise the importance of data/information/views they provide. There was a genuine feeling of recognition and importance to their data, views and feedback. We think this is an important outcome of this visit and is consistent with the ethical community engagement espoused by SIAGI.

3.6.2 Meetings with local stakeholders (Block level Agricultural Extension staff in Jalpaiguri)

As part of the model development, we also arranged for a meeting with four staff from the Agricultural Extension service at the CDHI office in Jalpaiguri. The purpose of the engagement was to validate the findings of bioeconomic modelling on the basis of reactions/reflections of the extension staff members. After the initial introductions, we elaborated on the purpose of interactions followed by the description of the modelling tool. We then demonstrated various scenarios to the team and explained the model and data in detail (like the exercise in Dhaloguri discussed earlier). This was followed by discussions of the results as well our experience with this exercise in Dhaloguri. We recorded the reactions/reflections by the staff members on results of the models and their implications for the farmers.

Our observations and reflections from this interaction were, extension staff members generally provide extension services to the farmers in respect of technology, especially in supplying quality seeds. They also provide information on soil health, weather conditions, market situation to the farmers. Decisions on crop choices are made by the farmers and the extension staff members have very little role in this regard in practice. Farmers generally prefer to cultivate potato due to its larger market, availability of cold storage facilities (in some cases), and scope for earning more profit even though the risks are also high. The growing tea market is an important factor behind increasing use of farmland for tea plantation in the area. The department aims at increasing farm production with minimum adverse impact on soil. In many cases, farmers' crop choices are influenced by business interests of traders in input and output markets, money lenders.

Extension staff mentioned that while male farmers take risks, female farmers are generally risk averse. Farmers tend to use more fertilizers and pesticides when land is taken on lease. Before the presentation of the tool, the extension staff were of the view that farmers are not interested to follow guidance of extension staff members, instead are generally influenced by traders of inputs and output, money lenders. However, after our discussions and the demonstration of the tool, the participating extension staff indicated interest to explore the crop choice scenario tool and expressed the view that this may be a useful tool for the farmers in discuss crop choice options. There are challenges in three major aspects – crop rotation, crop diversification and crop sequence. Bioeconomic modelling can play an important role in this regard. The extension staff also suggested that the modelling template can be linked to the website of the state government. However, this would require demonstration to the higher-level officials for larger impact.

3.6.3 Sekenderkhali and Khatail, farmer engagement March 2018

In March 2018, we undertook an engagement process with the farmers in the Bangladesh sites (Sekenderkhali and Khatail villages). The field visit to Sekenderkhali and Khatail was to present the interactive tool to the farmers and validate the data/information collected and the findings of bioeconomic modelling based on reactions/reflections of the farmers in case study villages.

A focus group discussion was organised involving 20 farmers including 6 women (who came from SIAGI groups such as marginal, landless and women managed households and water and silt management committee). The objective was for the team members of CSIRO, BAU and Shushilan to validate the bioeconomic data and understand the farmers' reflections and comments. Moreover, it was a good opportunity to interact with farmers and explain to them how the data they have provided over the previous few months is being used to develop a model and explore crop choice options with them.

We assisted the farmers to reflect/write their choices of the current key factors that influenced them to make crop choice decisions before the presentation. Almost all of them chose chilli, ground nut, sunflower and sweet potato due to mostly factors of home consumption, high market price and other factors such as lower irrigation requirements, market opportunity (close to market), meet the expenses of children's education and crops that are less perishable.

Fig 4: Women farmers of Sekenderkhali discussing the short questionnaire before the presentation.

Fig 5: Farmer group gets clarification from project partners.

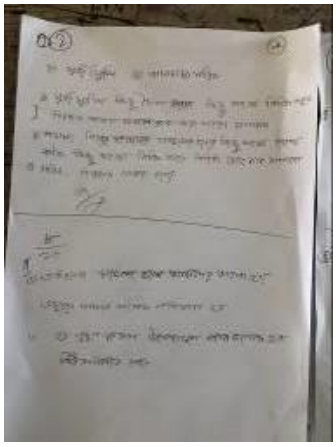

Fig 6: Response sheet in Bangla.

Fig 7: NGO partner Mahanam Dash explaining the model to the farmer group.

Fig 8: Data for the model being edited real-time to update women farmer preferences in relation to water.

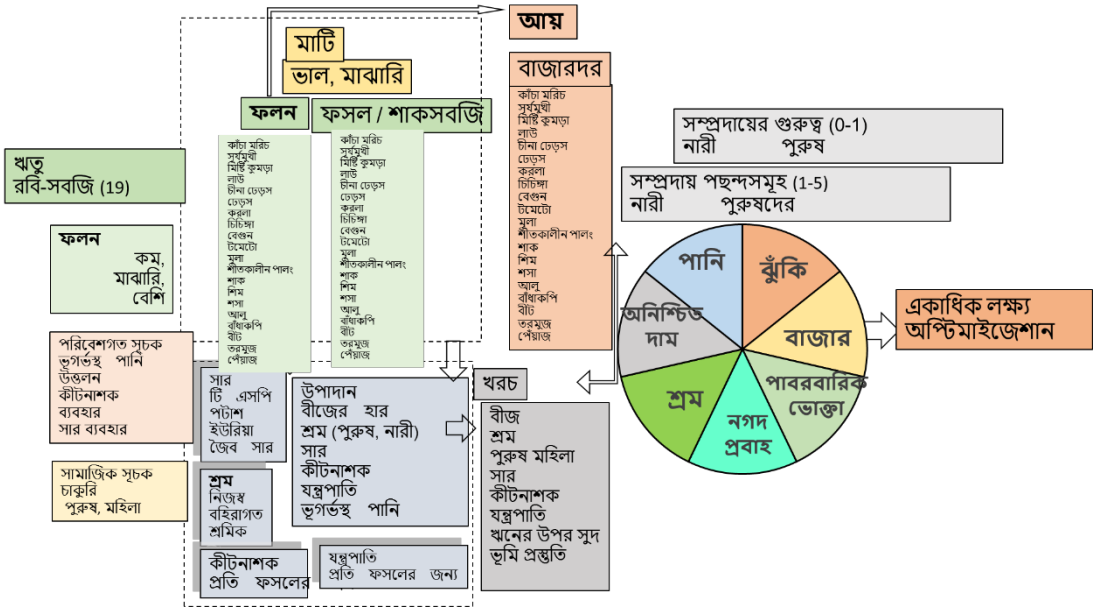

Fig 9: A Bangla language version of the model formulation that was used to explain the different elements of the model to the participating farmers.

Like in Sekenderkhali, we organised a farmer focus group discussion (FGD) in Khatail. Twelve farmers participated (7 women and 5 men). We followed the same approach of engagement as in Sekendarkhali. Before we proceeded to explain the modelling and scenario building, we requested the participants to respond to two basic questions about their knowledge on crop choice decisions.

Mahanam Dash from Shushilan and Wakil Rahman from BAU presented the modelling concept. Since the same set of farmers participated in the data collection phase of the model development, we again validated the data with them before running scenarios. Some prices were adjusted according to their suggestion. Once the data was agreed to, we ran the model scenarios. As an illustration of the model, we presented two scenarios for the farmers (that incorporate male and female preferences). The first scenario was maximising for profit without preferences and weights.

The model selected most of the area of the cultivated land of the village for sweet potato, bottle gourd, potato and water melon. Farmers agreed that this would be the outcome if profit was the only motive. We then ran a model scenario that included the weights they would place on one among the seven variables (water, risk, market, self-consumption, cash-flow, labour and price-volatility). As a start, the women farmers placed a weight on profit = 0.20, risk = 0.60 and water = 0.20; while men farmers placed a weight on profit= 0.40, risk = 0.20 and market = 0.40.

The model selected a large area for bottle gourd and sweet pumpkin as a result of female farmer's preference weights on labour while the model selected sweet potato, bottle gourd, potato and water melon in relation to male farmer preferences.

Fig 10: Mahanam Dash helping out to fill in the short survey before and after the model discussion.

Fig 11: Khatail farmers looking at the data and validating it (data collected from farmers).

Fig 12: Bangladesh Agricultural University and Shushilan partners (Wakilur and Mahanam) explaining the model to the participating farmers.

Fig 13: Khatail farmers and NGO staff with the project team.

3.7 Capacity building among in-country project partners

Bioeconomic modelling of crop choice was included in the SIAGI project in the project meeting of October 2016 in Kolkata. The bioeconomic modelling team constituted at the beginning of the process included Pulak Mishra (IIT), Subrata Majumdar (CDHI) from India and Wakilur Rahman (BAU) and Mahanam Dash (Shushilan) from Bangladesh. Along with this team Niladri Sekhar (IIT PhD student) joined in the data collection and farmer engagement in India case study. Sumana Bhuiyan as part of the Shushilan team with a focus on Khatail, and as part of the delivery team, Sambhu Singha joined Shushilan to carry out the engagement activities in Sekenderkhali.

Initially, the modelling and model runs were carried by Uday Nidumolu as it entailed working the GAMS programme and the project team were not familiar with it and there was no expectation that the project team would handle this tool by themselves. However, during the farmer engagement exercise in March 2018 in Khatail, NGO partner Shushilan made a comment about how useful it would be if they could use this tool themselves to engage with the farming community in the upcoming Rabi season. This triggered the

thinking about developing a user-friendly interface in Excel to run the model (inputs and outputs via Excel with no requirement to deal with the modelling programme). During May 2018, we developed a draft of the interface and tested it with the project team and after a few iterations, it was found to be useful to proceed to train our in-country project partners in the use of the tool.

It is important here to point out that the development of the model and interface were not in isolation of the project partner and farmer participation. In fact, the interest and participation from the in-country project partners in the tool developed from the conceptual stage to data collection to model development and demonstration to the farmers. Figure 3 illustrates this process.

The model was deliberately designed with the ease of use as an objective. As such a commonly used spreadsheet approach was taken for data collection and storage and the same spreadsheet for data outputs. Also, a free to use the demo version of GAMS was selected and the programming carried out within the restrictions of the demo version so it can be installed on in-country partner computer systems without the licensing hassle.

Also, the model is designed to be interactive and as such the model run with every iteration is about 30 secs so as not to lose the interest of the farmers when used as a discussion tool. Since the modelling tool will be used a discussion tool with the farmers, the model outputs have been developed to displayed in Bengali taking care that the Bengali used for the terms used in the model are slightly different in West Bengal (Indian case study) and in Bangladesh.

Once the model interface had been developed with this background, the capacity building workshops for the project partners worked out to be a smooth transfer of the model, software and knowhow (Figure 14-19). Since the project partners BAU, Shushilan, IIT and CDHI have been partners in this effort from the beginning they were familiar with the model framework, data (as this was collected by them) and they were able to connect to the working of this model easily.

As part of the workshop feedback, we administered a short survey to the project participants. Participants indicated that their knowledge and understanding of the modelling tool increased significantly as a result of their participation in the workshop. On a scale of 1-10 (1 = not at all confident; 10- very confident), they rated between 6-10 about their ability and perceptions on the utility of the tool to engage with the farming community on crop choice. Some of them also had a significant change in their perception on the utility of the modelling tool before and after the workshop participation. This questionnaire was not meant to be an exhaustive survey but a quick feedback from the workshop participants.

The next critical step in the process (next step 11 in the flowchart Figure 3) is their engagement with the farming community following this training on using this modelling tool. While the fact that NGO partners are able to use the modeling tool and feel comfortable about it is an important first step, if this adds to their portfolio of approaches to engage the community in a meaningful way then that would be an example of crossing the ‘technology barrier’.

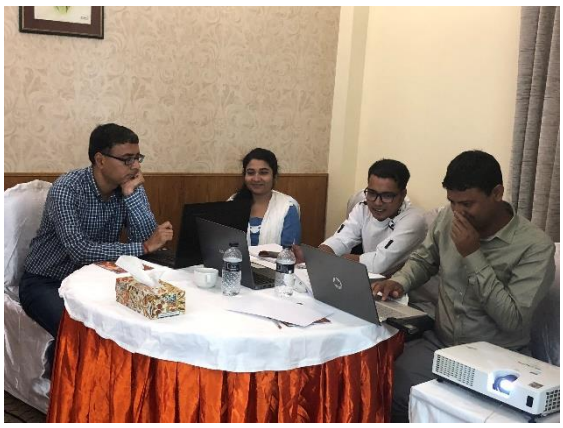

Figure 14: Data and model installing session.

Figure 15: Sumana Bhuiyan presenting the model in the 'role play' session where the rest of the team were role playing as farmers.

Figure 16: Sambhu Singha presenting the model in the 'role play' session where the rest of the team were role playing as farmers.

Figure 17: Workshop participants in Dhaka.

Figure 18: Workshop participants in Kolkata.

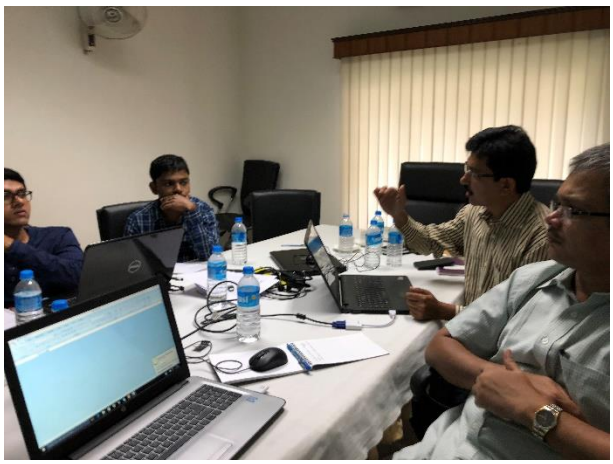

Figure 19: Subrata Majumdar presenting the model in the 'role play' session where the rest of the team were role playing as farmers.

3.8 Farmer engagement by NGO and university partners

3.8.1 Feedback on the use of bioeconomic modelling with farmers in Khatail and Sekenderkhali

As part of the engagement process in March 2018 we administered a short survey to capture the feedback from the farmers before and after the model presentation and discussion. The format is given below. The form was translated into Bengali and was written on a board, the farmers were later assisted with filling out the form.

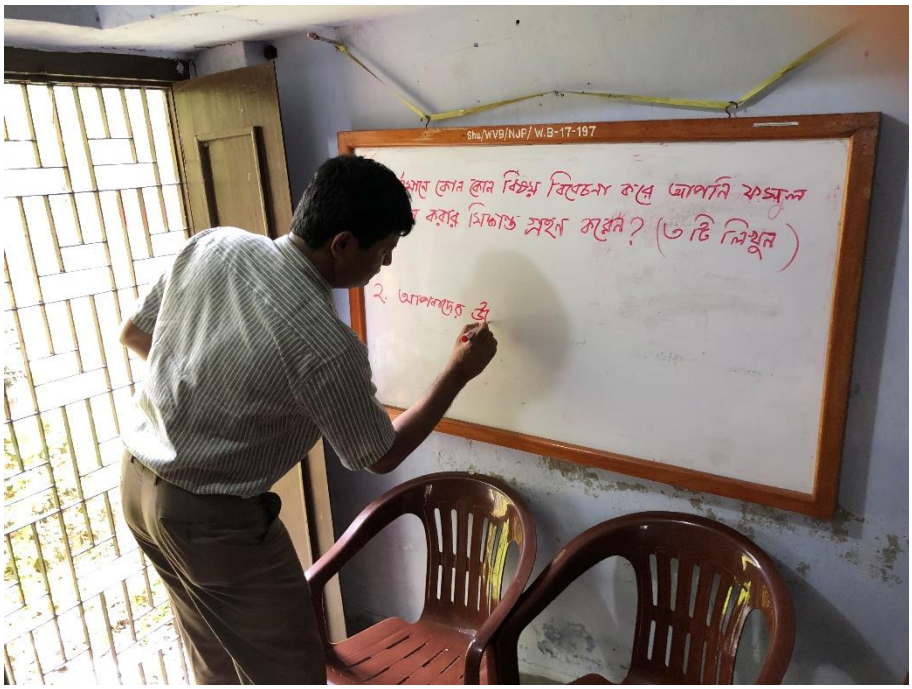

Fig 20: Wakil (BAU) writing the Bangla version of the survey for the benefit of the farmers.

A short survey was used to seek feedback from the participants in the workshops conducted in Sikenderkhali and Khatail in March 2017. The survey is shown below.

<u>Individual farmers response to be collected (each farmers to get one sheet). Names not recorded. Sushilan/BAU to explain the contents of this sheet and discuss this only after getting individual farmer's consent to participate.</u>

<u>Before</u> the model presentation and discussions

1. Currently Key factors influencing your crop choice decisions (top 3)
2. On a scale of 1-10 how do you rate your current knowledge factors influencing Rabi crop choice

<u>After</u> the model presentation and discussion

1. On a scale of 1-10 how do you rate your current knowledge factors influencing Rabi crop choice
2. First impressions from model presentation and discussion (key words)
3. Do you see this sort of tool as something useful to consult.
    a. If Yes, how
    b. If No, why and what would make this tool more relevant for you.

3.8.2 Engagement process developed by NGO partners

Shushilan and BAU in Bangladesh and IIT and CDHI in West Bengal subsequently re-engaged with the farming community using the modelling tool after the training workshop. They organised farmer meetings in Nov-Dec 2018. The NGO partners translated the modelling approach to suit the locally relevant formats that helped them with conveying options of the modelling tools to the audience and seek their participation. The short reports on the activity are appended which have been reported in their own words.

4. Results

The results presented in this section have two components: (i) the scenarios developed for discussions within the modelling/project team that were discussed before engaging with the farming communities and (ii) scenarios developed as part of the engagement with the participating farming communities in the case study locations.

4.1 Scenarios developed for discussions within the modelling/project team

As an example, we present the scenarios from Dhaloguri. Initial results of a using self-consumption scores of men and women farmers for the Rabi season for Dhalaguri are presented below. The yields used in these test runs are for a 'Medium' season (out of the three options 'Low', 'Medium' and 'High' yields). These model runs are a sample demonstration on how the model reacts to changes in scores and weights among men and women farmers and constraints that may be imposed.

Table 1: Women and men farmer scores on crop-wise self-consumption (on a scale of 1-5).

Crop	Women Self-consumption score	Men Self-consumption score
Cabbage	1	3
Cauliflower	1	2
Chili	1	3
Potato	3	5
Tomato	1	3
Brinjal	2	4
Spinach	5	4
Coriander	5	4

Scenario 1: Scores on self-consumption; weights 0.95 for profit and 0.05 for self-consumption
Crop choice for both women and men farmers (as profit has the highest priority)
Potato (good soil) 308 ha
Potato (medium soil) 57 ha

Table 2: Scenario 1 outputs for women and men farmers

Labour days		Costs ('000 Rs)							Revenue ('000 Rs)	Costs ('000 Rs)	Profit ('000 Rs)
Women	Men	Fert	Pest	Labour	Seed	Machine	Landprep	GW			
14542	21759	13025	16809	65	51	2733	1749	13	83800	36992	46807

GW: GroundWater; Fert: Fertiliser; Pest: Pesticide

In scenario 1, both women and men farmers have equal weights on profit and self-consumption. Although their scores on self-consumption are different for some crops, since they weigh profit more than their preference for a crop, the model optimises on profit and as such chooses the most profitable crop.

Scenario 2: Scores on self-consumption are same as Scenario 1; change in weights - 0.5 for profit and 0.5 for self-consumption

Crop choice for women farmers
Coriander (good soil) 308 ha

Table 3: Scenario 2 for Women farmers.

Labour days		Costs ('000 Rs)							Revenue ('000 Rs)	Costs ('000 Rs)	Profit ('000 Rs)
Women	Men	Fert	Pest	Labour	Seed	Machine	Landprep	GW			
13101	1575	7719	8483	65	624	2733	1749	4	50583	22658	27925

Crop choice for men farmers:
Potato (good soils) 308 ha
Potato (medium soils) 57 ha

Table 4: Scenario 2 outputs for Men farmers

Labour days		Costs ('000 Rs)							Revenue ('000 Rs)	Costs ('000 Rs)	Profit ('000 Rs)
Women	Men	Fert	Pest	Labour	Seed	Machine	Landprep	GW			
14542	21759	13025	16809	65	516	2733	1749	13	83800	36992	46807

In scenario 2, the both women and men farmers weigh their self-consumption equally with profit. Here their preference scores for potato and coriander for self-consumption are 5. Hence the model skews the selection to potato as a choice of men farmers and coriander as a selection of women farmers as most profitable given their preference scores and their weights with respect to profit.

Scenario 3: All variables remain the same as Scenario 2, except for the condition that that the area grown for potato and coriander cannot be more than 200 bigha each.

Crop choice for women farmers:
Spinach (good soil) 258 ha
Coriander (good soil) 51 ha
Coriander (medium soil) 57 ha

Table 5: Scenario 3 outputs for women farmers.

Labour days		Costs ('000 Rs)							Revenue ('000 Rs)	Costs ('000 Rs)	Profit ('000 Rs)
Women	Men	Fert	Pest	Labour	Seed	Machine	Landprep	GW			
13101	1575	7719	8483	65	726	2733	1749	5	40633	22766	17867

Crop choice for men farmers:
Spinach (good soil) 208 ha
Potato (good soil) 51 ha
Potato (medium soil) 57 ha
Coriander (good soil) 51 ha

Table 6: Scenario 3 outputs for men farmers.

Labour days		Costs ('000 Rs)							Revenue ('000 Rs)	Costs ('000 Rs)	Profit ('000 Rs)
Women	Men	Fert	Pest	Labour	Seed	Machine	Landprep	GW			
13522	7471	9619	10915	65	675	2733	1749	7	51042	27303	23739

These initial test runs show that the model responds to changes in preferences and weights and can generate a number of scenarios.

4.2 Scenarios developed as part of engagement with farmers in case study locations

4.2.1 Dhaloguri – scenario-based engagement with participating farmers

In November 2017, we engaged with the farmers in Dhaloguri and ran the model scenarios with them. In scenario 1, the model was run with profit maximisation as the only objective without any preferences from men and women farmers. The model allocated 25 ha to cabbage, 336 ha to potato, 3 ha to tomato and 5 ha to coriander (Figure 21).

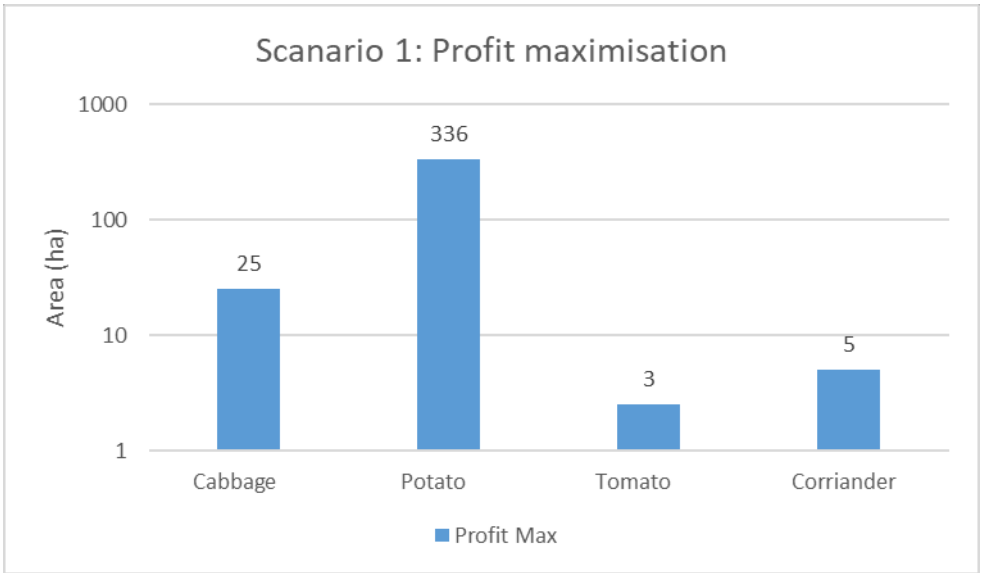

Figure 21: Crop choice without preferences

In a scenario 2 (Figure 21), women farmers placed a weight of 0.9 on labour (less labour-intensive crops) and 0.1 on profit while the men farmers had a weight of 0.8 on market and 0.2 on profit. The model allocated 255 ha for eggplant, 101 ha for spinach and 10 ha for coriander while based on the weights placed by the men farmers the model allocated 277 ha for tomato, 101 ha for cabbage and 10 ha for coriander.

The outcome of the model run is in Figure 21.

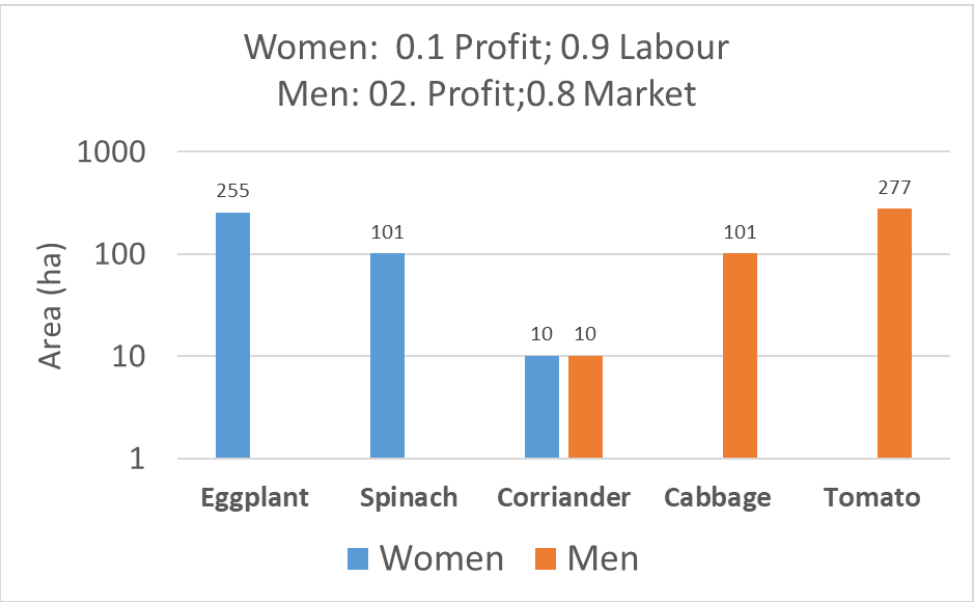

Figure 21: Crop choice with weights placed on preferred variables

In scenario 3, 0.8 weight is placed on cashflow and 0.2 on profit. The model allocated 358 ha for chilli and 10 ha for coriander as a result of the women farmer preferences and 358 ha for tomato and 10 ha for coriander in case of men farmer preferences (Figure 23). While the weights placed by both men and women farmers are the same the resultant crop choice is different because the preference scores are different. While the resultant profits vary between men and women farmers the response from the farmers in the discussion was that these scenarios reflected their choices based on their priorities.

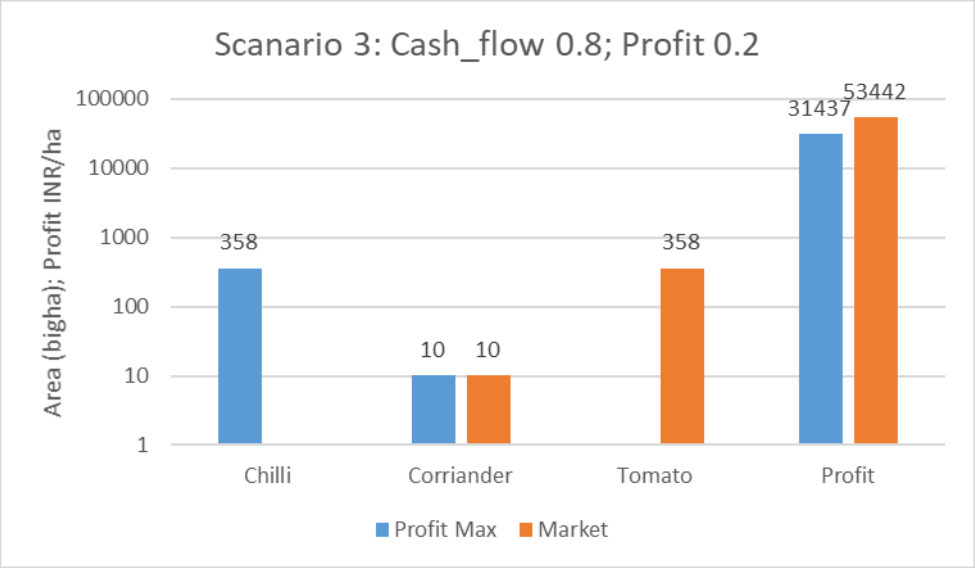

Figure 23: Cash flow weighted 0.8 and profit 0.2

Like the scenarios presented above a number of options can be developed through this interactive tool and since each of the model run takes about 30secs, this tool can be used interactively with the stakeholders (farmers, extension staff among others).

4.2.2. Khatail – scenario based engagement with participating farmers

Like in Dhaloguri, we ran the scenarios with the participating farmers in Khatail in March 2018. We first ran the scenario where profit maximisation is the only objective without any weights and preferences. The model results are presented in Table 5. Since the scenario was just on profit maximisation without preferences or weights being included the crop choice is the same for both men and women farmers. Farmers in the meeting agreed that sweet-pumpkin, bottle gourd, potato and water melon would be their choice if they wend just for profit as a criterion in their decision making.

Table 5: Scenario 1: profit maximisation only no weights on preferences

	Crop	Soil_type	Area (ha)
Women	Sweet_pumpkin	high_soil	10
	Sweet_pumpkin	medium_soil	10
	Bottle_gourd	medium_soil	23
	Potato	high_soil	23
	Water_melon	high_soil	7
	Water_melon	medium_soil	7
Men	Sweet_pumpkin	high_soil	10
	Sweet_pumpkin	medium_soil	10

	Bottle_gourd	medium_soil	23
	Potato	high_soil	23
	Water_melon	high_soil	7
	Water_melon	medium_soil	7

The next scenario we ran was a mix of profit, risk and water (optimising water) with different weights placed by men and women famers as shown the table 6. While the crop choices of sweet pumpkin and bottle gourd are common for men and women farmers, focusing on markets and profit in the case of men farmers resulted in model allocating 33 ha to potato and 7 ha to water melon.

Table 6: Scenario 2: Women Profit 0.20, Risk 0.60 and Water 0.20; Men Profit 0.40, Risk 0.20 and Market 0.40

	Crop	**Soil_type**	**Area (ha)**
Women	Sweet_pumpkin	High_soil	10
	Sweet_pumpkin	Medium_soil	10
	Bottle_gourd	High_soil	29
	Bottle_gourd	Medium_soil	29
Men	Sweet_pumpkin	Medium_soil	10
	Bottle_gourd	Medium_soil	23
	Potato	High_soil	33
	Water_melon	High_soil	7
	Water_melon	Medium_soil	7

Farmers also indicated their knowledge on choosing crops for upcoming Rabi season. As per their perception, the rate of their current knowledge was on the scale of 3 to 7 before the presentation of the crop choice model and 6 to 10 post-workshops.

In Sekenderkhali, participants reflected that they were impressed and felt good after presenting the model separately considering men and women farmer choices. With some limitation of data (particularly of water issue), the model had showed the most profitable crops such as potato and bottle gourd. Farmers recognise that a computer-based model *"can do many things within a short time that will help them to discuss crop choice options"*. However, they do indicated that ultimate decision must be taken by the farmers from their experiences and interest. Even, the person who is running the model may not prescribe about crops decision except helping the process. We noticed that we missed water variable for the case study scarcity in that project area. Later on, we include two aspects these are raised by farmers i.e., water and pulse crop. In Khatail, the response from the farmers to this sample demonstration was that it was realistic and that is what they would do have chosen with those preferences. We ran only a few scenarios as a demonstration of the model. Farmers clearly showed their interest in using similar tools for farming decision-making, especially for crop choices.

4.2.3 Response to survey on the utility of bioeconomic modelling activity and scenario building exercise by farmers

The responses from the farmers are given in the annexe to this report. Farmers provided the response in Bengala and they have been translated from Bangla to English by Mahanam. While the numbers may be seen only as indicative of their perception about improved understanding of reasons of crop choice, the key learning from this exercise for the farmers has been an appreciation of the complexity of incorporating a number of variables (input costs, labour, finances, markets) and a tool like the one presented is able to

combine lot of data and generate optimal choices based on preferences in about 30seconds (processing time for the model) was attractive as discussion tool which is reflected in their responses to the survey questions.

4.2.4 Response from one of the participating farmers on utility of bioeconomic modelling activity and scenario building exercise

NGO CDHI have reported the case of Bablu Oran on his exposure to the bioeconomic modelling tool:
"Bablu Oran is a farmer of Uttar Chakuakheti, one of our study villages where we have been facilitating Bio-economic modeling as a discussion tool, was sharing his learning from Bioeconomic Modelling exercises. According to him this modelling exercises have influenced him to practice the book keeping for recording all expenditures of inputs /cultivation cost and income (from selling crops). After participating to the Bioeconomic Modelling discussion / training organized by CDHI, he is writing daily expenses and income from crop sales in his note book very systematically, which is helping him in analysing the reasons behind profit-loss at the end of the crops season. At the same time, it is helping him during selection of crop for the next season. Prior to Bioeconomic Modelling, he also used to keep record like other farmers of Uttar Chakuakheti, but it was irregular and was unable to analyse the cost-benefits.

During the discussion with Bablu, it revealed that Rita, Mrinal, Soren, Tapan, Kaliram and many others have also been doing record keeping after participating in the discussion of bio-economic modelling. Although the number of such farmers is not so big but Bioeconomic Modelling has played an important role in changing the practice of crops cultivation (in some cases) in the SIAGI project location. It supported the poor and marginal farmers to enhance their skills and income."

5. Conclusions

Quantitative engagement with community using participatory crop choice scenario building modelling tool has been an important complement in the largely qualitative social engagement of SIAGI. The model developed specifically for supporting crop choices in the Rabi season considers several resources such as land, labour, capital to produce a certain number of crops (as activities) based on a certain number of constraints. The scenarios take into account community perceptions (gender-specific) on risk, labour use, market, price-volatility, self-consumption , water, cash flow and relate to exploring the consequences of different crop choices on income, labour (gender specific), use of inputs (environmental impact of intensification), markets among others and explicitly expose the trade-offs of pursuing different development pathways (in the context of intensification). We adopted a reflective learning process based on the Plan–Do–Observe–Reflect of the Kolb learning cycle as the quantitative scenarios tool was aimed at supporting a co-learning process among researchers, extensionists and the farming community.

With the availability of a tool like the bioeconomic model, the 'intermediaries' or 'boundary organisations' such as the NGOs are enabled to have a more 'informed' discussion with the farming community which is an important addition to their work. The participating farmers and NGO and academic partners have commented that an important use of the modelling provided them a better appreciation of the various inputs that were applied in growing different crops in the region, costs and revenues as a result of their crop choices. The gender specific preferences also raised insights into the reasons for either overlapping or differences in perceptions between men and women farmers. While these discussions are a regular feature in farming families, the scenario building activity enabled a more explicit expression of the choices which we think is a good outcome in cropping decision making within the farming communities. The value they placed on the modelling tool was that it facilitated the exploration of consequences ('what if?' scenarios) of their crop choices through identifying different cropping allocation decisions under different constraints. As with the scenario modelling tool such as this, the question of outcome and impact has a diffused pathway. For example, famers have *changed their behaviour (outcome)* in the way they start keeping expense records as has been evidenced by the narrative of Bablu Oran above. We did not anticipate this as an outcome, but it turns out to be a very useful one. Now how that 'informed' discussion manifests in cropping choices leading to improved financial or food security outcomes may be a diffused pathway and

attribution needs to be carefully calibrated while emphasising that this tool is not prescriptive tool and is a discussion tool only.

6. Acknowledgements

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Appendix 1:

Using Participatory Tool for Collecting Data and Presenting Crop's Choice Model to the Farmers
Mahanam Dash - Shushilan

The study team can use this participatory tool when carrying out an interactive and effective discussion with different interest groups of the communities such as marginal, landless and women managed farming household communities for choosing the crops in different crop seasons considering their agriculture inputs, outputs, risks factors and challenges. This tool is an aid to discussion and collection of quality data through consensus building of the participants. We think this tool enables a more consistent and robust interactive discussion, data collection and feedback from different groups.

Name of the tools: Interactive Data Collection and Weight Score Game

Objectives: to help the participants to explore

- Crops price, yield and costs (What are the changes in the crops' price, yield and costs? (maximum, minimum and average) why these are changing?
- Area of crops maximum and minimum and why maximum and a minimum area of land?
- Weights and variables (profit, labour, self-consumption, market, risk etc) and explore their comments and feedback. What are the weights and variables to choose crops for growing? What is the distribution of weights 0-10 score/number as per variables and why these weights/scores?

Time: 1.5-2 hours depending on the size of the groups

Materials: Poster paper, pictures of vegetables/ actual sample of vegetables can be used, permanent markers for writing/symbolize the objects/scoring. 20 marbles or stones need to use for playing the game and scoring/ weighting on factor's variables.

The process of crop choice model running included

- Sitting arrangement, rapport building and introduction
- Using homogenous group for men and women
- A brief look of data and group exercise
- Run model without any weights and discussion
- Again, run the model with changed data and discussion on changes
- Explain the weights and Weight Score Game on variables
- Comments, feedback and vote of thanks

Note: for delivery of each process, maintaining empathy, smile in face, correct body movement, eye contact, facial expression and tone of voice with the participants are absolutely important for ice-breaking and ensuring effective participation in the session.

Description of the process that we followed in both study villages:

- **Sitting arrangement, rapport building and introduction:** Comfortable and quiet place, but women-friendly is important for effective discussion and brainstorming of the farmers. U or round shape, but an equal arrangement of sitting is considered as an ideal shape of sitting to help concentrating on the activity for all. Mat or Jute sacks in rural areas can be used for sitting, but a table is necessary for using multimedia, laptop and presenting the crop choice model. The meeting starts with rapport building for enabling greater and easier communication with both men and wpmen participants. It is an initial process for ice breaking, bringing the participants into the main topic and making the session more interactive and effective. Example: The lead facilitator introduced the team members and assists the participants to introduce themselves. The lead facilitator also debriefs the objectives of the meeting and connect the data collection process in 2017 and the modelling tool experimental demonstration in February 2018. Moreover, lead facilitator should emphasis on the discussion that the results of the model are not absolute truth, fixed and

confirmed (and are not prescriptive). Many issues and factors are included here. It is a discussion and a brainstorming tool so that farmers can get an opportunity to discuss their choices for the upcoming season considering the field characteristics, risks, inputs and costs, but the final the decision absolutely depends upon farmers and their capabilities.

- **Using homogenous group for men and women:** Divided the participants into two homogenous groups (men and women) for easy interaction and maintaining cultural norms. Formation of the homogenous group also helped in the group exercise with using participatory tools such as Matrix Exercise and Weight Score Game. In that case, 7-8 participants are ideal for each group.
- **A brief look of data and group exercise:** If possible, using multimedia is fine for presenting the data. Distribution of the brown paper of the matrix format showing one column vegetables' pictures (vegetables that were identified during data collection) and other columns are prices, yields and costs so that group members use the brown paper if there is any change they find or consider during presenting the data. This is followed by presenting data that collected in 2017 by the facilitator (Sambhu/Sumana). If there is any change, the participants have written down the values on the matrix format through discussion and consensus building with other members. The facilitator also took an opportunity by asking questions why the changes/reasons for changes? In that way, the participants changed the prices, yields and costs.
  Questions: Are you finding any change of data (yields, prices and costs) during presenting the data you provided in 2017? If yes, please follow the matrix format to write down the real values. (See the data on the screen you provided in 2017. You also have found a matrix format including vegetables, yields, prices and costs. If you find any change during presenting the data please stop us and consult with the group members what will be real figures/values and write down on matrix format by seeing the vegetables pictures.)

Table 1: data verification chart used in the engagement activty

Vegetables	Yields per bigha	Prices per kg	Costs per kg/packet
			
			
			
			
			
			
			

Figure 1: Translating model components into charts/pictorial representation

- **Run model without any weights and discussion:** After presenting the brief data, the co-facilitator (Sambhu/Sumana) run the model without adding any weights to run the model only for profit maximisaiton. The facilitator opens the floor for the discussion after completing running the model for profit maximisation. Example of questions: Are the results are matching with their experience and ideas of choice that they think or not. What about the comments on the results?
- **Again, run the model with changed data and discussion on changes:** Incorporate the values that have been changed by the participants then run the model again to see the results and open the floor both men and women separately to know their comments and feedback.
- **Explain the weights and Weight Score Game on variables:** Weight Score Game is a matrix box of weight factors (such as profit, labour, risk, market, self-consumption, price volatility and cash-flow) that is indciated on poster/brown paper. Use of pictures on weight factors for clear understanding the message to illiterate participants has been done. Again, divide the participants into two groups (men and women) and distribute the materials of Weight Score Game (drawn brown paper, 10 marbles/stones to each group (what are available). Explain the weight factors and Weight Score Game how they weigh the variables (such as labour, self-consumption, market, risks against profit) by using 10 marbles/stones. Participants make the score/weight on variables through discussion and consensus building with each other. participants. One mentor may be selected from each group to carry on the game. The facilitator will change the weights based on score/weight on variables done by the participants. After inputting the score into the database of the computer, the facilitator will run the model to see the results and open the discussion session on results.
  Examples of game board

Profit	**Labour**	**Risk**	**Market**
Self-consumption	**Price volatility**	**Cash flow**	**Water**

Figure 2: Women farmers score on variables using stones.

Roles and Responsibilities:

Resource persons: require two facilitators and one note taker (one lead facilitator, one co-facilitator for operating the model and one note taker)

- **Lead Facilitator** Mahanam from Shushilan is responsible for delivering the tools effectively and engaging the participants in the process. He is also responsible for guiding the process and ensuring other team members with sufficient technical support to carry out the implementation of the tool and presentation of the crop-choice model. During running the model, he/s may take the picture with the concern of the participants.
- **Co-Facilitator:** Sambhu/Sumana Sarah is responsible for running the crop-choice model confidently and make the model understandable to all. He/s will also follow the lead facilitator for maintaining the process and makes the discussion interactive. During the discussion session conducted by the lead facilitator, he/s may take the picture with the concern of the participants.
- **Note-Taker:** Wakil sir/Sambhu/Sumana is responsible to take note of what are the changes made by the participants, the participant's comments, feedback etc. He/s will also look after if there is anything missing during delivery of the tool, presenting the model process. He/s is also responsible to finalize the notes.

Appendix 2:
Bio-economic modeling: the farmers offer useful insights and learn to practice

Field note by
Subrata Majumdar and Dhanajay Roy, CDHI

The background
Bioeconomic modelling is an important component of SIAGI which is designed to offer a platform to examine and analyse various options in different evolving situations-farmers being able to do it themselves and take decisions on crop choices under evolving conditions the consideration for the choice being

- Profitability
- Investment abilities
- Labour requirement
- Short duration
- Good market / market access / easily saleable
- Cash-flow
- Self-consumption as well as demand in market
- Preferred multi crops (less risky)
- Low risk
- According to the soil /land and time, etc.

The list could be expanded.

During the last mid-term review of SIAGI, at Khulna, the concept attracted further attention. It was suggested to fashion the model as a farmer friendly concept and practice. It was argued that if the farmers could take advantage of the model, in practice, this was worth pursuing. Another set of thoughts suggested that the modelling could be immensely useful in the face of thin presence of the extension agencies, equipped to advise the farmers.

For CDHI it was an opportunity to

- introduce the concept before the farmers
- Have their views and feedback
- Evolve training and hand holding
- Create an environment of ease of comfort to try understanding
- Help them design practice protocols

It was presumed that if the farmers could be involved in the design and practice strategies, they could establish ownership and enjoy the benefit. The model cannot be a permanent solution tool. It would offer the farmers revisit and see the context before putting the understanding into practice.

We used the ECE perspective while introducing the concept and helping the farmers evolve options under varied conditions. This necessitated use of participatory tools, vernacular conceptual nuances and self-evolving processes. Our collaborators CSIRO and IIT Kharagpur offered conceptual and technical inputs while CDHI helped unpack the complex concepts and technical nuances by using participatory strategies and tools. Following steps were used:

1. Conceptual clarity for the team
2. Practical training to the team members
3. Training to the team members
4. Final introduction to the farmers
5. Training and hand holding and
6. Integration into farmers protocols and practices.

In the following section we present the process and outcome of one training cum practice exercise:

A discussion on Bioeconomic modelling with the framers of Dhalaguri was held on 17th of November 2018. Team members of CDHI and IIT, Kharagpur discussed the model with the farmers and explained the implications of the model. There were 23 farmers including from the existing collectives and newly formed WUAs actively participated in the discussion and shared their views. We played the role of facilitators during the discussion and used various interactive tools as they easily understand the process and model. It helped the farmers quite a lot to understand the purpose of the model and they communicated their views without any hesitation. We followed the following steps –

- We prepared some materials in Bengali as the farmers can understand the model easily and reflect. We observed during our earlier interventions that farmers are not very comfortable with the projectors / computer (when display any data). They are more comfortable with evolving process as we used the chart papers and used interactive way.
- We used chart papers for noting down all the points shared by the farmers and volunteers from the participants took all the notes and discussed.
- Initially farmers are requested to share their thoughts behind selection of crops and farmers shared them. At the same time, the points that came out from the last meeting were displayed and requested to the participants for finding out the matches or discrepancies with their current thinking. We facilitated the discussion and later linked it to the model and farmers enjoyed the whole process and reflected their views freely.

Figure 1: One of the farmers sharing his thoughts on the crop selection

They considered the following points for selecting any crop.

- Profit
- Investment is less or within the capacity
- Labour requirement is less
- Short duration
- Good market / market access / easily sellable
- Cash-flow
- Self-consumption as well as demand in market
- Preferred multi crops (less risky)
- Low risk
- According to the soil /land and time, etc.
-

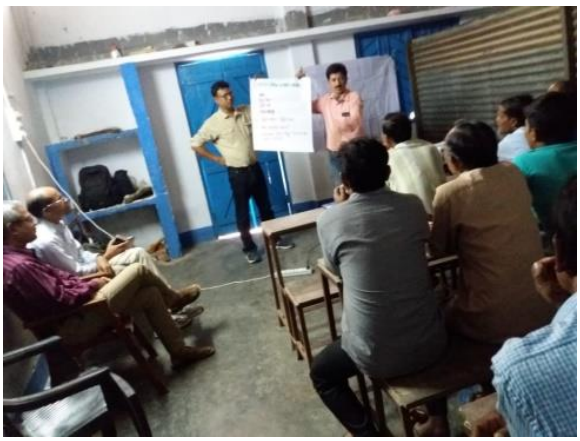
- 

Figure 2: Explaining the modelling approach to the farming community

- Each component of the model was written in a chart paper (in Bengali) and displayed in front of the farmers as they understand the model properly. The team gave full explanation on the process of collecting data from the farmers. Everyone agreed on the need of keeping records properly and decided from now on they will keep all the accounts properly. During the discussion they said that only 5-6% farmers may keep their expenditure and income account properly and most of them (who are keeping accounts properly) are businessman, poor farmers (small and marginal farmers) have no habit of keeping accounts properly, Sometimes they start to keep the accounts but it is continuous until they get the profit from the crop.
- We prepared some slips / cards in Bengali for understanding the concept of weightage. We prepared cards of profit, labour, market access, price volatility, risk, self-consumption, cash flow and farmers were requested to keep stones (we used 10 stones) on the cards according to their preferences and they did the same (someone kept 6 stones on the profit, three on the risk, etc.). After getting the preference of the farmers, we transferred data on the computer and ran the program. Computer displayed the list of crops accordingly. Participants seemed to have enjoyed the process and the interactions. Everyone participated on the discussion and reflected.

Figure 3: Understanding the concept of weightage

After the above interactions, farmers discussed their plan for next rabi season. Farmers are encouraged by mixed cultivation because it is less risky, although the farmers (WUAs) have planned potatoes in most of the land.

Outcome

- Enhanced understanding of the concept
- Reflective environment created
- Willingness among the farmers to use and try
- Scientific –more rational planning
- Bioeconomic modelling demystified –even the farmers can do and practice it as a planning and management tool
- Respect for farmers wisdom and capabilities enhanced
- ECE approach proved a better methodological option to empower the farmers

Appendix 3: Feedback on the use of bioeconomic modelling with farmers in Sekenderkhali and Khatail

Sekenderkhali

Farmers' number	Before presentation		After presentation and discussion			
	1. Currently Key factors influencing your crop choice decisions (top 3)	2. On a scale of 1-10 how do you rate your current knowledge factors influencing Rabi crop choice	1. On a scale of 1-10 how do you rate your current knowledge factors influencing Rabi crop choice	2. First impressions from model presentation and discussion (key words)	3. Do you see this sort of tool as something useful to consult a. If Yes, how	b. If No, why and what would make this tool more relevant for you.
Women farmers						
1-w	Sunflower and maize: • High production • Easy marketing • Meet the demand of family expenses • Meet the demand of expenses of cultivation	7	8			
2-w	Sunflower • Meet the need of oil of the family • Sale in the market • Meet the expenses of the Aman production Ground nut • Consumption purposes • Sale in the market • Meet the demand of the family Chilli • For consumption	7	8	• We will be benefited	• Will be benefited to grow new crops	
3-w	Ground nut • Consumption purposes • Improving good health through consumption • Good price in the market	5	8	• will be benefited	• Will be effective to introduce new crops • Taking right choice of the crops' decision	
4-w	• Ground nut • Consumption purposes • Sale purposes • Require less labour High profit Pulses • Consumption • Sale in the market • Potato • Consumption and sale in the market	3	10	• It can help which crops are more profitable	• We can cultivate right crops	
5	Ground nut • For good health and getting vitamin • High price Potato • Consumption • High profit	4	9	• Increased knowledge	• Help us to become financially benefited • Select right crops for being benefited	

	• Meet the cost of the child education Moogbean • High price • Home consumption (for eating Khichuri) • Sale					
6-w	Sweet pumpkin • Home consumption • Sale Pulses • Profit • Consumption • Sale	5	9	• Help to become benefited	• Yes, increased knowledge • Help us to choose right crops	
7-w	Potato • Home consumption • Sale in the market • Get vitamin	8	10	• Model is good and I will be benefited if it works	• Developed knowledge about new method	
8-w	Chilli • Home consumption • Getting vitamin • Sale in the market	9	10	• I like this model	• Yes, Help us to select right crops • Developed knowledge about crops choice	
Men farmers						
9m	Potato, sunflower, pulses, maize • Home consumption • High market price	4	8	• Feel good	• Yes, help us to choose right corps • Help to increase production • Help for new crops	
10m	Ground nut, potato and sunflower • Home consumption • Family earning • Getting benefit by selling in the market	6	9	• Feel good and learn about new idea • Need more discussion about this issue	• Yes, Developed encouragement about new crops • Help us to become benefited	
11m	Potato and sunflower • Home consumption • For sale •	2	6	• It will help me	• Developed knowledge • Help us to become benefited financially	
12m	Ground nut, sunflower, sweet potato, chilli • Home consumption • For sale • To stay active in Robi season	5	8	• Feel good • It is essential for us • Can be used for us • Help us to develop our skills • Help us to reduce poverty	• Yes, • Need more discussion • We can be benefited • Help us to become self-reliant	
13m	Sunflower, ground nut, sweet potato • Home consumption • High profit • Keep food storage at home	5	7		•	
14m	Chilli, ground nut and sweet potato • Home consumption • High price • Less investment	7	9	• Feel good	• It can help us to get profit • Need discussion	
15m	Ground nut • Home consumption	5	8	• Feel good	• helpful to take right decision of crops	

	• High profit and close market • For sale Potato • High production Sunflower • Home consumption • For sale					
16m	• Sunflower, sweet potato and ground nut • Home consumption • For increasing income • Help the relatives	8	9	• Feel good and it will help us	• Help us for crop selection	
17m	Sunflower, pulses, chilli, ground nut • Home consumption • For sale and increase income • Less prouduction cost	7	9	• Feel good and it will help us • Developed knowledge	• Help us for crop selection • Help us to take right decision	
18m	Sunflower and chilli • Home consumption and for sale • Food for livestock	8	9	• Developed knowledge • Learned new methods of computer • Essential to discuss	• Help us to take right decision	•
19m	Sweet potato and ground nut • Home consumption • For sale • Meet the cost of children's education • Meet the cost of Amon production	5	6	• Developed knowledge	• Help us to take right decision	•
20m	• Tomato and sunflower • Require less irrigation • High profit • Home consumption	5	8	• We will be benefited by this model	• Help us to take right decision	•

Khatail

w – women; m - men

Farmers' number	Before presentation		After presentation and discussion			
	1. Currently Key factors influencing your crop choice decisions (top 3)	2. On a scale of 1-10 how do you rate your current knowledge factors influencing Rabi crop choice	1. On a scale of 1-10 how do you rate your current knowledge factors influencing Rabi crop choice	2. First impressions from model presentation and discussion (key words)	3. Do you see this sort of tool as something useful to consult. a. If Yes, how	b. If No, why and what would make this tool more relevant for you.
Women farmers						
1-w	Sweet pumpkin, Okra and Indian spinach (leafy vegetables) • For sale • Benefit of profit • Meet the expenses of children's education	6	8	• Feel good	• It is necessary to know • Need more discussion	
2-w	Watermelon, sweet pumpkin, okra, bean and leafy vegetables	5	8	• Feel good	• We can know more	

	• Home consumption • Financial benefit through selling the products in the market • Meet the educational expenses of children				• It is necessary for us	
3-w	Watermelon, sweet pumpkin, pulses • Meet the expenses of children's education • Meet the demand of family's nutrition • Become self-reliant	7	10	• Feel good	Need to know more Discussion is necessary	
4-w	Watermelon, sweet pumpkin, bean, pulses • Home consumption and meet the demand of nutrition of family members particularly for children • Financial benefit and to reduce poverty	6	10	• Feel good	• Need consultation and advice of the project's persons	
5-w	Watermelon, sweet pumpkin, bitter gourd and okra • Home consumption and meet the demand of nutrition • Meet the expenses of the children's education • Financial benefit of the family	8	10	• Feel good	• Developed knowledge	
6-w	Sweet pumpkin, bitter gourd, leafy vegetables and okra • Home consumption and meet the demand of nutrition • Meet the expenses of the children's education • Financial benefit of the family	8	10	• Feel good	• Help us to know more	
7-w	Watermelon and Okra • Home consumption • Meet the demand of nutrition • Safe crops •	8	10	• Feel good and many ideas are similar to us	• Will help to know and understand	
Men farmers						

8-m	Watermelon, sweet pumpkin and okra • Home consumption • Getting vitamin • Sale in the market to meet the expenses of the children's education	8	9	• Feel good about training	• Yes, Need more training about this issue •	
9-m	Watermelon and sweet pumpkin • Home consumption • High market price • Financial solvency	8	10	• Feel good	• Yes, need this type of training • Like to learn again	
10-m	Watermelon, sweet pumpkin and tomato • Home consumption and nutrition • Sale in the market • Become self-reliant	9	10	• Feel good as a farmer • This presents farmers choices	• Yes, Need discussion about this issue frequently	
11-m	Watermelon, sweet pumpkin, bean/cowpea • Home consumption • For sale	5	9	• Feel good	• Need discussion frequently	
12-m	Sweet pumpkin, okra, bitter gourd, Data(vegetables) • Home consumption and nutrition • Sale in the market • Meet the demand of the children's education	8	10	• Feel very good	• Yes, • Like to learn more by this technique	

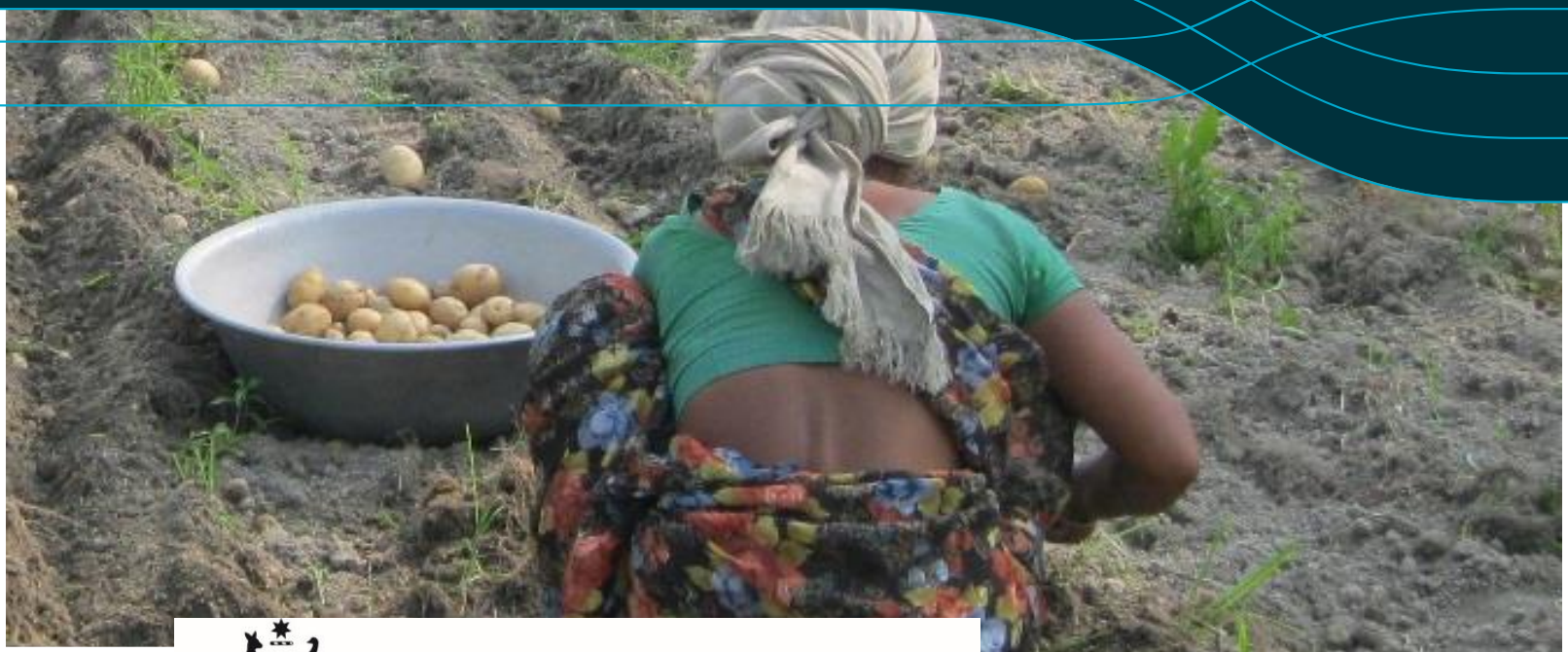
Report 4: Integrated Assessment

Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh (SIAGI)

SIAGI Integrated Assessment frameworks

Compiled by

Wendy Merritt (Australian National University)
Serena Hamilton (Edith Cowan University)



Australian Government
Australian Centre for International Agricultural Research

SIAGI Integrated Assessment frameworks

Compiled by Wendy Merritt and Serena Hamilton in collaboration with BAU, CDHI, CSIRO, IIT Kharagpur, LNRMI, PRADAN and Shushilan.

Summary

The integrated assessment process was intended to provide a 'big picture' of the social and agricultural systems we are researching in SIAGI, and to improve understanding of the interrelationships between the diverse processes, and the pathways between drivers and outcomes. A series of frameworks were developed that synthesise and distil key information gathered through the various project activities of SIAGI and its sister projects, supported by theory and observations. The framework development served as a process for synthesising and structuring knowledge, data and assumptions from the project, thereby formalising our understanding as a team. The frameworks also formed the basis for further (semi)quantitative or qualitative analysis, demonstrated in this report through the development of semi-quantitative models (fuzzy cognitive maps) and narratives.

Three interacting integrated assessment (IA) frameworks were developed, covering the themes: local water management, inclusive value chain analysis, and empowering change. The process of developing and applying these frameworks led to a broader and deeper understanding of the interrelationships between the various social, environmental, political/institutional and market systems.

By mapping out the key concepts and processes relevant to each theme, the frameworks provide a template for researchers and development actors to reflect upon the possible implications of interventions or system perturbations, and the conditions that are needed to enable positive outcomes to be achieved. The corresponding fuzzy cognitive maps also allow such scenarios to be tested, providing indications of the possible effects within the system.

The scenario analysis identified a few possible leverage points, which are promising places in the system to intervene: increasing social capital (e.g. formation of community based groups), increasing agency (e.g. through community engagement activities), increasing access to financial capital (e.g. low-interest loans) and increasing capacity to aggregate to buy or sell (e.g. collective farming/marketing). Compared to the other interventions tested, the model results for these four intervention scenarios showed that they had potential to have positive impacts on the farmer through multiple pathways. Given that the marginalised farmers are subject to a broad range of constraints, it is also likely that a suite of interventions, rather than singular actions are required for these farmers to both remove the risks and take advantage of opportunities in agricultural intervention.

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1 Introduction

Marginal groups, such as small-holder, landless and women farmers and tribal communities, often face serious constraints that prevent them engaging in agricultural intensification. These stem from a range of sociocultural, economic, environmental and policy issues that put them at risk of social exclusion and increasing inequity. Therefore to meaningfully address the complex challenge of socially inclusive agricultural intensification, research needs to go beyond the focus on the biophysical to understand the social and institutional intricacies and, critically, the system interactions.

This appendix report presents the integrated assessment frameworks and models developed by the SIAGI project under Objective 2 '*To identify opportunities to manage risk and promote social inclusivity and equity under different agricultural development scenarios using scenario and trade-off analysis*'. Integrated assessment (IA) was proposed as a process and tool to provide a 'big picture' of the complex, case study socio-environmental systems, and to improve understanding of the interrelationships between the diverse processes, and the pathways between drivers and outcomes.

The IA frameworks developed are essentially conceptual models that capture the structure and functioning of the system. Frameworks were developed from three themes that emerged through a workshop-driven process[1] covering: local water management, inclusive value chain analysis, and empowering change. Each of the frameworks identify and delineate the main elements of each theme and their causal connections. The frameworks were iteratively developed to capture the insights and learnings from the SIAGI and sister projects[2,3]. The frameworks can form the basis for further (semi)quantitative or qualitative analysis, as demonstrated in this report through the development of semi-quantitative models (fuzzy cognitive maps) and narratives.

The next section (2) summarises the process adopted for developing the frameworks, and the overarching IA framework, which captures its main components and their linkages, is presented in Section 3. Detailed descriptions of each of the three frameworks and examples of their applications are given in Sections 4 to 7. The report concludes with a synthesis section (8), which outlines the outcomes of the IA work, including learnings from the process.

[1] This process is described in Section 4 of Merritt and Hamilton 2018 [SIAGI Annual Report 2018, Appendix 13]

[2] Dry Season Irrigation for Marginal and Tenant Farmers (DSI4MTF; ACIAR sister project in Northern West Bengal)

[3] Cropping systems intensification in the salt-affected coastal zones of Bangladesh and West Bengal, India (CSI4CZ; ACIAR sister project in Bangladesh)

2 Development Process and Core Methods

2.1 Development process

The contribution of IA to SIAGI has been to develop frameworks and apply them to capture the knowledge and learnings from the SIAGI and sister projects, and to explore opportunities and risks of agricultural intensification for marginalised households. The IA has drawn on analyses and learnings from all the SIAGI project activities, but particularly the outcomes from ethical community engagement (ECE), value chain analysis (VCA), and development of a social justice framework. We have also drawn on livelihood, policy and institutional analyses undertaken by the project team. These activities drew on a range of primary and secondary data sources and methods including narratives, focus group discussions, regional market evaluations, and desktop analysis of policy documents and environmental literature.

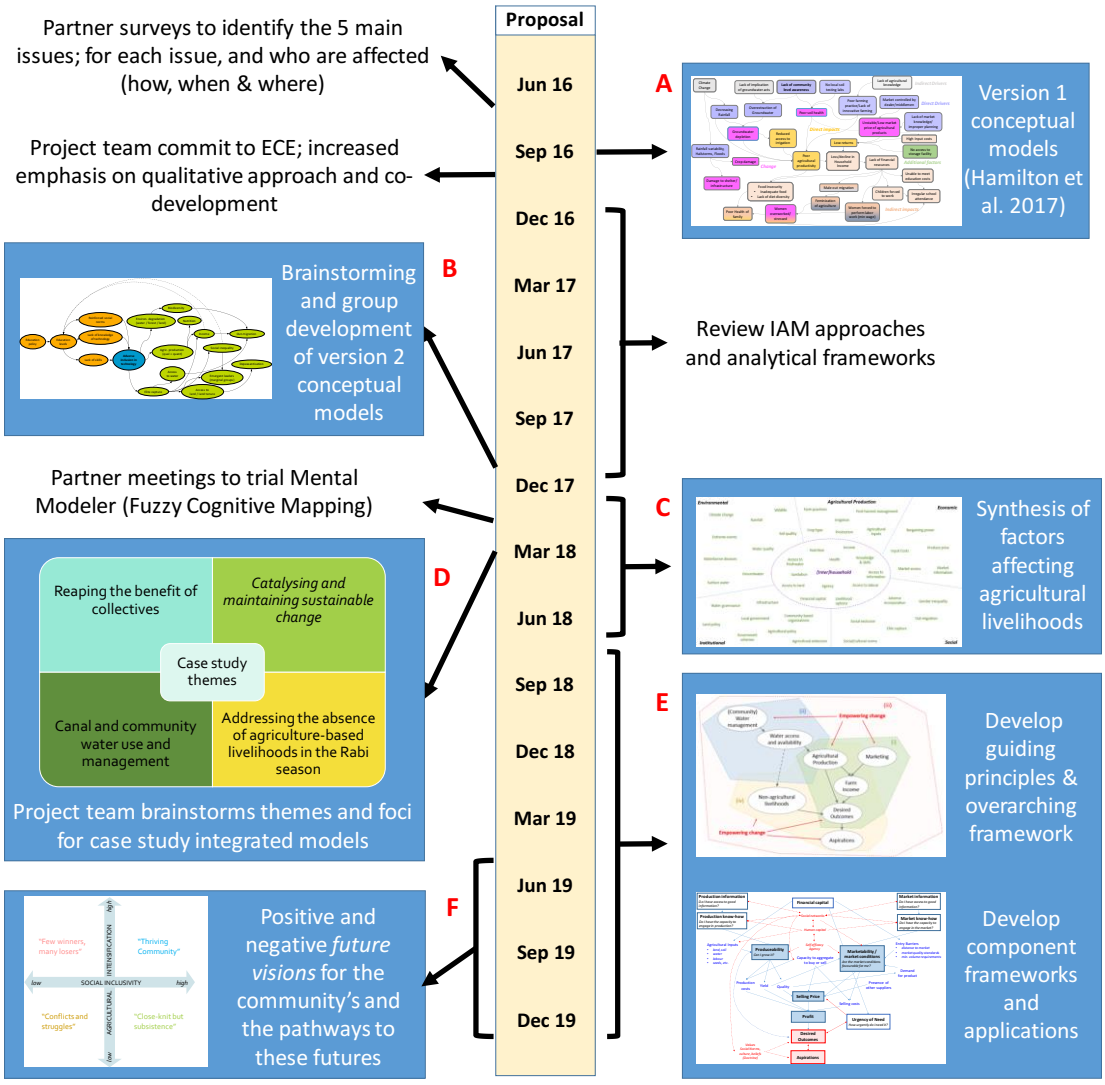


Figure 1 Timeline of key IA activities and outputs in the SIAGI project over the first three (of four) years. Timeline graphics are included for pictorial purposes only.

Two main rounds of conceptual modelling were conducted with the project team in mid-late 2016 and mid-late 2017 (A and B in Figure 1). For the first round (A) we conducted a simple survey to capture our partners' early understanding of the agricultural and social systems in the study villages, and recorded this understanding using a simple conceptual framework that enabled perspectives and processes to be mapped out using a common 'language' (Hamilton et al. 2017). The second round (B) involved the project team brainstorming the risks that marginalised actors face and, then in sub-groups developing conceptual models for one or more of the key 'risks'.

We had anticipated conducting a formal, largely quantitative risk assessment for activity 1.8 in the SIAGI project proposal, drawing primarily on outputs from activities 1.1 to 1.6. This approach was neither feasible nor justified following the decision to embrace an ECE approach at the heart of SIAGI. Thus, we adapted our methodologies to fit within the ECE approach and utilise the primarily qualitative data. Specifically, IA needed to:

- draw on qualitative data (including narrative based learnings),
- explicitly consider concepts around social structure and dynamics, and inclusion,
- add value to disciplinary work (e.g. help in the shift from traditional value chain analysis (VCA) to inclusive VCA), and
- use approaches that supported the team to think about their work in the broader concept and allowed them to 'see their words' in the IA outputs.

The conceptual modelling outputs, with follow-up meetings with partners in March 2018 to clarify concepts and relationships, allowed us to qualitatively synthesise the various risks and opportunities of agricultural intensification in the SIAGI case study areas (C in Figure 1). Details are provided in SIAGI (2018b). The SIAGI team brainstormed themes for the IA by case study (D in Figure 1); early on we had intended to build models or frameworks specific to each case study, as the focus of the Bangladesh and North Bengal villages had seemed quite discrete (local water management and collective farming, respectively). However, as we progressed and commonalities between case studies emerged, it became apparent that we can largely generalise the frameworks at least across the SIAGI study villages, including the Bankura villages, and we hypothesise to other similar socio-agricultural settings.

Since August 2018, we have been iteratively developing the IA component frameworks and applying them (E in Figure 1). The frameworks are grounded in both theory and observations from project activities, and were iteratively developed with input from stakeholders and domain experts. The first drafts of the frameworks were developed in separate workshops involving the modellers and at least one domain expert from the project team. The workshop process involved intensive discussion on the key elements of the theme and their causal connections, often beginning with a few key concepts as central building blocks (following Murungweni et al. 2011). For example, the value chain framework started with 'access to market information' and 'improved income' as the central building blocks, whereas the empowering change framework started with 'relationships', 'self-efficacy', 'social capital', 'empowerment', and 'social norms' as its initial building blocks. The key variables (or concepts), relationships, and other relevant factors that bridged the central building blocks were then identified and discussed. The workshop discussions drew on anecdotes and observations from the case study villages.

The key concepts that had been identified were researched to ensure the definitions and notions around each were in line with the international literature. This literature also helped us better frame or structure many of the concepts and relationships. An updated framework was then discussed with workshop participants, and revised according to feedback. The framework, along with accompanying text that defined each concept and described each relationship, was then presented to other members of the project team for review and comment, and subsequently revised. This review and revision process, occurred over many cycles for each framework. The robustness of the frameworks was then tested by applying them to various scenarios (e.g. different crops, interventions, climate) across study villages and contexts, to ensure they represent the diversity of values and outcomes in the communities.

The frameworks have formed the basis for further (semi)quantitative or qualitative analysis (Figure 2). Context specific applications were developed in two ways. Narrative-based applications were used to document changes in community and why/how they occurred, and to guide key informant and focus group discussions with community (facilitated and co-designed by our NGO partners). The other way was through the development and use of semi-quantitative models (fuzzy cognitive maps; FCM). Our literature review of how social processes and outcomes have been represented in model-based integration science conducted in 2017 suggested that FCM would be the most suitable modelling approach for utilising qualitative data and capturing complex social concepts. This was supported by initial trials of the Mental Modeler software with SIAGI partners (http://www.mentalmodeler.org/, accessed 30/09/2019). Through this approach we have conducted system analysis to identify the most influential variables in the models and scenario analysis to assess the plausibility of the frameworks and to explore options to improve the situation or identify potential risks.

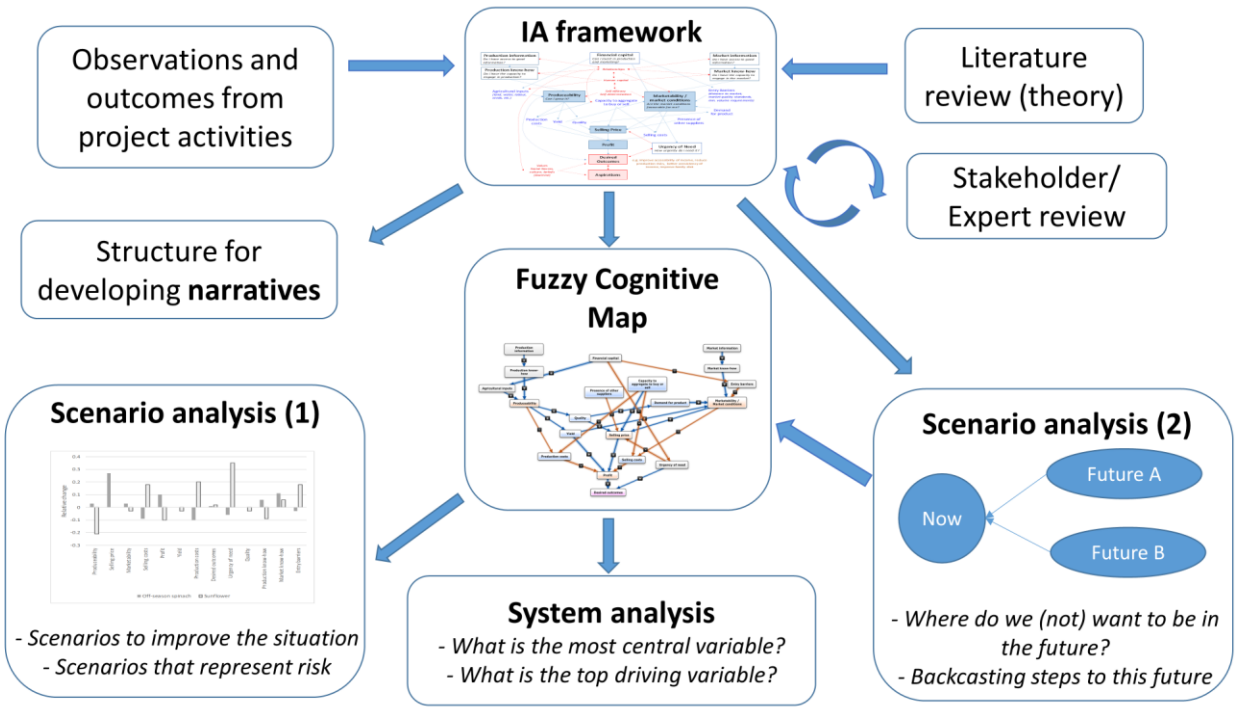


Figure 2 An overview of the integrated assessment process.

A second type of scenario analysis conducted in SIAGI has been to project forward to 2030 and develop a vision of the situation for the community, with inclusive or non-inclusive agricultural intensification (F in Figure 1; Figure 2) – see Section 7. The purpose of such an exercise was to use the IA frameworks to help the team think about the pathways that might continue the upwards trajectory that has been facilitated over the last few years, or alternatively to recognise potential risks and identify strategies to avoid or mitigate them.

2.2 Core methods

2.2.1 Integrated assessment and Conceptual modelling

Integrated assessment (IA) is defined as a "scientific *meta-discipline* that integrates knowledge about a problem domain and makes it available for societal learning and decision making processes"[4]. As a methodology, integrated assessment combines multiple and diverse system components (e.g. social, environmental, political/institutional and market), crossing disciplinary, organisational and conceptual boundaries (Hamilton et al., 2015, Kelly et al., 2013). As a process, it is interdisciplinary, reflective and iterative and aims to link science to action (Van der Sluijs, 2002). This study adopted conceptual modelling as a tool to support the IA process.

The conceptual models map the causal structure of the system, representing the system as a network of variables linked by arrows that indicate casual links. Conceptual models provide a visual summary of one's understanding or hypotheses about the key elements, structure and workings of a system. They are also advocated as a platform to develop mutual understanding and learning amongst multiple disciplinary experts (Argent et al. 2016).

2.2.2 Fuzzy cognitive maps

The commitment to ECE encouraged us to explore how social processes and outcomes have been represented in model-based integration science for development projects. The application of Fuzzy Cognitive Mapping (FCM) approaches across the organisational behaviour (Craiger et al. 1996), livelihood analysis (Murungweni et al. 2011) and participatory modelling (Henly-Shepard et al. 2015) literature pointed to its potential for exploring complex social concepts.

A FCM comprises of a network of concepts that represent different variables or characteristics of the system and their behaviour. These concepts are connected to one another by arcs with weights between -1 and +1 that define the direction and strength of the cause-effect relationship (Stylios and Groumpos, 1999). We defined the direction (positive/negative) and strength of cause-effect linkages between concepts, identifying them as very strong (1), moderately strong (0.75), moderate (0.5) or weak (0.25). The FCM was developed and analysed using Mental Modeler (Gray et al., 2013; http://www.mentalmodeler.org/). The results of the analysis in Mental Modeler provided measures of the key variables in the system. The centrality score of each variable indicates its relative importance in the network.

[4] The Integrated Assessment Society (TIAS) [www.tias-web.info/integrated-assessment/; accessed November 2019]

3 Overarching IA framework

The Integrated Assessment (IA) components were developed with input from the SIAGI team members and communities. Each component covers key areas of interest in the context of risks and opportunities for marginalised households in agricultural intensification. The IA components are intended as discussion support tools for assessing interventions and their trade-offs in the communities, and understanding the conditions under which interventions can be effective.

The linkages between the three components described in Sections 4 to 6 are shown in Figure 3.

i) *Local water management* – this component focuses on how local water governance and community engagement affect available freshwater resources, and the distribution and use of these resources within the communities (Section 4).

ii) *Inclusive Value Chain Analysis* – this component links value chain focused interventions to the desired outcomes of farmers, which is often but not limited to income-related outcomes. This component assesses the factors determining the produceability and marketability of the product, and the subsequent selling price and profit (Section 5).

iii) *Empowering change* – this component represents the psychosocial processes related to behavioural change that underlie the other components. Empowerment is treated as a process of change, which we examine through pathways of motivation, self-efficacy, agency and access to resources (Section 6).

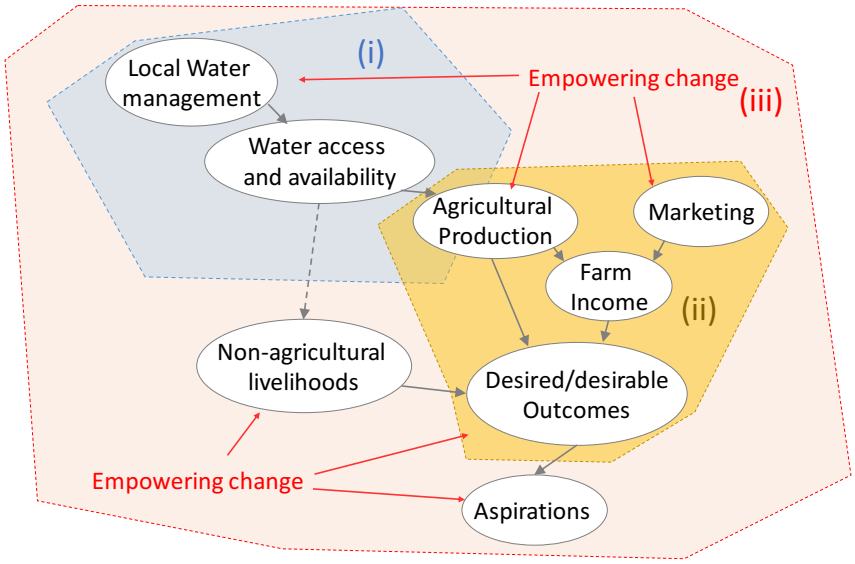


Figure 3 The overarching integrated assessment framework, consisting of four interacting components: i) local water management, ii) inclusive value chain analysis, iii) empowering change, and iv) livelihood aspirations.

Within each component, we identify and link the key elements and causal pathways of the processes involved. For example, the inclusive value chain analysis component represents important factors related to growing and selling the product, and how they relate to one another

and to the desired outcomes of the farmer. The framework maps out assumptions about the process through which change occurs from interventions or activities through to the targeted outcomes; this includes the intermediate outcomes and the set of conditions that enable the change. This articulation of the connection between activities and outcomes is akin to Theory of Change (Vogel, 2012).

The framework takes the perspective of an individual farmer or farmer group (referred to as the actor) when defining objectives and outcomes and not, for example, that of an NGO, government or research body. In doing so, we look beyond the generalised outcomes (e.g. increased income) that are normally presumed or determined by external bodies, and recognise that each actor has a different set of needs and wants. The framework captures the actor-specific nature of outcomes in the final output, termed desirable outcomes, which we define as outcomes that support the capacity of the actor to meet their underlying goals. These may be anticipated (desired) outcomes or emergent outcomes of benefit to the actor. A wide range of desirable outcomes can be attained through agriculture. These outcomes include not only goods and services purchased through income, such as health care, housing maintenance or improvements, education, food and other expenditures, but also social and psychological outcomes such as improved relationships, a sense of freedom, happiness and respect.

The principles that helped guide the design of the frameworks are summarised in Figure 4. Interventions have intermediate outcomes (a) that lead to generalised outcomes (b), which subsequently result in desirable outcomes (c) specific to the actors and their objectives. The progressive outcomes are dependent on a number of conditions and are bounded by the contextual factors of the actor(s) including their location (which dictates the agro-ecological and environmental setting, distance to markets, etc), and their socio-cultural, political and economic setting and positioning.

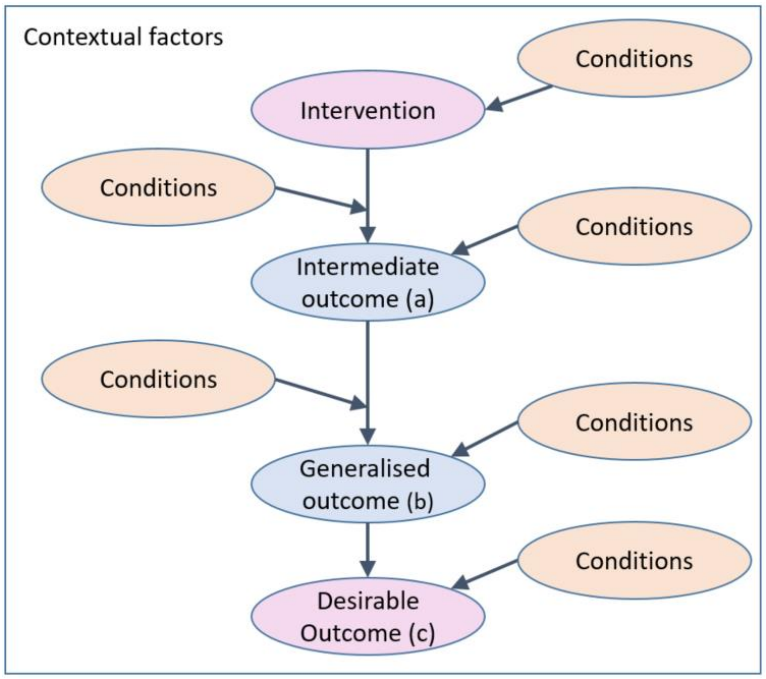


Figure 4 Principles guiding the development of the integrated assessment (IA) frameworks

4 Local Water Management Framework

4.1 The framework

Freshwater availability is critical for crop production in the *Rabi* season, and potentially to supplement natural rainfall during the germination phase of *Aus* crops. Limited freshwater can either prevent cropping entirely or greatly reduce production by reducing germination, establishment and yields. In the SIAGI case study villages, the lack of freshwater in the *Rabi* season prior to the project, meant that much of the land was fallow outside of the monsoon period. Over the life of the CSI4CZ, DSI4MTF and SIAGI projects, farmers have been trialling dry season crops with the support of the NGOs and researchers.

This integrated assessment (IA) framework focuses on access of freshwater by marginal farmers. Originally conceived for the Bangladesh case studies, considering water access and use from the canals, it has been modified to be non-specific to Bangladesh, and applicable to the West Bengal case studies. The component facilitates exploration of factors and issues involved with improving water availability, water quality and ensuring equitable distribution of water within the community.

The framework shown in Figure 5 draws from learnings from the SIAGI, CSI4CZ and DSI4MTF projects to define the variables, outcomes and conditions. In the figure, concepts for the community level are in the yellow box, those for the local water institution are in the orange box, whilst the individual actor level concepts are below the yellow box. The framework is applied to a community water resource (e.g. the canal in Sekendarkhali). Four main intermediate outcomes are defined: *Freshwater availability*[5], *Water quality*, *Shared benefits* and *Access to water resource*.

Access to water resource describes an actor's (e.g. a person, household or group) access to the community water resource when they want it[6]. It will increase with greater freshwater availability, *Distributive justice*, and greater capacity (of the actor) to invest in irrigation. *Distributive justice* occurs when community feel that decisions around water allocation, and the distribution of costs to develop and maintain water infrastructure, are fair. *Shared benefits* describes the benefits that arise at a community level which marginalised actors may gain advantage from in other ways (e.g. off-farm income from being employed in another water-dependant industry; a healthy environment). It will increase with enhanced *Distributive justice*, freshwater availability, and in most situations, *Water quality.*[7]

[5] This framework takes the lens of agriculture and so places the emphasis on (non-saline) freshwater

[6] This is from the perspective of the target farmers in SIAGI (e.g. landless, tenant, marginal or women farmers).

[7] One exception might be if shrimp farming (which requires saline water) is supported by community and there is distributive justice of its benefits. However, often shrimp farming has not been practiced in an inclusive manner that benefited the larger community.

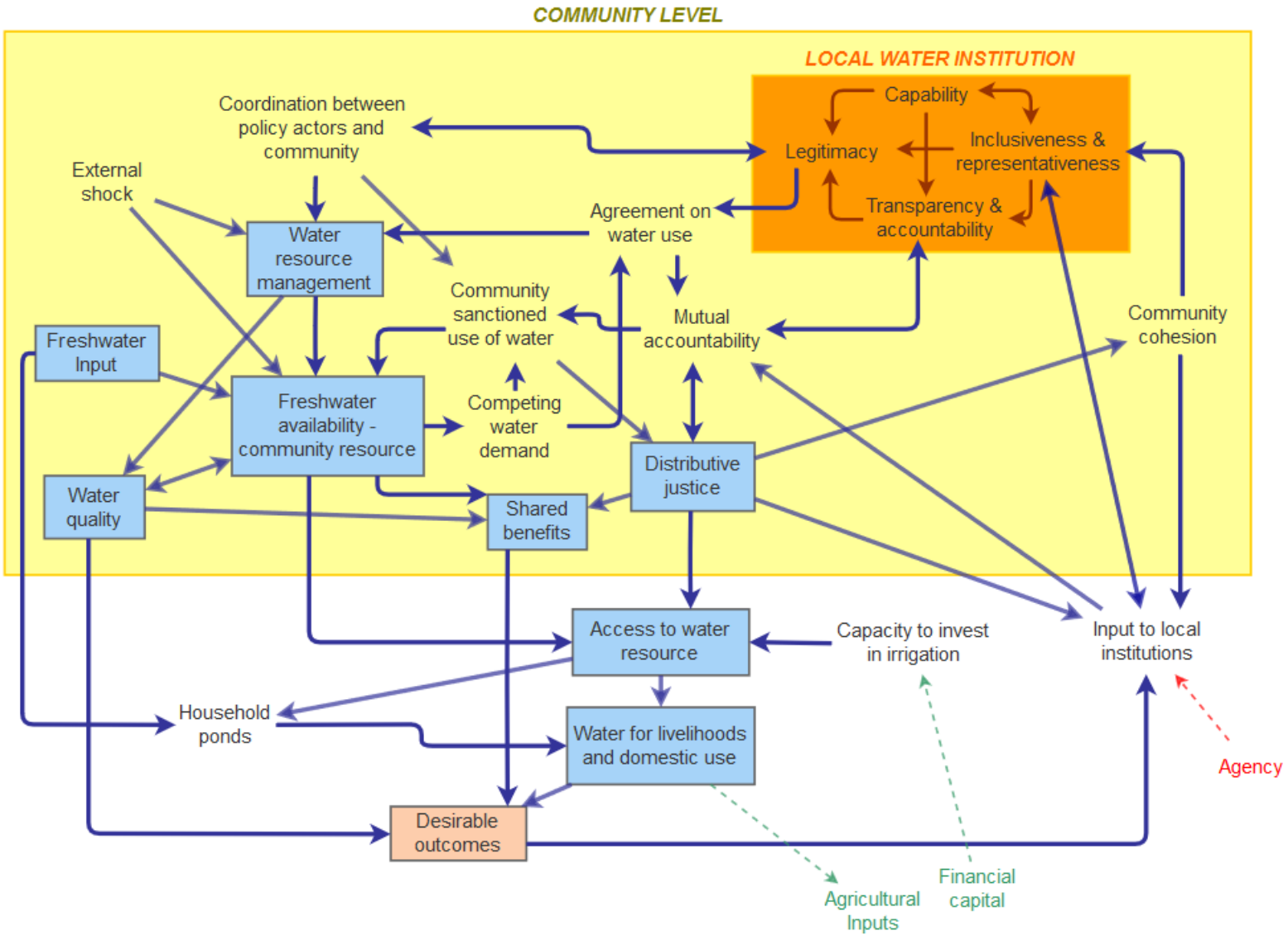


Figure 5 The local water management framework showing the core structure of the framework (concepts in the boxes) and the concepts that describe the pathways to the core concepts (black text not in a box). For all concepts definitions or relative importance may differ between people, groups or locations. Links to the underlying Empowering Change framework are indicated by the red text and dashed arrows. Links to the IVCA framework are in green.

The governance of the local water institution is considered in terms of four concepts:

- *Capability* – the leadership and skills, competency, knowledge, and experiences of the members of the institution to effectively deliver on their responsibilities, and their ability to adapt to changing conditions;
- *Legitimacy* – the social acceptability of the institution's right to govern;
- *Transparency & accountability* – the visibility of the decision making process, and whether the institution meets its obligations and is answerable for their actions; and
- *Inclusiveness & representativeness* – whether the institution provides opportunity for all to participate in and influence decision-making, and gives unbiased and respectful attention to community members' views in their decision making.

The capability of the institution and its committee affects its *Legitimacy*, *Inclusiveness & representativeness*, and *Transparency & accountability*. The organisation is perceived as more legitimate if it is *inclusive & representative*, and *transparent & accountable*, and if it has support from the relevant government authorities (i.e. link to *Coordination between policy actors and community*). The *inclusiveness & representativeness* of the institution is affected by the level of *Community cohesion* that supports the participation of often-marginalised groups in community planning. Being inclusive increases the capabilities of the organisation by widening its collective knowledge base and skillset and increases its transparency.

Freshwater availability is the volume of freshwater available and is affected by *Freshwater input* (e.g. rainfall, streamflow), the community's commitment to develop and maintain the community resource (*Water resource management*), *External shocks* and control of *Community sanctioned use of water*. The latter is determined by the *Mutual accountability* and *Competing water demand* concepts. Mutual accountability is the community commitment to abide by the decisions and rules of local water institutions around the distribution and use of water, and it will act to reduce unsanctioned use of water. If there are competing demands for water (e.g. brackish water for aquaculture versus fresh water for irrigation), then the non-sanctioned use of water could occur, particularly if mutual accountability is low and there is a lack of coordination between policy actors and the community.

Water resource management is the community's commitment to managing its water resources to maintain reliability of supply (*Freshwater availability*) and *Water quality* of the water resource (e.g. salinity, nutrients, pathogens, and pesticides). It includes the development and maintenance of infrastructure (e.g. sluices gate, solar pumps) as well as appropriate land management (e.g. stock exclusion; use of pesticides, etc). The level of coordination between policy makers, implementing agencies and the community, and agreement (or not) around how water is to be used, are both critical to achieving this commitment. Some water resource infrastructure may be exposed to damage from 'outside' the community (*External shock*), for example from extreme

weather events or deliberate acts of sabotage[8,9] which can negatively impact freshwater availability.

Mutual accountability develops from the *Transparency & accountability* of local water institutions, the *Agreement on water use, Distributive justice,* and *Input to local institutions.* Agreement on water use is a general agreement within community on how much water is needed, how it is to be used, and by whom. Agreement on water uses should be strengthened if the local water institution has *Legitimacy.* Agreement on water use may be challenged if there are competing demands for water quantity or quality (*Competing water demand*), particularly if freshwater availability is low. The link from *Distributive justice* to *Mutual accountability* is a reinforcing feedback – if the community thinks the distribution of water and costs are fair then the commitment to abide by decisions should further strengthen. Similarly, if (marginalised) actors (or the wider community) can contribute their opinions and influence decisions, (*Input to local institutions)* mutual accountability will increase. *Input to local institutions* will be enhanced with C*ommunity cohesion* and *Inclusive & representative* local water institutions, and will be reinforced if a community sense of *Distributive Justice* develops.

Water for livelihoods and domestic use is a generalised outcome, which is connected to the actors' access to the community water resource as well as an actor's household pond. Livelihood uses of water includes crop irrigation, fish cultivation, and livestock uses. *Household ponds* may be directly filled through freshwater inputs (e.g. rainfall) or by owners filling them from the community resource.

Water for livelihoods and domestic use, Water quality and *Shared benefits* can lead to *Desired outcomes*. These can enable farmers to achieve further underlying goals, which might include outcomes such as improved income, improved WASH outcomes or greater food security. For example, shared benefits such as environmental health can have health or well-being outcomes for individuals. Water quality can affect the desired outcomes through two possible ways. Firstly, if water quality is too poor (e.g. very saline or high in pathogens) then the freshwater resource may not be used by community or individual. Secondly, there are cases where despite poor water quality the water is still used (knowingly or not) without the necessary treatment to make it safe, and this can have negative outcomes for health of humans, crops or livestock.

Small or marginal households comprise the majority of the communities and so we hypothesise that as marginalised actors start to achieve positive outcomes (desired or otherwise), this should strengthen their agency to give input to, and influence, local institutions.

[8] Deliberate sabotage of canal infrastructure was raised as a potential risk and past disasters such as Cyclone Sidr demonstrate that natural calamities pose a major disruption to communities in Bangladesh.

[9] Whether or not the risk of this damage may be mitigated or not may vary. A cyclone event that causes direct damage to infrastructure is not controllable by community, whereas efforts to work with parties outside the community may reduce acts of deliberate damage.

4.2 A narrative-based application for Sekendarkhali

As mentioned earlier, the IA frameworks can form the basis for further qualitative or (semi)quantitative analysis. The local water management framework is used here to demonstrate qualitative analysis using narratives.

4.2.1 The 'baseline' situation

The summary provided in this section is adapted from the 'baseline' situation in Sekendarkhali documented in Rahman and Das (2017) 'Report on household typologies of two villages in Amtali and Dacope Upazila, Bangladesh'[10].

Prior to the ACIAR projects, agriculture was primarily constrained to the production of rice crops in the rainy (*Aman*) season. Those who had experimented with *Rabi* season cultivation of sunflower, lentils and vegetables had not achieved adequate yields. A few households conducted freshwater fish cultivation in their household ponds and/or produced some limited vegetable crops in the dry season. Otherwise, much of the landscape was not cropped although was used for the 'open rearing' (grazing) of cattle. Some in the community had deliberately let in salt water for shrimp production in *gher*.

The local water institutions in Sekendarkhali were absent until the intervention of the SIAGI project (Figure 6). The operation and maintenance of gates (sluices) were influenced by the 'elite' (Rahman and Das, 2017). In the rainy season the gates (sluices) were completely open, and water was sometimes flushed out at the ebb period. However, in the dry period, saline water was introduced into the canal through the gate (sluices) for shrimp production (Rahman and Das, 2017). Even though the canals were regarded as common resources, they could not be accessed by all those in the community, and some canals were leased by the Government to individuals (Rahman and Das, 2017).

Freshwater availability was a severe constraint to agricultural production and insufficient to meet household WASH requirements. Of the four canals in the village area, two would be dry in the *Rabi* season, while in the other canals the water would be saline from October to January. Some in the community had tried to install deep tube wells but were not able to get freshwater until depths below 700 feet; at those depths the running costs are too high (Rahman and Das, 2017). Drinking water availability was also an issue in the village. Although all households had access to the community tubewells, some of these wells failed during the dry season and in the other wells the salinity of the groundwater meant they were not useable. Consequently, women (mostly) had to carry drinking water sourced from 300 to 500 metres away from their houses.

[10] https://siagi.files.wordpress.com/2016/07/siagi-report_household-typologies_bangladesh_final_10-nov-2017.pdf, accessed 25/06/2019. The summary was primarily adapted from the description on the Sekendarkhali village and Annex C (pages 7-8 and 35-44 of the typology report).

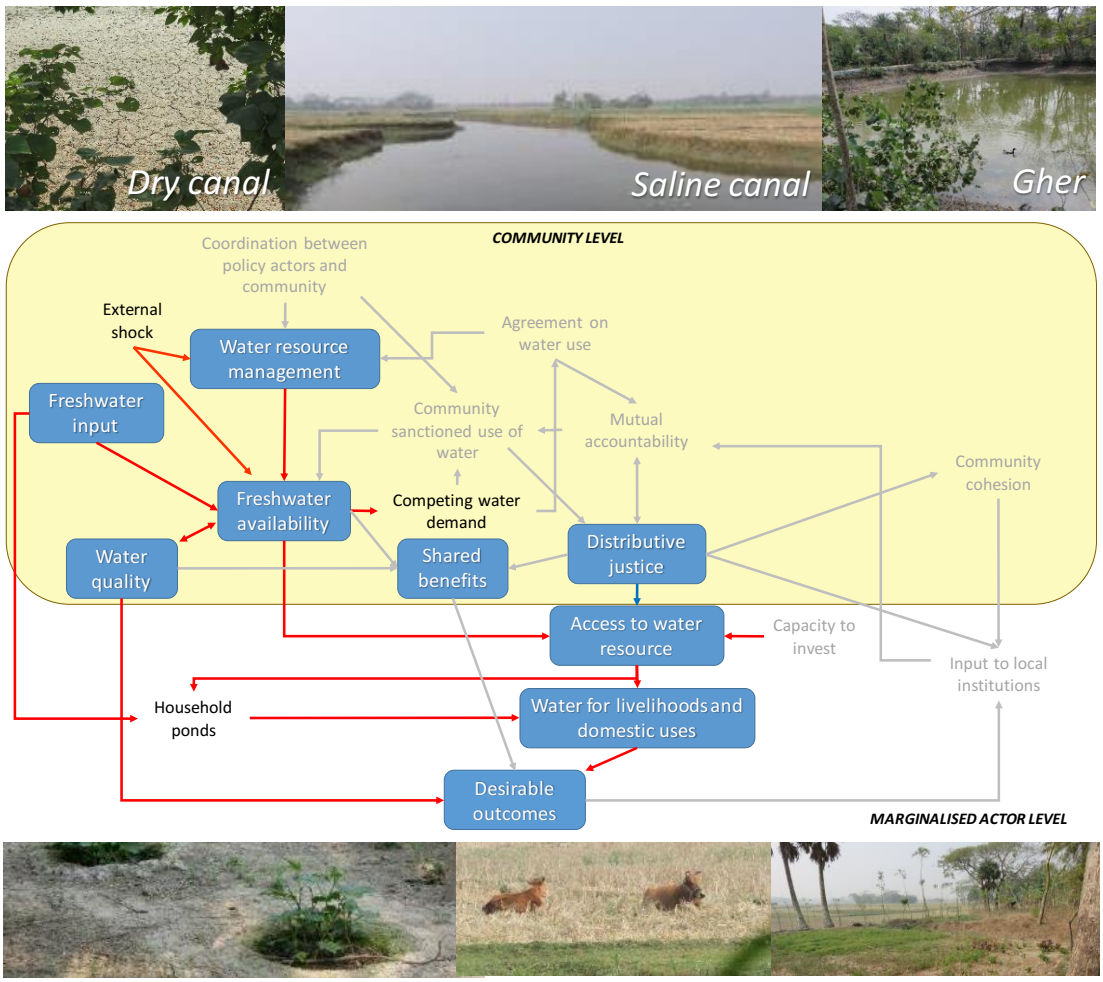


Figure 6 The baseline situation in Sekendarkhali. Red lines represent the negative conditions that limited access to freshwater by marginalised households and thus to support their freshwater dependant livelihoods or domestic uses.

In terms of access to water for irrigation, (lack of) governance prevented most members of the community from accessing any freshwater that may have been present. Aspects like coordination between local government and community were lacking in water management and the richer farmers or community members were doing what they wanted with water infrastructure. In terms of the framework in Figure 6 the concepts of mutual accountability, agreement on water use community cohesion (in relation to water) were lacking. Landless, women, and small or marginal farmers had no agency to influence others behaviour and use of water resources.

In addition to the governance issues, marginal farmers had limited access to irrigation facilities and would have to hire a power pump for irrigation which was prohibitive. On the other hand, medium to large farmers on the other hand were able to afford to buy or rent tube-well and irrigation inputs for agriculture should they wish to. Access to irrigation was considered primarily constrained by the 'salinity of groundwater and the lack of access to freshwater through canals' (Rahman and Das, 2017).

4.2.2 The development of institutions, community water resource management and distributive justice

Management of water resources and their infrastructure was recognised as a key issue at the start of the ACIAR projects. The 'intervention' to establish the Water & Silt Management Committee (WSMC) – supported with community engagement to build the four pillars of governance defined

in the framework as well as the capacity of marginalised to engage in the institutions – in effect activated the links represented in the framework between policy actors and the community decision-making (Figure 7). From a justice perspective, this intervention has elements of building interactive justice (interactions between participants are seen to be fair and respectful) and procedural justice (intervention are organised to ensure that there is appropriate influence, representation, opportunity for voice, power sharing and leadership).

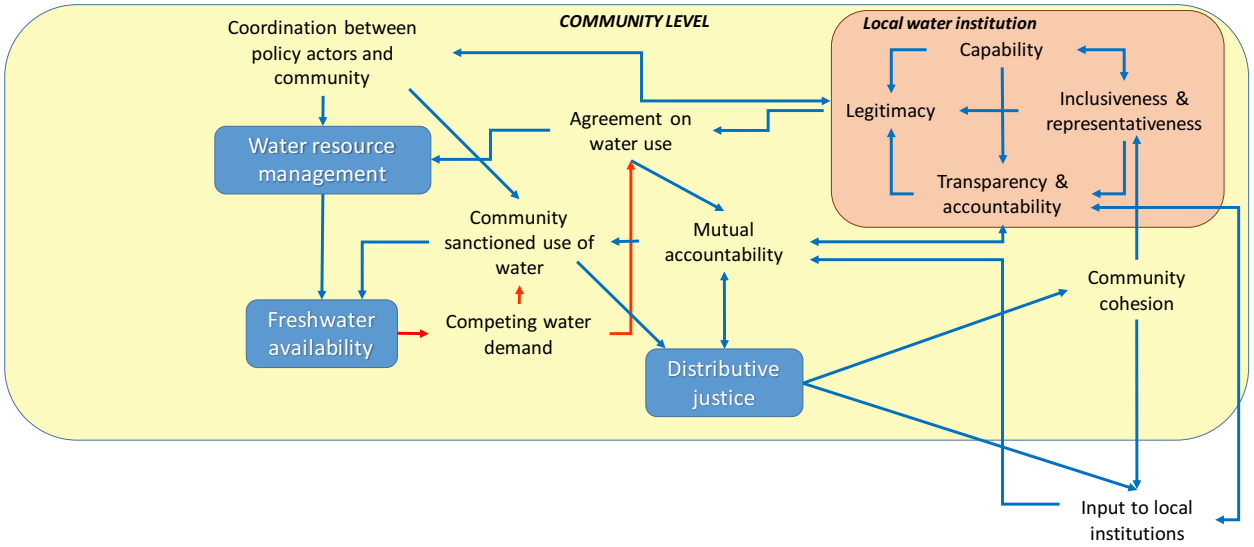


Figure 7 Developing local water institutions for managing water resources and governing their use by community

Local water institutions: Prior to SIAGI, there were several NGOs working in the village area including BRAC, Grameen Bank, ASA, RDF, Sonkolpo, BRDB, UDDIPON, etc. Most of these worked in micro-credit, development and agriculture (but not community water management). For SIAGI, the early process for engaging with the community around the issues of water management and agriculture was to involve local Shushilan staff who had been delivering school feeding programs in the village. This was because they had built up trust with women and the community in general.

Demand to form the WSMC (covering the Hafamari and Munchibar canals) was created by the SIAGI partners' engaging with the community who were naturally motivated to improve their water-dependant agricultural and WASH outcomes. The community, with help from Shushilan, developed a constitution that outlines rules and regulations around the membership and operation of the WSMC. It aims to include all members of community, and build accountability and transparency in discussions and decisions on the maintenance, development and use of community water resources. Most villagers are involved in the WSMC (the apex institution) and/or the farmer groups[11].

The community are engaged in decision-making and seeking information from SIAGI partners and other stakeholders on financial matters, crop choice and water resource use and have demonstrated their ongoing commitment to the WSMC interventions through cash or in-kind contributions. For the excavation of the Hafamari canal, they made the decision that all 81 member households would contribute a one-off payment of 150 Taka per family to conduct

[11] Details on the formation of the WSMC and community engagement are provided in the Bangladesh case study in Report 7 of Volume 3 of the final report of LWR/2014/072 (SIAGI).

community fish rearing to partially fund these works. In April 2019, the members agreed to another 100 Taka contribution to continue community fish farming. Most members are happy with this arrangement given the improved access to freshwater resources, suggesting a greater sense of distributive justice. Those persons who are not satisfied tend not to be investing in their own (household) production of crops or other water-dependant activities.

Mutual accountability, agreement on water use and the community sanctioned use of water has generally increased following the establishment of the WSMC and the re-excavation of the two canals.

Coordination between policy actors and community: in Sekendarkhali, sluice gate management is highly political and collective action was needed for the community able to manage the sluice gate and not the elite. Initially many community members were reluctant to talk to politically connected persons and government employees. Shushilan encouraged the more active group members to step up and talk with these stakeholders and there is now recognition within community that they have to talk to government to get the support they need. Some community members have raised their voice regarding water irrigation, storage of fresh water and open livestock rearing-related issues to the local government officials (such as the Upazila Nirbahi Officer) as well as representatives of the Union Parishad and Upazila Parishad. The officials provide their support to community where they can and participate in community meetings if time permits. The officials play an important role in resolution of conflicts and, as presented in Report 7 of Volume 3 of the final report of LWR/2014/072 (SIAGI), a number of officials have voiced their enthusiasm and engagement in the water management initiative in Sekendarkhali.

Water resource infrastructure: a core element of SIAGI's work has been to build the community's commitment to develop and maintain the water resource infrastructure. There is much evidence of this commitment, including their contribution of cash and labour to re-excavate the canal, and the aforementioned engagement with government and neighbouring villages to maintain dykes and maintain and operate the sluice gates. The WSMC also negotiated with the local government, particularly the Union Parishad Chairman, to construct two culverts to enable regular water flow and freshwater availability in the Hafamari canal.

Freshwater availability: investment in the WSMC and infrastructure, and control over the use of water and the sluice gates, has increased water availability from pre-project. Shushilan and CSI4CZ challenged the WSMC over whether enough water exists to support *Boro* production. The WSMC say that they can get a top-up of freshwater every 15 days from the springtide and that there is enough freshwater.

Competing water demand: At the start of the project, there were reports that saline water was let into the canals in the dry season, primarily for shrimp farming (Rahman and Das, 2017). The community is now managing this through the WSMC and the risk of saline water entering the canals and affecting freshwater-dependant activities has reduced. Discussions within the community that relate to the 'Competing water demand' concept represented in the IA framework have transitioned from crop vs. shrimp (fresh vs. saline) to brick vs. crop or *Boro* rice vs. vegetables. There are two brickfields taking freshwater from Hafamari canal (see discussion below) and in the recent dry season the area of *Boro* rice cultivation has increased considerably. The WSMC initially made the decision to limit *Boro* rice farming and to assist marginal and tenant farmers in accessing canal water to irrigate a range of *Rabi* crops, although this ban has since been

lifted. At this stage freshwater availability is not considered an issue by the community as Munchibar and Hafamari canals are connected to one another and the Hafamari canal is connected to the freshwater Payra River.

Mutual accountability has improved through the establishment of the WSMC and ECE activities to develop inclusive rules and decision-making processes, and community ownership of the WSMC. There remains a degree of elite capture but overall the benefit to others has increased across the board. There have been times when individuals have not complied with the wishes of the majority. An example of this is the brickworks owner who listened to community concerns but then at midnight took water from the canal; the community went to the UP chairman but he was neutral about the issue and did not intervene. This raises the question around whether there are penalties that can be applied to people who do not comply with rules around water use, and if so whether there is willingness of the authority to implement them at a community level. The instigation for lifting the ban on *Boro* rice production occurred when general members of the WSMC challenged some of the executive as to why they had started planting *Boro*. The response was that now the canals are being replenished every 15 days, there is sufficient water and the ban could be lifted. Whilst this example demonstrates a greater 'voice' of community to provide input to institutions and hold others accountable, it does suggest that there are still improvements that could be made around the transparency of decisions, and building mutual accountability.

Input to local institutions has developed in response to the ECE approach used by Shushilan placing emphasis on increasing the participation of often-marginalised groups in community planning. In general, women, landless and marginal farmers have increased their agency and input to water institutions, although this varies between individuals and genders. From the outset of the project women did not hesitate to talk to outsiders, which Rahman and Das (2017) thought may reflect the combined efforts of different NGOs and Government to increase awareness of women in preceding years. However, in the early days of the WSMC, women were reluctant to actively participate in meetings and some men were uncomfortable with their presence. Now, many women attend monthly meetings and willingly speak, and both genders seem more comfortable participating in the presence of the other. It has been observed that women are participating more than men. Women generally participate in all types of meeting, but men seem to only be interested in participating 'important' meetings such as training, orientation, or learning and sharing programs. Nonetheless, a positive aspect around this is that after attending meetings, women typically share the learning and experience to their male counterparts and other family members. The active involvement of women reflects their growing interest in agriculture, particularly cultivation of vegetables on dykes and in the home garden. The women groups have developed greater unity and together are generating ideas for water and agriculture and working with Shushilan to implement them.

4.2.3 Changes at the marginalised actor level

The improved freshwater availability and access to the water resources has enabled villagers (including marginal, landless and women farmers) to increase their use of freshwater for irrigation, other freshwater dependant livelihoods and domestic uses (Figure 8). There is increased confidence that water can be accessed when needed (e.g. https://siagi.org/2019/01/28/rabi-cropping-gives-the-farmers-choice-to-stay-in-the-village/).

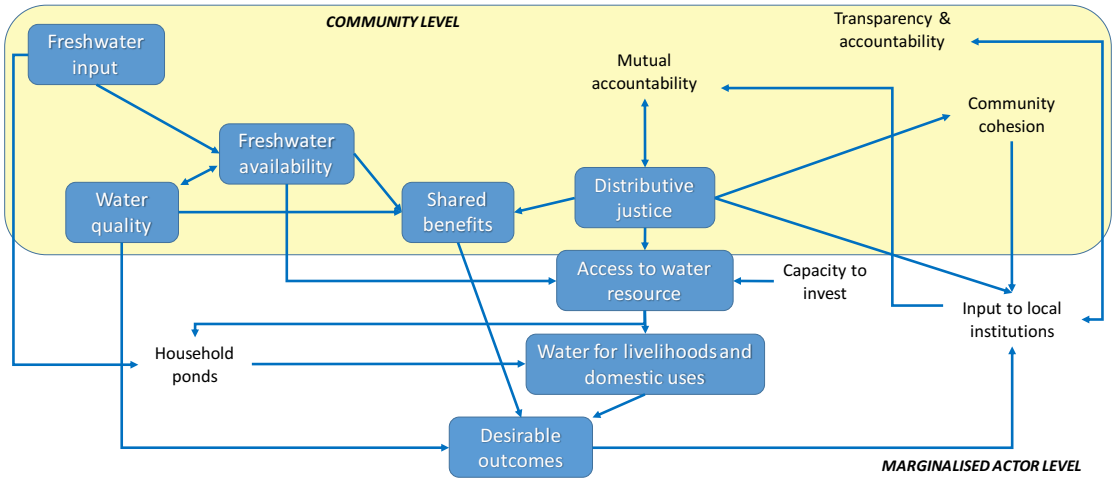


Figure 8 Changes in marginalised actors in Sekendarkhali access and use of water and their participation in water governance.

There is mixed interest in growing crops in the *Rabi* season for a combination of reasons. The cost of accessing water remains a key consideration and labour costs, for those who hire labour, is expensive. Outside of agriculture there are alternative opportunities, namely the brick works and the nearby port constructions. In Amtali, vegetable prices used to be very high but now prices are lower for some reason. The national government is pushing for the commercialisation of agriculture so smallholders may have the incentive to move out of agriculture again. Although leasing out their land is an option, if their land is too small an area to be attractive to tenant farmers they may sell off their land. Another factor is the risk of early rains; for the last two years (early) heavy rainfall in February damaged *Rabi* crops. This risk is playing on the mind of farmers and so the safer option is seen to be *Boro* rice. Another advantage of rice is that they can leave it and work elsewhere. Sunflower failed again in 2018/19 *Rabi* and it is not seen as a great option even though a technical solution (i.e. quick drainage facilities in the field) is available. 75 farmers tried sunflower this year and all failed. Sweet potato and peanut were planted later and were not so affected by the early rainfall.

Cultivation on the dykes has increased, mainly for vegetables but also as a seed bed and to grow food for animals. Some dyke lands have been left barren as the landholders consider their home to be too far away for them to protect crops grown on them[12]. Typically, it is those who have land next to the dyke who benefit, amounting to about 10% of population (although others may lease land on the dykes).

A key constraint remains individuals *Capacity to invest in irrigation.* Distance to the canal remains an equity issue for some women and other poor farmers as it affects their access to water for irrigation, and the cost to irrigate. However, the **autonomy** of women and marginal farmers to invest in irrigation has increased. Women's involvement in the formation and evolution of the WSMC has also allowed some women to lease land for irrigated Rabi crop production, with leases taken in their own name. For further details see Report 7 of Volume 3 of the final report of LWR/2014/072 (SIAGI) final report.

[12] The homes are about 500m away from the land in question.

For non-crop uses of water, the families have been able to replenish their household ponds several times from Hafamari canal during the *Rabi* season and then used for domestic purposes. Whilst a few households reared freshwater fish in their household ponds prior to the ACIAR projects, there has been a major change towards community-driven freshwater aquaculture. This is providing livelihood opportunities and dietary benefits to individuals as well as contributing funds back to the local water institutions. Families are also able to rear white fish in their household ponds.

Some indications of the desired or desirable outcomes that individual farmers have expressed are 'enough earnings to stay in community during the Rabi season' (e.g. https://siagi.org/2019/01/28/rabi-cropping-gives-the-farmers-choice-to-stay-in-the-village/), 'increased confidence and changed aspiration due to confirmation of fresh water', 'multiple crops cultivation for increasing their income', and 'Women managed households are expending their earnings for their children's education, household chores'.

4.3 Discussion

In this section we have demonstrated the framework for one case study; however we have developed other applications of the framework under quite different contexts, and found the same high-level concepts and relationships seem to hold true (see Appendix). Although the community owned sources of water and the water-related issues differ between the Bangladesh and West Bengal case studies (i.e., canal, groundwater and/or community ponds) there are aspects of water governance and distribution, and equity that are shared across these studies. The IA component facilitates exploration of factors and issues involved with improving water availability, water quality and ensuring equitable distribution of water within the community.

4.3.1 System analysis

Although not the focus of this section, the framework has been converted into an FCM and the assumptions behind each link the strengths of the relationships have been documented and are available upon request. Figure 9 plots the centrality, out-degree, and in-degree scores for the network variables. Unsurprisingly, *Freshwater availability* is the most central variable (7.75) followed by a number of variables with scores between 4 and 5. The level of conflict around water is strongly influenced by freshwater availability (i.e. conflict occurs under water scarcity). In the case of Sekendarkhali, tensions within the community seemed to be resolved through the increased freshwater availability that followed from the reexcavation of the canals, despite indications that distributive justice as well as some interactional justice concepts that are represented in our framework (namely, community sanctioned use of water and mutual accountability) were still in development. In other words, issues around governance can be muted while freshwater is available, but may resurface if/when water availability is reduced. The top driving variable, defined by having the highest total out-degree score with an in-degree score of zero, is *Freshwater input*.

The process of developing this water management framework has highlighted the complexity of water governance and community dynamics. Although the concepts in the framework are quite simple, the linkages are complex. Even though there is one less variable compared with the IVCA

framework (See Section 6), there are more connections (52 compared with 38) and more connections (links) per concept (2.26 links per concept compared to 1.58). This is due to the feedback loops within the community level part of the framework and between the marginalised actor, local water institution, and community levels for positive outcomes in water to be achieved, a community requires not only an effective water management institution but also the community dynamics that encourage and maintain mutual accountability.

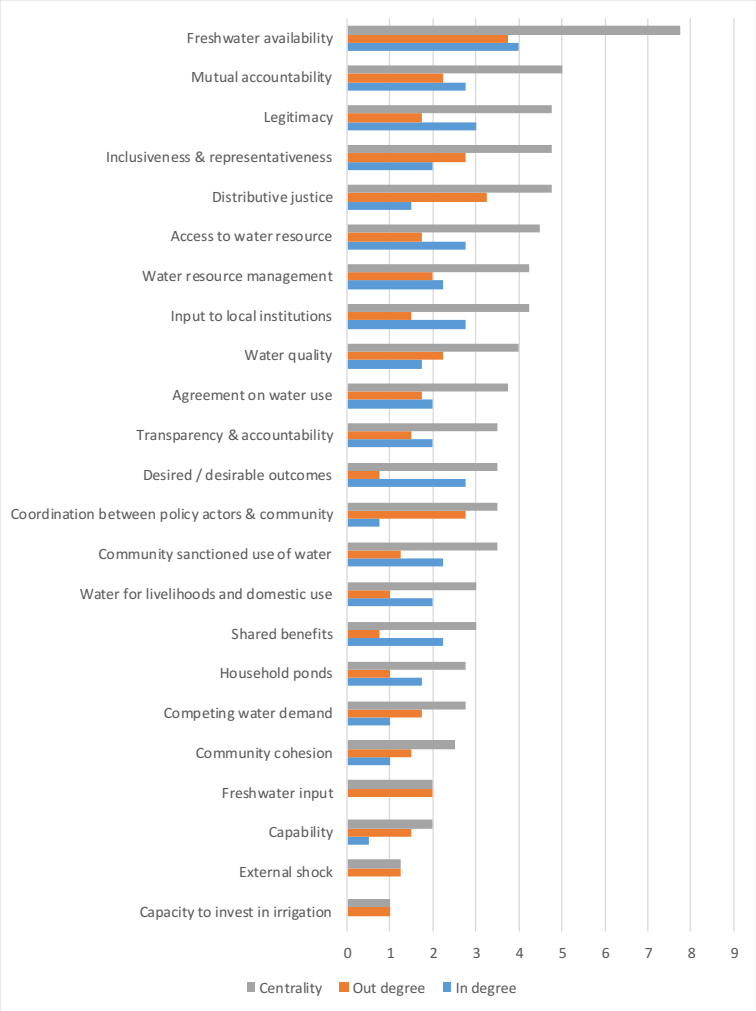


Figure 9 System analysis of the local water management framework showing the centrality, out-degree, and in-degree scores for the network variables

4.3.2 Links to the IVCA and empowering change frameworks

The link from this framework to the inclusive value chain framework described in the following section, is that community level freshwater availability and the (often) marginalised actors access to that water is a critical input for dry season crop production in all case study villages. Indeed water has been the lens through which SIAGI is considering inclusion in agricultural intensification. Increased access to water, be it through the revitalised canal system in Sekendarkhali or the groundwater irrigation pumps in Dhaloguri and Uttar Chakowakheti has contributed to farmers increased confidence and motivation to grow dry season crops.

Although crops are not explicitly represented in local water management framework, we did explore the inclusion of concepts around preferred or intended crop (or crop system). The

advantage of including crops would have been that we could more seamlessly consider the impact of community-level water management on an individual farmer's crop choice. The disadvantages were the framework would be even more complex, we would have oversimplified crop choice, and we have needed to capture cross-scale interactions (e.g. community water management to individual farm choices), which would have added further complexity. Given that the bioeconomic modelling, described in Report 3 of Volume 3 of the final report of LWR/2014/072 (SIAGI), can effectively capture crop preferences given the various economic, environmental, production or other constraints that exist in a given context, we decided not to explicitly represent crops in this framework. The use of the framework to develop narratives or models should consider crop choices at the community and marginalised actor scale.

The collective agency of the community that developed through the establishment of the WSMC and its relative success in achieving distributive justice in water has led to marginalised households having greater agency to speak up about other non-water issues within the community. This shows the link between the water management and empowering change frameworks. Geoff Syme (*pers. comm.* November 2019) noted that by treating water management as a 'creation of benefits', water becomes a tool for empowerment. This has been demonstrated in the case of Sekendarkhali through the outcomes of the community and ACIAR project activities.

4.3.3 Representation of governance and social justice concepts

This framework explicitly gives equal representation to the social processes and concepts that are not easily quantified but which are critical in achieving goals around development, maintenance and distribution of water resources and the fair access to institutions.

The eight NRM governance principles outlined in Lockwood et al. (2010) were used to frame the governance characteristics of the local water institution. In the framework, governance is considered in terms of its capability (e.g. leadership, skills and competency of members), legitimacy, transparency, accountability, inclusiveness and representativeness. These governance criteria affect the institution's effectiveness in helping to achieve fair distribution of the water resource within the community (i.e. distributive justice).

Also captured to some extent in the framework are other dimensions of justice (Lukasiewicz et al. 2013):

- *interactive justice:* how interactions between participants are seen to be fair and respectful
- *procedural justice:* how the intervention is organised to ensure that there is appropriate influence, representation, opportunity for voice, power sharing and leadership

The intent of capturing such justice and governance concepts in the framework is so that donors, researchers or other stakeholders who are proposing water interventions in the community – and who may not have knowledge or experience across these domains – can use the frameworks as a tool to think through intended outcomes, possible risks to those outcomes, and supporting mechanisms needed to achieve the outcomes. We contend that by explicitly representing these social processes and concepts in the framework, there is less risk that their importance can be sidelined.

5 Inclusive Value Chain Analysis Framework

***Note:** This work was developed collaboratively with the value chain programme of work and will form the basis of joint publications. To aid stand-alone readability of this and the inclusive value chain assessment report (see Report 2 of Volume 3 of the final report of LWR/2014/072) some of the text in this section is replicated in both reports.*

5.1 The framework

Traditional value chain analysis (VCA) typically focuses on linear interactions, from producer to consumer, and outcomes in financial terms (i.e. cost and/or profit). In many situations this narrow focus overlooks the needs and constraints faced by certain marginalised groups, which may prevent them from benefiting from interventions. In worst case situations, some may end up worse off from interventions, for example through reinforced social exclusion or increased exposure to production or market risks. A broadened analysis may better identify causes of value chain inefficiency and help develop intervention strategies that address the needs and constraints of the target groups.

We focus on the concepts of *Marketability* and *Produceability* as key pathways linking interventions to improved non-monetary and income-related outcomes. The framework attempts to go beyond income to distinguish the underlying goals of the actor and other important outcomes. For farmers, goals might be consistent income, money for children's education, reduced need to seasonally migrate for work, or profit maximisation. Examples of non-income outcomes include improved diets and food security, and reduced labour or work hours. Different actors will have different values, goals and preferences, and it is expected that interventions may result in tradeoffs of outcomes (both tradeoffs among multiple objectives of individual actors and tradeoffs between actors).

In developing the framework in Figure 10, we drew on learnings from the SIAGI and DSI4MTF project activities to define the variables, outcomes and conditions to include. We use *Profit, Produce for subsistence, Engagement in Production* and *Engagement in Market* as the generalised outcomes, as they are the outcome pathways evident in all SIAGI case studies, across locations, household typologies and crops. Three intermediate outcomes are defined: these are produceability, marketability and selling price. The *Desired / Desirable Outcome* variable considers whether the profit and non-monetary outcomes gained allows the actor to meet their underlying goals.

Taking the perspective of a farmer, *Produceability* encapsulates the question of 'Can I grow it?' and it is a function of the farmer's available resources (*Agricultural Inputs*), given the requirements of the crop, and their production know-how. Agricultural inputs can include land, water, fertiliser, pesticides, labour and machinery; depending on the context, including the farm location (which influences soil, climate, etc) and crop choice, limited access to any one of these inputs can be critical to production. *Produceability* influences the yield (volume), quality of product and

production costs. The yield and quality of the product can also be affected by External shocks, which can include extreme climate events (e.g. hail, early rainfall), pests and disease, and damage by animals (e.g. wild animals such as elephants, and livestock such as cattle).

Marketability encapsulates the question 'Are the market conditions favourable for me?' and is a function of the presence (or absence) of entry barriers, yield produced by the farmer, the demand for the product and the farmer's market know-how. Marketability affects the selling price as well as selling costs. Financial capital – access to savings or credit – is important for addressing entry barriers and meeting agricultural input requirements.

Production know-how considers the question 'Do I have the capacity to engage in production?' while *Market know-how* asks 'Do I have the capacity to engage in the market?'. Engagement in either might be as an individual or as part of a group, whilst capacity includes skills, knowledge and actual capacity to engage. Know-how is influenced by the farmers access to good information, their formal or informal relationships with others (e.g. with other farmers, shop owners, traders or extension agents) and their skills, abilities and knowledge (i.e. their *Human Capital*). Access to good market or production information is determined by three criteria: the reliability, adequacy and relevancy of information. Reliability concerns the farmers' perceived credibility of the source of data (e.g. market information from a local trader is more reliable than information from someone outside the market). Adequacy captures the timing, format and completeness of the information. Relevance is the pertinence of the information given the conditions experienced by the farmer (e.g. production information relevant to the given climate and soil type) as well as their objectives and capacities (e.g. production information involving expensive high-tech inputs won't be relevant to a poor farmer). Social networks are key to mitigating the production and market-related challenges facing farmers and building their capabilities and confidence to take and create opportunities.

At the centre of the framework is the selling price of the product which may be affected by a number of factors: the marketability and quality of the produce, the presence of other suppliers, the capacity to aggregate product to take to the market (e.g. through farmer collectives), and how urgently the farmer needs to sell the product (*Urgency of Need*), for example to pay off high-interest loans. The selling price, together with production costs, selling costs and yield, determine the *Profit*.

The one-way link between profit and *Desired / Desirable Outcomes* relates to whether the profit gained allows the actor to meet their varying underlying goals. 'Desired' implies that this is the objective, whilst 'Desirable' reflects outcomes or benefits that were perhaps unintended or unplanned (gaining the respect of others); both desired and desirable outcomes have been observed across the SIAGI project. Desired or desirable outcomes are also shaped by (and in return shape) produceability, relationships (via values and social norms), and 'aspirations'.

The framework also captures non-income outcomes from agricultural production through Pr*oduce for subsistence*, which includes produce for household consumption or given to neighbours or relatives. The amount of produce set aside for consumption may depend on the yield; for example if a large volume is produced, the farmer will have plenty to sell and provide to the family, and even to give to friends. On the other hand, if only a small amount of crop is produced, the farmer may keep it all for the family as it is not enough to bring to the market. Another factor that may

affect the amount of produce set aside for subsistence is the selling price of the product; if the selling price is high, the farmer may sell the full amount.

Engagement in Production and *Engagement in Market* themselves can also lead to *Desirable Outcomes*. Engagement in production, for example, can lead to new learnings and experiences, as well as new or improved relationships with family, friends or neighbours. Similarly, through engaging in market, farmers can become exposed to new learnings or ideas (e.g. new types of produce) and the interaction with other sellers and buyers can also be a positive outcome (e.g. new friendships, or being noticed by others in the community).

The IA framework provides a way to structure thinking around interventions related to agricultural livelihoods. From a VCA perspective, the framework helps VC interventions to be more inclusive, by explicitly mapping out how an intervention affects the various risks and opportunities that a group of farmers may face, in the context of what they have access to and social norms. The framework has explicit links to three of the concepts from the empowering change framework (section 6) – social networks, human capital and agency.

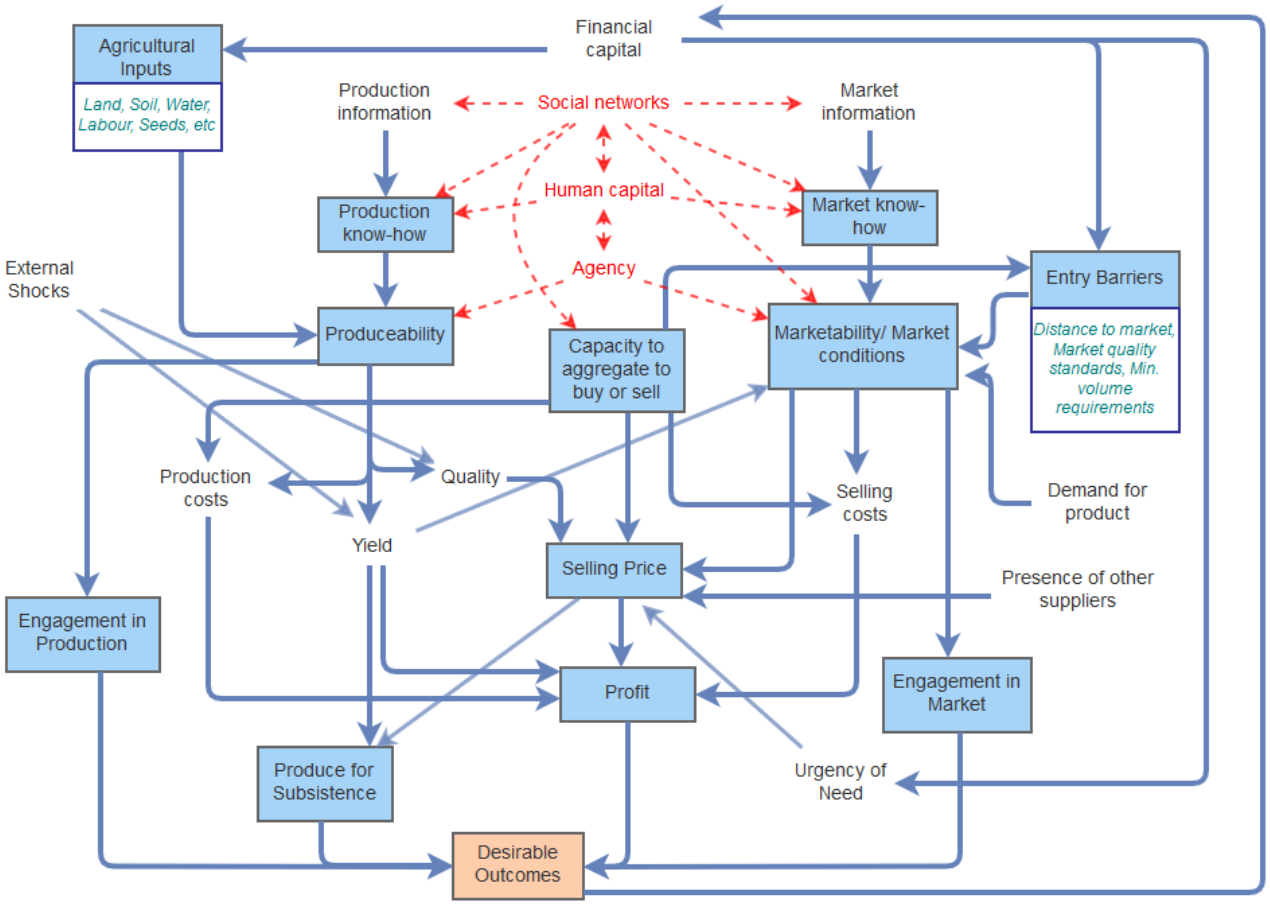


Figure 10 The Inclusive Value Chain Analysis (IVCA) framework showing the core structure of the framework (as the concepts in the boxes) and the concepts that describe the pathways to the core concepts (black text not in a box). For all concepts definitions or relative importance may differ between people, groups or locations. Links to the underlying Empowering Change framework are indicated by the red text and dashed red arrows.

5.2 Fuzzy Cognitive Mapping

5.2.1 Model structure

The framework in Figure 10 – excluding the links to the empowering change framework – formed the basis of the Fuzzy Cognitive Map (FCM) shown in Figure 11. The assumptions behind each link shown in Figure 11 and the strengths of the relationships have been documented and are available upon request. Selling price, marketability and profit are the most central concepts (Table 1). The top driving variable, defined by having the highest total out-degree score with an in-degree score of zero, is *Capacity to aggregate to buy or sell* followed by *Financial capital*.

The relationships in this FCM are defined for the generalised case (e.g. any crop or any actor) and the validity of these will need testing when applied to different contexts (e.g. a new village in a similar agroecological setting). To apply the FCM to case study scenarios we then perturb variables of the model and compare results against the 'steady state'. In this appendix, we use the FCM to demonstrate two case studies – off-season spinach grown in polyhouses (greenhouses made with polyethylene covering) in Dhaloguri and Sunflower seeds in Sekendarkhali – and these case studies are described in Sections 5.2.2 and 5.2.3, respectively. Model verification and testing of scenarios is described in Section 5.2.4. For both off-season spinach and sunflower, scenarios are defined for the 'current' state (as of December 2018); further scenario analysis is performed for sunflower to explore the possible effects of four interventions in isolation as well as the combination of the four interventions.

Narratives around the sunflower and spinach case studies were structured based on the FCM by qualitatively describing and ranking the states of the FCM variables corresponding to the case study. This helped us define semi-quantitative 'baseline' scenarios for off-season spinach and sunflower in Section 5.2.4.

5.2.2 Off-season spinach production in Dhaloguri

Off-season spinach production in Dhaloguri was initiated through a series of interventions including the formation of farmer collectives, capacity building and community mobilisation and polyhouse cultivation trials in 2016. By 2018, production of spinach had expanded considerably; farmers were engaging a middleman to sell organic spinach to Bhutan and new, larger and cheaper greenhouses were constructed by farmer clubs in the village. Now produceability is high, market conditions favourable, and selling price and profits are high.

Polyhouses can provide protection from heavy rains during the monsoon season, which allows three to four off-season spinach crops per season. Once set up, the polyhouses are simple to maintain and cultivate crops, making it particularly suitable for time-poor women farmers. The initial cost of constructing polyhouses (~24,000 INR) is three times the cost of traditional field-based farming and therefore not viable for most individual farming households. For collectives of 8-10 farmers, these costs are more affordable although they remain a significant constraint. Further aggregating to farmer clubs with legal status opens avenues to accessing government schemes to co-invest in agriculture.

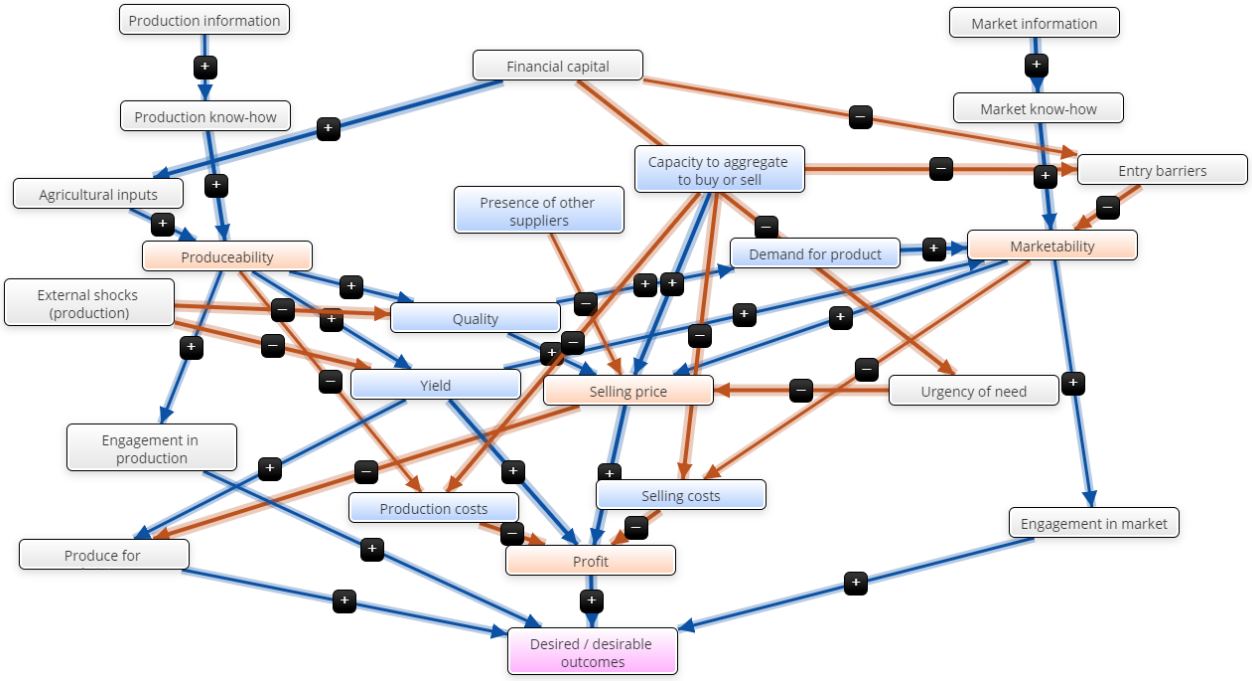


Figure 11 The fuzzy cognitive map representing the team's shared understanding of value chains from a perspective that integrates market and production dimensions. The map was developed in the software Mental Modeler. A blue arrow indicates a positive relationship between concepts, and an orange arrow indicates a negative relationship. The strength of relationship is represented by the thickness of the line and documentation of the model relationships are available upon request.

Table 1 Metrics for the FCM application of the Inclusive Value Chain Analysis framework, sorted by descending centrality score.

Component	Indegree	Outdegree	Centrality	Variable type
Selling price	4	2	6	Ordinary
Marketability	3.5	1.75	5.25	Ordinary
Profit	4	1	5	Ordinary
Capacity to aggregate to buy or sell	0	4	4	Driver
Yield	1.5	2.25	3.75	Ordinary
Produceability	1.5	2.25	3.75	Ordinary
Quality	1.5	1.5	3	Ordinary
Desired / desirable outcomes	2.75	0	2.75	Receiver
Produce for subsistence	1.75	0.75	2.5	Ordinary
Entry barriers	1.5	1	2.5	Ordinary
Financial capital	0	2.5	2.5	Driver
Production costs	1.5	1	2.5	Ordinary
Selling costs	1.5	1	2.5	Ordinary
External shocks (production)	0	2	2	Driver
Market know-how	1	1	2	Ordinary
Urgency of need	1	1	2	Ordinary
Demand for product	0.75	1	1.75	Ordinary
Agricultural inputs	1	0.5	1.5	Ordinary
Production know-how	0.5	1	1.5	Ordinary
Engagement in market	0.75	0.5	1.25	Ordinary
Engagement in production	0.75	0.5	1.25	Ordinary
Market information	0	1	1	Driver
Presence of other suppliers	0	0.75	0.75	Driver
Production information	0	0.5	0.5	Driver

Although the income and profit gained from off-season spinach are undoubtedly important, other beneficial outcomes have stemmed from its production. The nutritious vegetable is consumed by farming households at a time of year when it is too expensive for them to purchase. Some spinach is given to neighbours or relatives (considered as building their social capital) and farmers offer part of first harvest to the village deity and priest. Besides being an important cultural practice the produce reaches different homes and thus acts as marketing for collectives. With the success of polyhouse-grown spinach, the community has expanded its spinach production and has expressed aspiration to become the spinach specialist of north Bengal. This represents a great sense of identity forming for the community and agency for the individual farmers.

5.2.3 Sunflower seeds in Sekendarkhali

Sunflower was considered by the Sekendarkhali community and the ACIAR project teams as a *Rabi* crop that offers potential for farmers as it is relatively tolerant of salinity. It also has relatively low requirements for irrigation, fertilisers and insecticides, especially compared to other oil crops. Another big draw for producing the crop is the two large sunflower seed oil processors located near the village. Farmers have the option to either sell seed or sell oil produced from their seed (themselves or by out-sourcing to a small-scale oil mill). To date, most farmers have preferred producing and selling their seed.

Following on from a successful trial of sunflower in the village in 2016-17, instigated by our sister project, about 30 medium-sized farmers (1-2 acres) cultivated the crop the following year. However, the volume and quality of sunflower seeds (and resulting oil) were low as early rains and resulting waterlogging meant farmers had to harvest the remaining crop before it fully matured.

Despite its potential, production has been relatively low in part due to farmers being in the learning phase of growing sunflower and growing *Rabi* crops in general, but also due to the environmental challenges and the poor quality seed (for growing) purchased from local markets (Table 2). Technical know-how is developing within the farmer groups in response to the presence of government agricultural research scientists and also the ECE activities of Shushilan. At this stage, the NGO are focusing their activities on crop 'produceability' and crop planning. Market information and know-how is not a constraint to marketability unlike poor yield and quality. The selling price that farmers can get for sunflower seeds depends on many factors: the timing of their harvest, their connection to processors, the quality and dryness of the seed, and the volume of seed. The last two factors are the key limits to selling price and farmers being able to sell directly to processors. By comparison, sunflower producers in a neighbouring village receive a higher price for their seed due to their good relationship with the processor and improved production of the crop. The motivation for farmers in Sekendarkhali growing sunflower seed was the higher prices compared with other crops, and the potentially higher yields compared with other crops. The Baseline scenario the following section represents the situation at the end of the 2017-18 season.

5.2.4 Model verification and testing

As a form of model verification, baseline scenarios corresponding to the two case studies were analysed in the FCM. For the "off-season spinach baseline" we allocated states to the following ***driving*** variables: 'good' market information, 'good' production information, 'low' presence of

other suppliers, 'high' capacity to aggregate to buy or sell, and moderate to good 'Financial capital' (due to the presence of collectives) and moderate to good 'agricultural inputs'. For the "sunflower baseline" we defined these variables: 'moderate to good' market information, 'moderately poor' production information, 'low' presence of other suppliers, 'poor' agricultural inputs (reflecting poor access to good seeds and, for marginal farmers tractors), 'low' financial capital and 'somewhat low' capacity to aggregate to buy or sell (due to the absence of collectives). The numeric values that were applied to the FCM to represent these baseline scenarios are shown in Table 2.

The relative change to variables in the FCM under the two baseline scenarios compared to the 'steady state' are shown in Figure 12. 'Steady state' is the reference point representing the conditions converged to over time under the generalised situation. For off-season spinach, the greatest relative change compared to the steady state was the higher selling prices; compared with greater entry barriers and higher urgency of need for sunflower. Notably, under the "sunflower scenario", there was lower produceability and production know-how, higher production costs, as well as poorer yield, quality and profit. These FCM scenario results and the above centrality scores are consistent with expectations.

Table 2 Changes applied to driving variable states of the FCM to represent the off-season spinach and sunflower baseline scenarios (see Figure 12) and the sunflower intervention scenarios (see Figure 13).

Variable	Baseline Scenario		Sunflower Intervention Scenarios				
	Offseason spinach	Sunflower	Production know-how	Capacity to aggregate	Financial Capital	Agricultural Inputs	All
Market information	1	0.75	0.75	0.75	0.75	0.75	0.75
Production information	1	-0.25	0.75	-0.25	-0.25	-0.25	0.75
Capacity to aggregate to buy or sell	1	-0.25	-0.25	0.75	-0.25	-0.25	0.75
Financial capital	0.75	-1	-1	-1	0.75	-1	0.75
Agricultural inputs	0.75	-1	-1	-1	-1	0.75	0.75
Presence of other suppliers	-1	-1	-1	-1	-1	-1	-1

The FCM can be used to explore the potential effects of further interventions. For example, Figure 13 shows the relative gains that may be achieved in the Sekendarkhali sunflower case study through enhancing: production know-how, capacity to aggregate to buy or sell, financial capital, and/or agricultural inputs. The numeric values that were applied to the FCM to represent these interventions are shown in Table 2. Figure 13a suggests that only improving the quality of production information will lead to minor improvements in produceability of sunflower. In comparison, Figure 13b indicates that improving access to agricultural inputs may lead to a greater change in produceability, albeit with muted improvements in yield, quality and profit. The scenario results for improved financial capital (Figure 13c) and capacity to aggregate to buy or sell (Figure 13d) highlight the strong influence of these variables on selling price and the costs of production and marketing, and therefore profit. Figure 13e suggests a multi-pronged approach addressing the

produceability and marketing of sunflower together with the low financial capital faced by many farmers in Sekendarkhali is needed to achieve real gains in the outcomes of agricultural interventions. The 'desired outcomes' is not very sensitive to the scenarios tested, reflecting its position in the FCM network relative to the driving variables (i.e. any impact is mediated through intermediary variables).

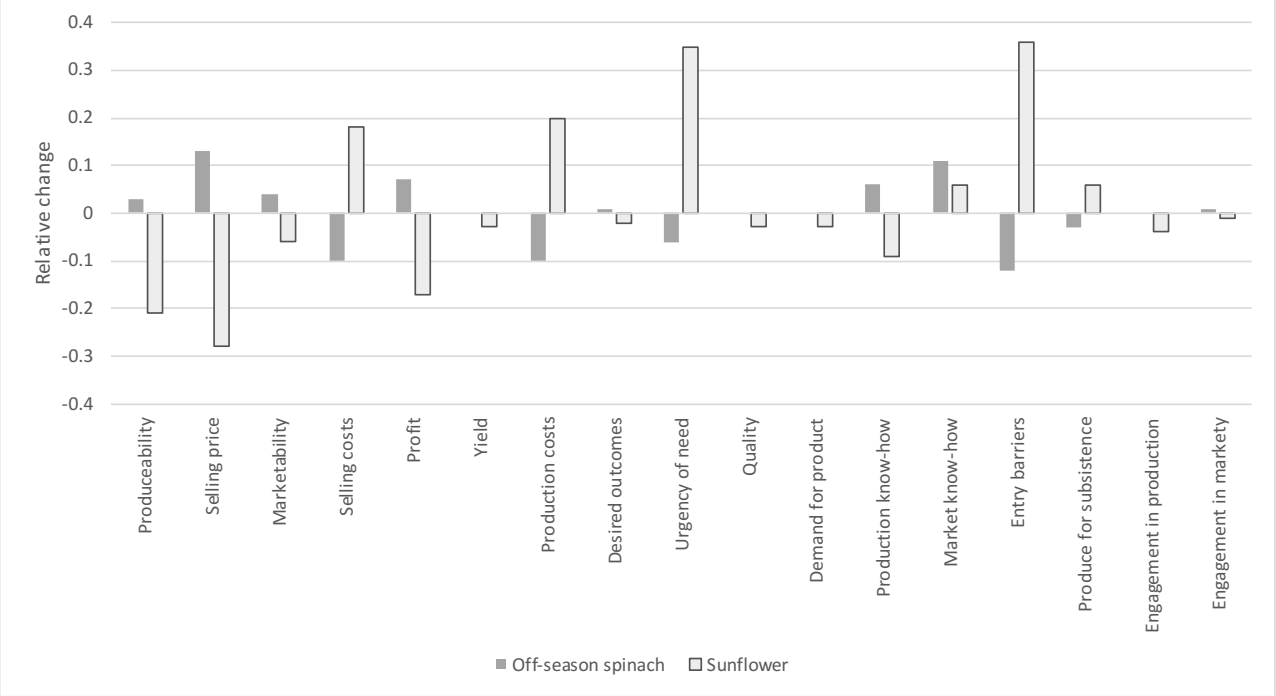


Figure 12 Chart shows the relative effects of the "off-season spinach baseline" and "sunflower baseline" scenarios on variables in the FCM. The scenarios were defined by allocating applying changes to the *market information, production information, presence of other suppliers*, *financial capital*, *agricultural inputs* and *capacity to aggregate to buy or sell* concepts (see Table 2).

Following the end of the 2017-18 dry season there was still some interest in sunflower within the Sekendarkhali community and Shushilan expected that the cultivated area would increase in the 2018-19 season. Some marginal farmers, however, were reluctant to grow sunflower due to the challenges they observed in the 2017-18 season, namely the early rainfalls that led to waterlogging and low, poor quality yields. In the 2018-19 season, about 70 farmers grew sunflower and again these crops failed due to early rains. Interest for this crop has since diminished. The FCM is able to represent 'shocks' like these early rains through the External Shocks concept in Figure 10 and its links to Yield and Quality. This is demonstrated in Figure 14 for selected variables in the FCM. In the baseline scenario, *External shocks* was not altered, but to represent early rains and waterlogging a change of +1 is applied which reduces both yield and quality, and hence the selling price and yield that can be attained. Alternatively, with land management practices that allowed the rapid removal of excess rainfall, represent by a change of -1 to *External shocks*, improvements in yields and quality might be gained. What is not represented in the FCM is the link back from failure (or success) in terms of the yield and quality of production and the farmer motivation or intent to continue producing the crop (this is a link to empowering change framework).

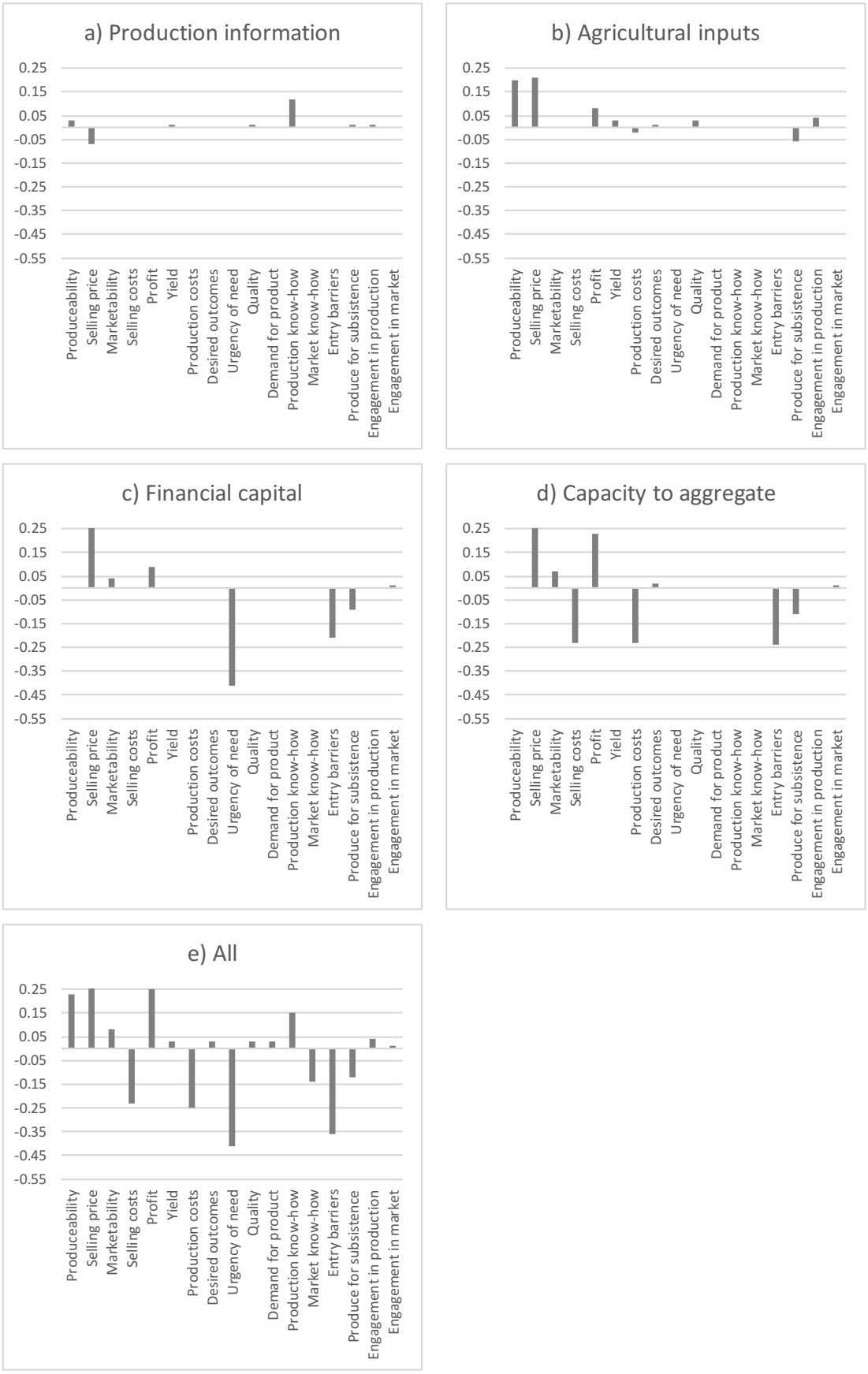
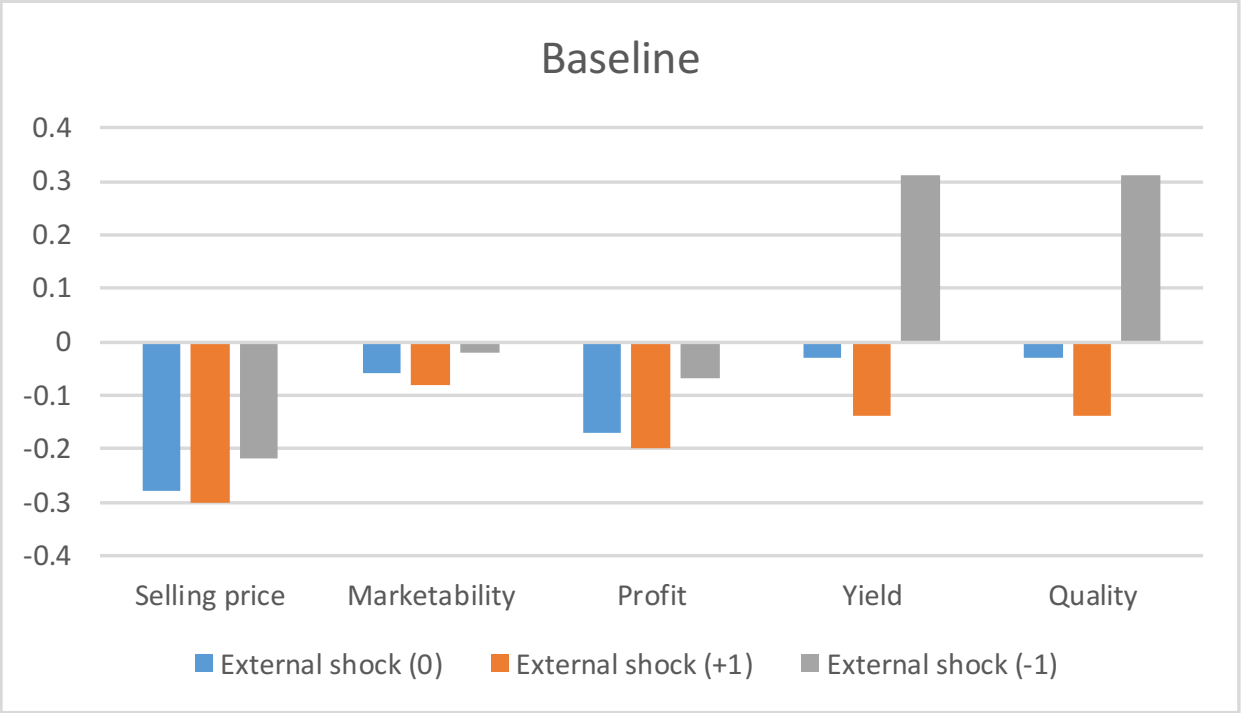


Figure 13 The relative change in the FCM variables from the baseline sunflower scenario with improved a) production information, b) agricultural inputs, c) financial capital, d) capacity to aggregate to buy or sell, and e) all improvements.



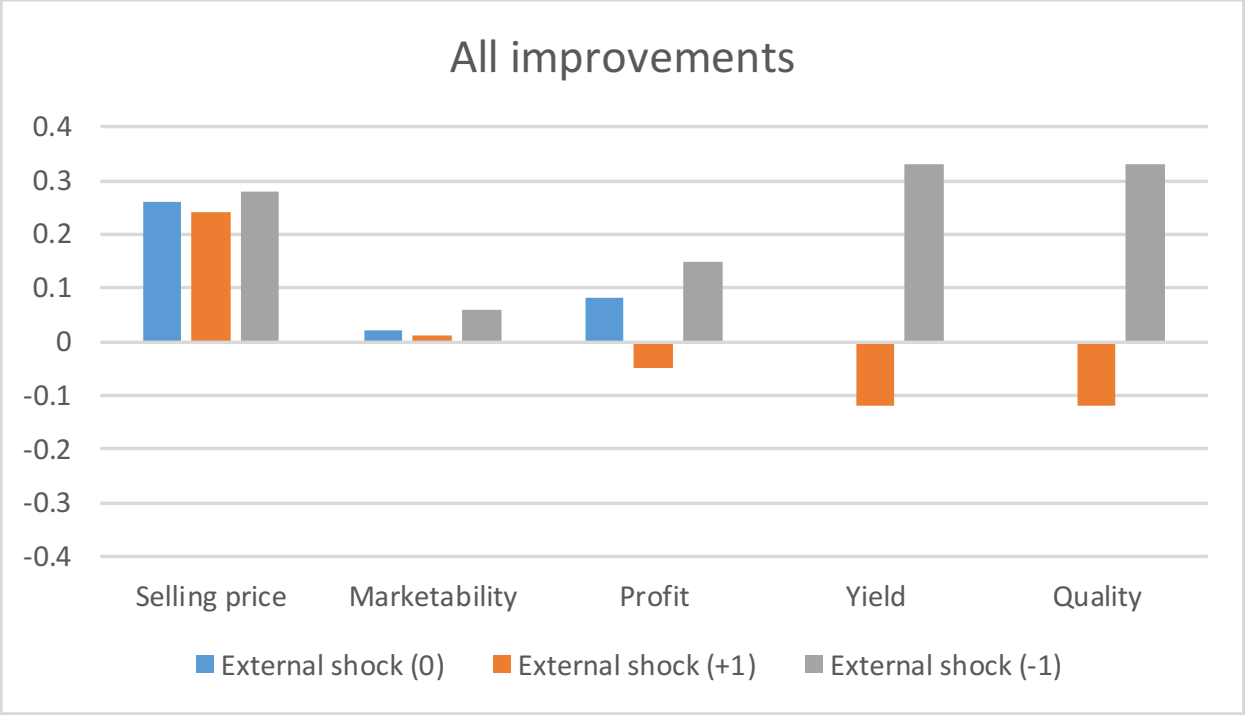


Figure 14 Influence of external shock on selected variables in the FCM variables for the baseline (top) and all improvements (bottom) scenarios for sunflower.

5.3 Scenario analysis on extended IVCA FCM

Another FCM was developed from the IVCA framework that included the three concepts from the empowering change framework – social capital, human capital and agency. The strengths of the relationships have been documented and are available upon request. A range of scenarios representing possible interventions were tested on the model.

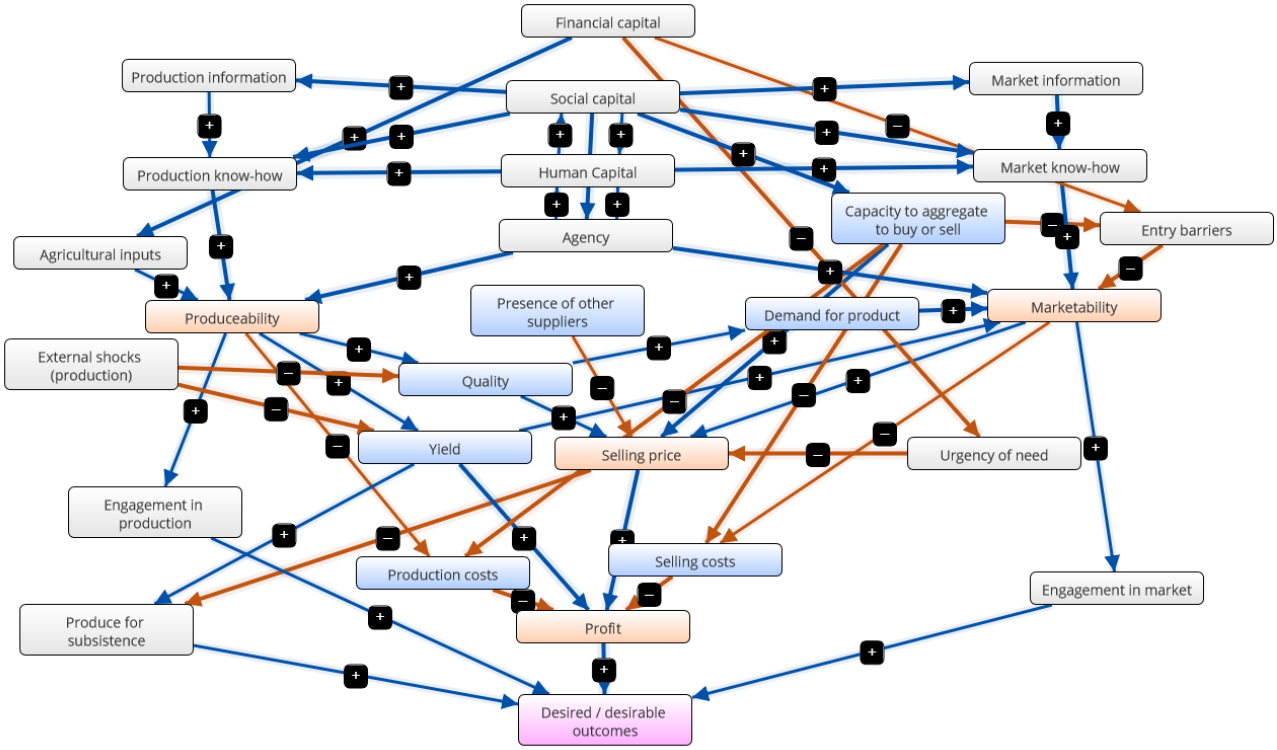


Figure 15 A fuzzy cognitive map based on the IVCA framework with additional concepts from the empowering change framework. The map was developed in the software Mental Modeler. A blue arrow indicates a positive relationship between concepts, and an orange arrow indicates a negative relationship. The strength of relationship is represented by the thickness of the line.

The interventions tested are listed in Table 3. Each intervention tested, represents a change in one of the FCM concepts. It is assumed in this scenario analysis that each intervention was successful in achieving maximum impact in the corresponding variable.

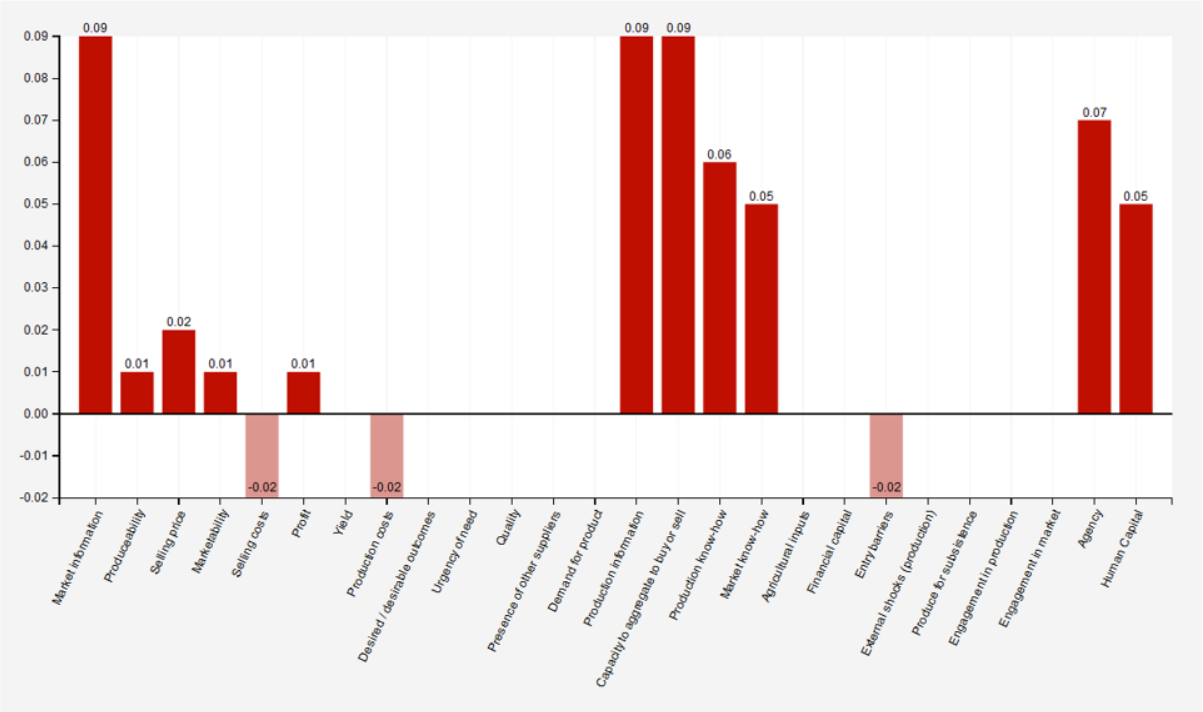
Table 3 The intervention scenarios tested and their corresponding changes in FCM concept states.

Intervention	**Changes to FCM state**
Provision of market information	↑ Market information (+1)
Provision of production information	↑ Production information (+1)
Formation of community based groups	↑ Social capital (+1)
Empowering individuals through community engagement activities	↑ Agency (+1)
Capacity building to improve production know-how	↑ Production know-how (+1)
Capacity building to improve market know-how	↑ Market know-how (+1)
Improve access to ag. inputs (freshwater for irrigation, good quality seeds, etc)	↑ Agricultural inputs (+1)
Low-interest, 'farmer-friendly' loans	↑ Financial capital (+1)
Collective farming/marketing	↑ Capacity to aggregate to buy/sell (+1)

The results of the scenario runs showed that over time, five of the interventions only showed relative gains in one other factor. Provision of market information and production information led

to increases in market know-how and production know-how, respectively. Capacity building to improve production know-how and improved access to agricultural inputs both led to increases in produceability. Capacity building to improve market know-how increased marketability. On the other hand, the remaining four intervention scenarios led to improvements in multiple areas (Figure 16 and Figure 17).

a) Formation of community based groups (+1 Social capital)



b) Empowering individuals through community engagement activities (+1 Agency)

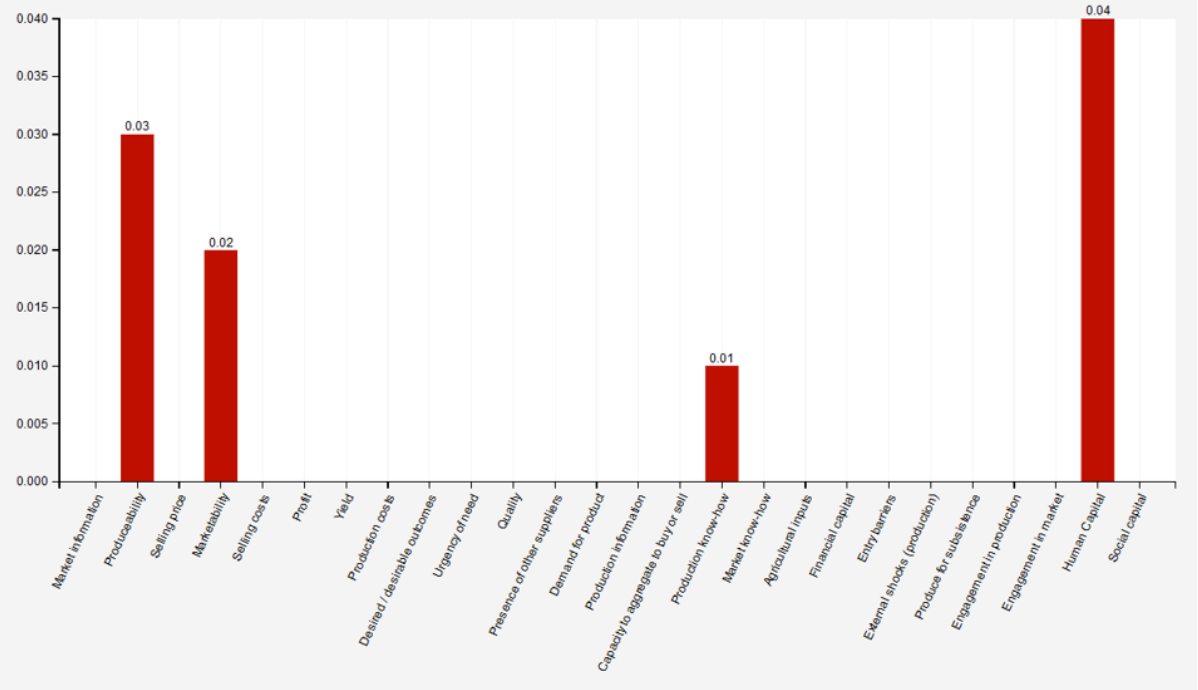
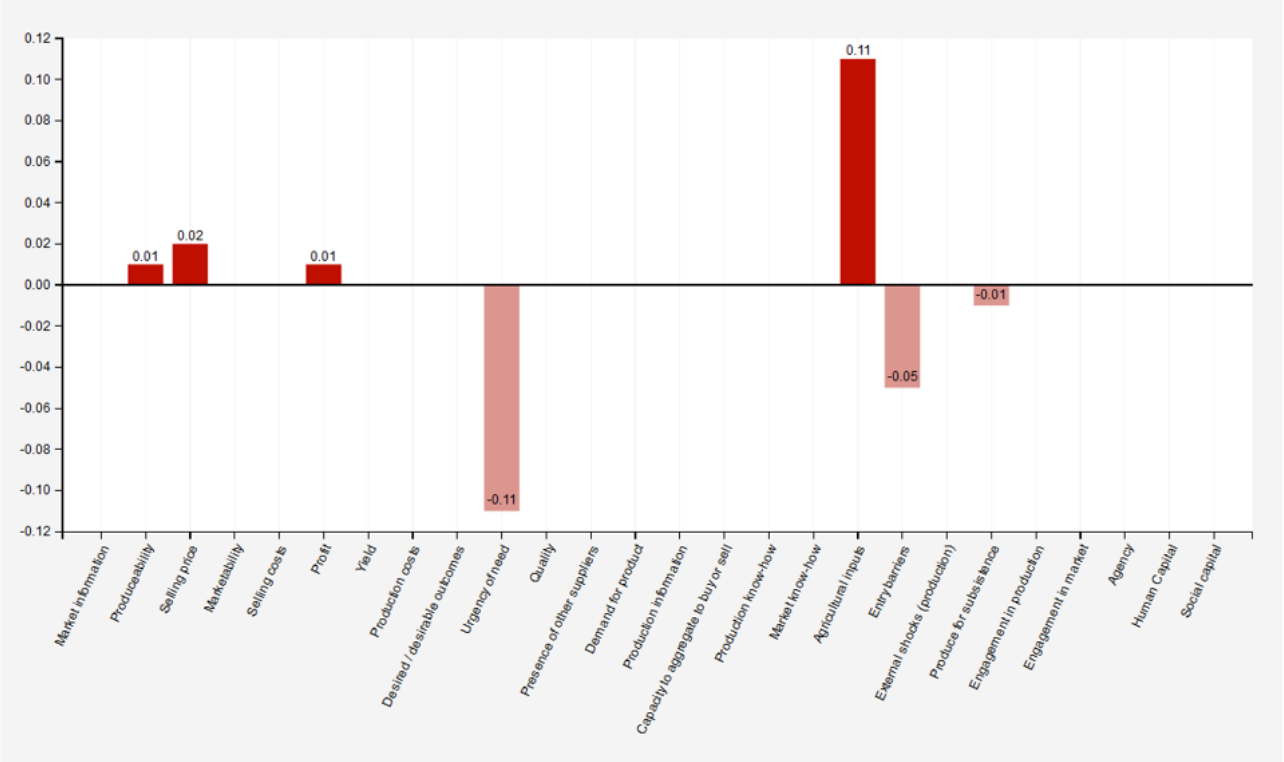


Figure 16 Graphs showing the relative effects of four of the intervention scenarios (Part 1): a) formation of community based groups, b) empowering individuals through community engagement activities.

c) Low-interest, 'farmer-friendly' loans (+1 Financial capital)



d) Collective farming/marketing (+1 Capacity to aggregate to buy or sell)

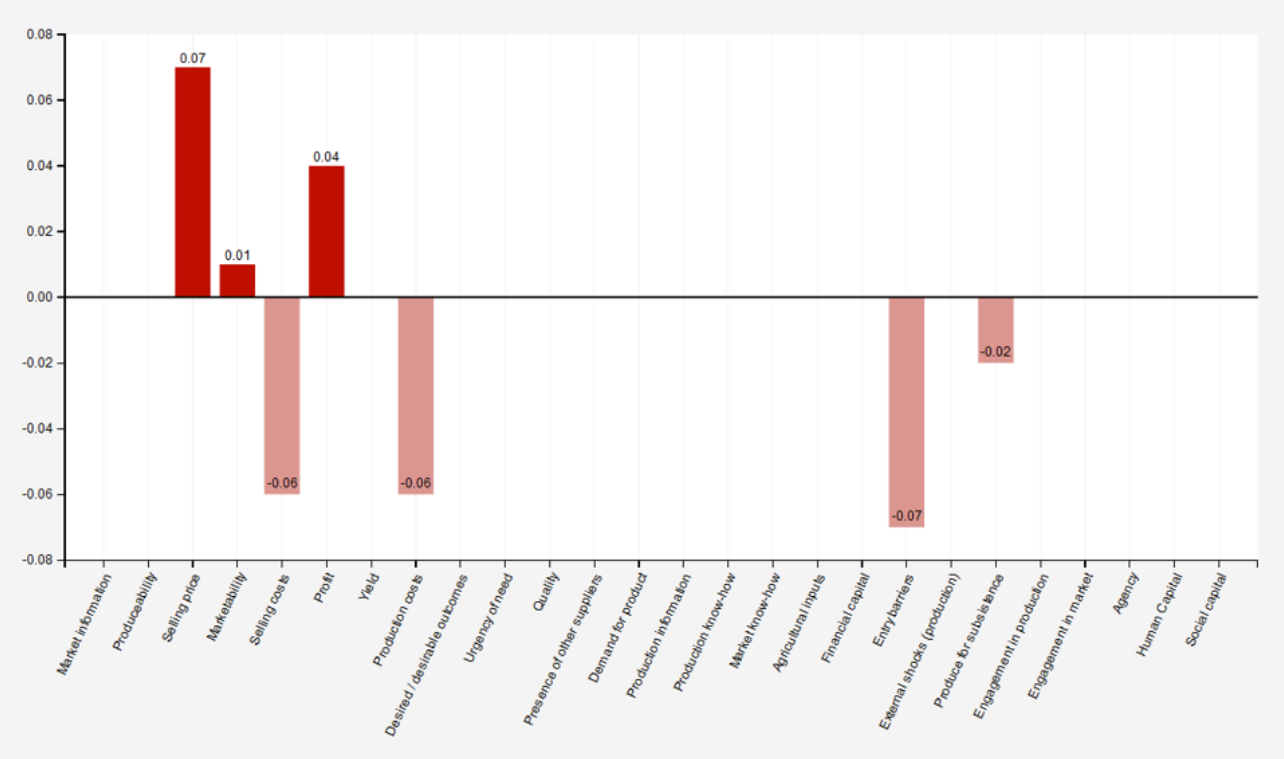


Figure 17 Graphs showing the relative effects of four of the intervention scenarios (Part 2): c) low-interest, 'famer-friendly' loans, and d) collective farming/marketing.

The scenarios runs suggest that the four interventions shown in Figure 16 and Figure 17, which involved targeted improvements in social capital, agency, financial capital or capacity to aggregate to buy/sell, each have the potential to have positive impacts through multiple pathways. For example, an intervention aimed at forming groups for collective farming and marketing can lead to

reduction in selling costs, production costs and market entry barriers, and subsequent increases in marketability, selling price and profit, as well as a potential decrease in produce for subsistence (due to farmers being less likely to consume produce that they can sell for a good price) (Figure 17 bottom panel). Of the interventions tested, the formation of community-based groups (e.g. SHGs) seemed to have the greatest impact on the system, affecting 14 other variables in the model, including: increases in market information, production information, capacity to aggregate to buy/sell, production know-how, market know-how, produceability, marketability, selling price, profit, agency and human capital; and decreases in selling costs, production costs and entry barriers.

5.4 Discussion

In this section we have demonstrated the IVCA framework using FCM applications, although we have developed other applications of the framework. Links to further information on these narratives can be accessed from the Appendix.

5.4.1 Links to the other frameworks

The link from the IVCA framework to the local water management framework described in the preceding section, is through the driving variable *Financial capital* to *Capacity to invest* in the water framework. Financial capital has consistently been raised as a constraint to farmer investment in accessing and using water resources development, as well as the sourcing of other agricultural inputs required to intensify agriculture at an individual or group scale.

The empowering change framework is also linked to the IVCA framework, through the social networks, human capital and agency concepts. Social networks can be a source of production or marketing information, or source of learning through which farmers can improve their production or marketing know-how. Through social networks, marginalised farmers can potentially pool resources and work together to buy (e.g. agricultural inputs) or sell produce at better rates, and access better market conditions. Human capital, which includes skills, knowledge and personal qualities, influences production and market know-how. Finally, the marginalised farmer also requires agency (and not just know-how and the physical resources) to engage in production and marketing.

5.4.2 Mapping the inclusion in value chain analysis

Our applications of the IVCA framework have focused on the farmer to market segment of the value chain, taken from the perspective of the farmer. Typically, the focus of value chain assessment at this scale has been to look at ways to increase the selling price or profit gained by farmers through production and/or market based interventions. Although income and profit gained from crop production are undisputedly important to the SIAGI communities, we saw evidence of the importance of other outcomes, namely engagement in production and/or market as well as consumption which we have represented in the IVCA framework. As well as income, statements like '*Feel good because I made a difference to others*', '*Respect & improved status*', '*Time and opportunity*', '*Exposure to new things*' [e.g. new foods]. '*Freedom*', '*Being noticed and asked what we are doing*', and '*Vegetables every day now*' can be found throughout the SIAGI

reports back from community. Further, by explicitly linking these monetary and non-monetary to *Desired / desirable outcomes* we make more explicit the link between outcomes of interventions and how they may support (or not) the capacity of the actor to meet their underlying goals and aspirations.

6 Empowering Change

6.1 Description

6.1.1 Overview

The empowering change framework explicitly maps out important psychosocial concepts in relation to change. It is centred on empowerment, defined by the World Bank as "*the process of enhancing the assets and capabilities of individuals or groups to make purposive choices and to transform those choices into desired actions and outcomes*" (Alsop et al. 2006). Power here is considered in terms of the ability to make choices (Kabeer 1999). The IA framework examines empowerment as a dynamic process for poor and marginalised farmers to enact positive change in their lives. This includes changes in all aspects of their lives from how they engage in production (e.g. crop choice, farming practice), in the market (e.g. negotiating prices, approaching new buyers), in their household (e.g. expenditures, diet), within the community (e.g. participation in community-based organisations activities), or with institutions (e.g. gaining access to entitlements). This framework is intended to be applicable to all institutional scales, including individual, village and organisational, and also to be used conjunction with the inclusive value chain and local water management frameworks.

6.1.2 Framework structure

The Empowering Change framework presented here builds on workshop discussions with one or more SIAGI partners, starting in December 2018, and early May 2019 field visits and reflections with CDHI. It also draws from learnings from the SIAGI project activities and literature on related topics. We treat empowerment as a process of change (not a condition or state) and represent it through the pathways shown in Figure 18. The framework examines some of the important factors underlying a person or group's decision to make a change. Below we describe this change in general terms of a farmer performing a specific task, but as mentioned above, 'change' can be applied to all possible aspects of their lives.

The generalised outcome (see Figure 4) of the Empowering change framework is *Intention/Decision to make change* and the desired outcomes correspond to *Desired actions and outcomes/Progress towards aspirations* and *Goals and aspirations*. The intention/decision to make a change is dependent on three main factors: 1) *motivation* ('This is what I want to do'), 2) *self-efficacy* ('I am capable of doing it'), and 3) *agency* ('I have the authority to make this choice'). These three drivers of change are the main intermediate outcomes (b) of the framework. The strength of these three factors can also determine the amount of effort people would be willing to spend in turning this choice into action and persisting in the face of difficulties.

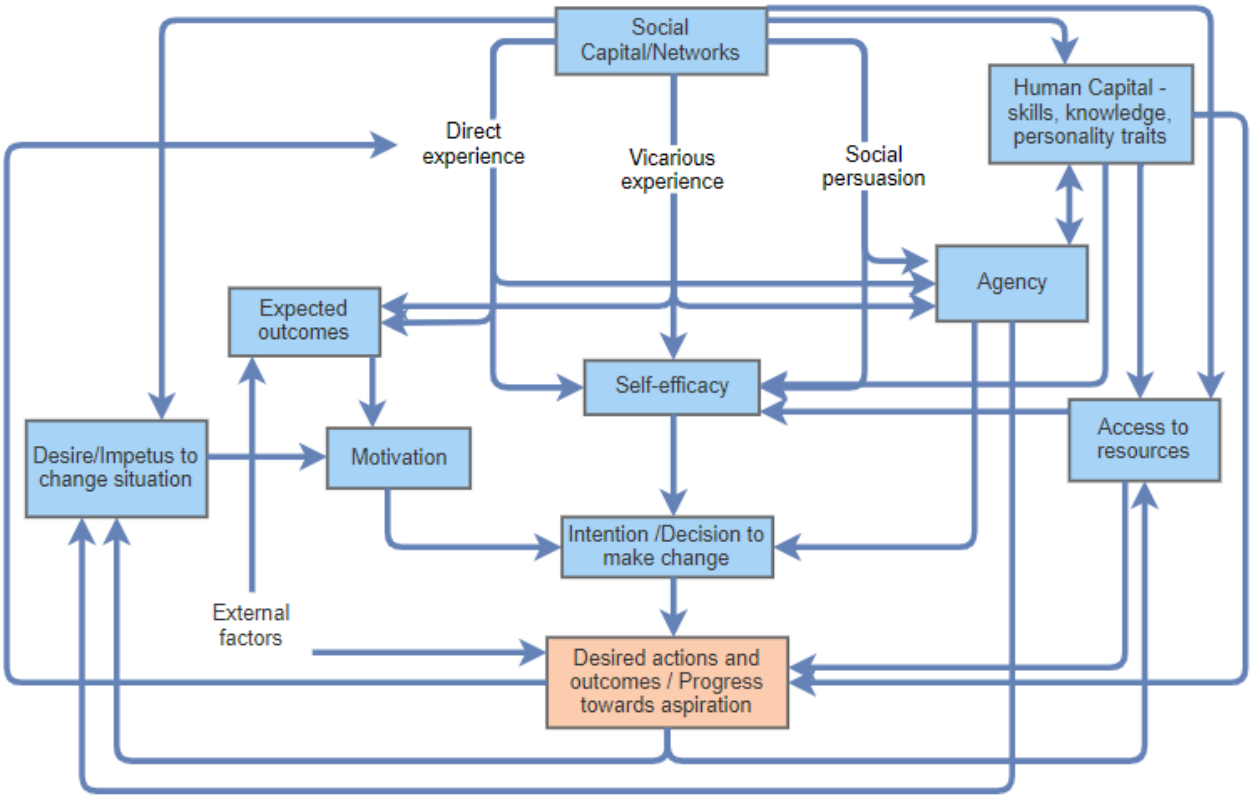


Figure 18 IA framework describing empowering change showing the core structure of the framework (as the concepts in the boxes) and the concepts that describe the pathways to the core concepts (black text not in a box). For all concepts definitions or relative importance may differ between people, groups or locations.

Motivation to change is driven by the *Expected outcome* of the change and whether this lines up with the person's goals and aspirations and their *Desire/Impetus to change their situation*. Without motivation, there is little incentive to change or persevere when faced with setbacks. This relationship alludes to the importance of (e.g.) donors consulting with potential recipients when designing interventions to ensure investments are in line with their goals. Furthermore, motivation depends on the centrality or priority of the issue that the change addresses; for example a farmer may be interested in practising environmentally sustainable, organic farming, but at present is more focussed on achieving high yields and quicker returns to pay off loans. There may also be consideration of whether there are more effective ways to achieve these goals (e.g. higher income through non-agricultural work). In addition, the expected outcome may also be influenced by factors outside of the control of the farmer (*external factors*, including social and other); for example, where outcomes rely on collective effort (e.g. area-wide pest control), expected inaction of other local farmers can demotivate a farmer (similar to the 'tragedy of the commons').

Self-efficacy is the belief in one's capability to perform a specific task. The framework captures three main sources of self-efficacy (Bandura 1977): direct experience, vicarious experience and social persuasion. *Direct experience* in undertaking the specific (or similar) task is the most effective way one can develop self-efficacy, and assess their capabilities. People can also learn by observing others perform the task (e.g. neighbour growing a new crop), and seeing the outcomes of these tasks (i.e. *vicarious experience*). Vicarious experience allows the farmer to compare their own capabilities in relation to others; these social comparisons can help to raise their self-efficacy

('If they can do it, so can I'). While experiences of successes, direct or vicarious, can build efficacy, failures may undermine it. *Social persuasion* is the verbal encouragement (or discouragement) by others in their social networks, and can either build or erode self-efficacy.

The framework also recognises that an individual's *Human capital* and *Access to resources* can influence their self-efficacy. Human capital includes a person's skills, knowledge and personal qualities. In addition to skills and knowledge, personal qualities such as assertiveness, problem-solving skills, resilience, creativity, confidence and entrepreneurship can help cultivate self-efficacy, especially in challenging situations. *Access to resources* captures the resources the individual/household currently holds as well as those they can gain access to (e.g. a tractor they could lease from a local farmer or business). Relevant resources include the materials, assets, support or services, entitlements and information (including scientific advice) necessary or helpful for performing the given task. The individual's human capital, as well as their social networks and environment can affect their ability to access resources they need. We consider an enabling environment as one that consists of institutions that are *effective* (e.g. an effective public sector institution provides timely delivery of quality services), *fair* in that they are inclusive and equitable and allow participatory or representative decision-making at all levels, and *responsive* to the needs and requests of marginalised groups (this implies that the formal institutions are willing to communicate with the marginalised people and adapt to their needs and interests). The qualities of institutions are often context-specific as they rely on the people in them.

The third driver of change concerns the belief that one has the authority to make the decision (*agency*). For example, without self-agency, a female farmer may not expand their production or sell their produce at a marketplace despite being capable and motivated. On the other hand, with self-agency a farmer may be willing to speak out to hold local authorities accountable to services they are meant to deliver. There is a two-way relationship between agency and personal attributes such as confidence and assertiveness. Greater agency may also lead to more ambitious goals or aspirations, and thus desire to change their situation. A person's agency can be influenced by their social networks via social persuasion, as well as through previous experience (both direct and vicarious). Social networks include connections to both informal and formal institutions, who may impose their shared norms, customs, ideas and rules. Accordingly, social networks can also influence an individual's aspirations and goals.

After making the decision, the next step is taking appropriate action. Outcomes rely on applying the right skills and resources, but can also be affected by external shocks; even if a new farming practice being perfectly executed, climate events or a market crash, for example, can lead to negative outcomes. If successful this action may help achieve the given goal, or at least lead to progress towards it as well as further experience and subsequently stronger self-efficacy. Unsuccessful attempts are not necessarily dire, but as mentioned earlier, can undermine self-efficacy especially if it occurs early on. Personal qualities such as resilience is particularly important in cases faced with difficulties or risks, as it can lead to persistent effort despite challenges (Wueppert and Lybbert 2017). The outcomes of actions may lead to feedbacks not only to self-efficacy (via direct experience), but also to access to resources and to the desire to change. Farmer collectives in Dhaloguri, for example, successfully produced off-season spinach and sold it for high returns, leading to greater financial capacity to expand their polyhouse production. Some farmers even expressed lofty aspirations for the village to become the spinach specialist of north Bengal.

6.2 Narratives

A field visit to Dhaloguri and UC on May 1 and 2, 2019 was used to ensure the empowering change framework was valid and applicable to various farmers in the study villages, and to clarify some of the concepts and relationships in the framework. The visit included four key informant interviews with individual farmers and three focus group discussions with farmer collective members. Questions were asked about how and why the farmer changed, with the aim of checking whether their responses aligned with the empowering change framework. The line of questions intended to evoke anecdotes that trace the journey of farmers from before the change, to the events or conditions that triggered the change, to the outcomes of the change and whether the change has been sustained. The framework itself was not presented to farmers and we avoided any leading questions that described the relationships in the framework.

Most the farmers we spoke to had progressed from only growing paddy once a year to farming a more diverse range of crops that were sold at the market. In all cases the initiating driver of change seemed to be vicarious experience – through exposure visits to farms in other villages or observing neighbours growing different crops. The context of the farmers varied, including their access to land and resources, and their personal qualities. These contextual factors affected their self-efficacy and motivation to change, and as leaders in the community, how they supported others in their change. For all farmers, after their first success in trialling new crops and farming practices, they became more motivated and progressively confident to try new things. While improved income was important, there were also other outcomes of the changes that were highly notable to farmers, including happiness gained by helping others, receiving recognition of expertise from others, and participation in market trading.

The narratives obtained from the field visit as well as discussions from the subsequent one day reflections workshop are documented in a detailed trip report which is available upon request. Summarised narratives of two of the farmers are presented below. The empowering change framework was used to structure the narratives.

6.2.1 Progressive farmer in Dhaloguri

Male farmer ND is considered a leader in the community in terms of his innovative and progressive farming. He is often the first to experiment with new crops, technologies and practices. He used to only grow paddy and jute, but now grows a variety of crops including cabbage, potato and tomato. He leads by example, and his work in agriculture has leveraged him socially, with other farmers approaching him for advice. He first wanted to change his farming as he found growing paddy to be demotivating. The impetus to experiment with new crops initiated from the desire to earn more income. Support from the DSI4MTF project allowed him to start experimenting.

His success in producing new crops that fetched good prices further motivated him to try new things. He was not discouraged by failed experiments, he simply accepted it and moved on to try something else. He has discussions with other farmers and takes these learnings to the field. Other farmers have appreciated him and his advice, which gives him happiness – this has been an unintentional outcome. When he sees other farmers selling vegetables that he introduced to them he feels good that he could help make a difference to others; again reinforcing his motivation.

When he sees someone else doing well, it encourages him to work harder and persevere even when conditions are not favourable (e.g. too hot).

He was asked why he thought other farmers with similar access to resources (land and financial capital, etc) were not farming multiple crops like him. He thought that perhaps other farmers were comfortable with more traditional farming and were not wanting to challenge themselves. Also they had more limited knowledge about farming. He believes knowledge gives him more freedom; his knowledge about several crop options, allows him to adapt to changing circumstances. For example if the weather is not suitable for tomato, he can switch to another crop. One important difference between him and many other farmers is that he is a full-time farmer, whereas others were only part-time with skills and occupations in other livelihoods. The part-time farmers were often focussed on achieving short term gains in agriculture, on the other he has a longer term view. Although he is a small-holder farmer, combined with his brothers and uncle, he has access to 4 acres of land which is sizeable and allows greater flexibility to diversify. Another reason for his ability to experiment was the lack of external pressure (from family etc) and he is not always thinking of finances. His brothers recognise his expertise and allow him to make decisions about their combined farmland on his own.

In terms of the empowering change framework, this narrative illustrates how there can be several sources of motivation, and how the positive outcomes from change (e.g. higher income, happiness from helping others) can lead to reinforcing feedback loops that strengthen not only motivation but also self-efficacy. For farmer N, direct experience was the dominant pathway to self-efficacy and agency, compared to vicarious experience being more important for the other farmers interviewed. His personal situation, including being a full-time farmer and having access to not only his own land but also his extended family's land, and having a supportive family gave him the ability and agency to experiment with crops.

6.2.2 Women's collective farmer in Uttar Chakowakheti

Female farmer LO used to grow only paddy once a year. Now she grows a diverse range of crops including cabbage, broccoli, beans, lady finger and tomato. Prior to SIAGI, she had no plans to grow vegetables – in fact no one in the village was growing vegetables. Now farmers throughout the village are growing all sorts of vegetables. She enjoys going to the market to sell her produce every week. She gets upset if she is unable to go to the market. Not only is it a source of income, but it also gives her an opportunity to see new things, meet and interact with people and get ideas.

Before, farmer LO and other women in her collective were dependent on their husbands to go to the market to buy produce. For the last 2.5 years, the women have been going to the market and buying new foods. This has given them a greater sense of freedom. As sellers in the market, the buyers trust them and their produce, and whatever they take to the market is quickly sold. Consumers know that they do not apply chemicals to their crops and that their produce is always fresh.

Their change started with training, demonstrations and exposure visits to other farms. When they first tried to grow vegetables, it was mostly for consumption but they sold a small amount at market. This helped them realise they can grow not only to eat but also to sell. Although initially

CDHI gave them a lot of support in growing, now less support is needed and they are doing it on their own. For example they mobilized their own funds to build a second polyhouse, and also made the decision to move the original polyhouse to a better location that was more protected and closer to their houses.

They noted the advantage of the collectives include being able to take on greater risks; as individuals they could not invest or take risks. Together they can share risks and learnings, which they use in their individual crop production activities as well as their group pursuits. They are also now willing to provide advice to and teach other farmers about growing new crops. For farmer R in the women's collective, the profits from farming are now sufficient that her husband no longer needs to migrate seasonally.

From the framework's perspective, this narrative demonstrated the importance of social networks, in this case – the collectives and their connections to CDHI – for exposure to new ideas, and provision of direct and vicarious experience and encouragement to change. As with farmer N, higher income was not the only positive outcome, but also happiness from new interactions, and the greater sense of freedom. For farmer RB's household, an important outcome is that her husband no longer needs to work away from UC. The women have achieved a greater sense of agency as well as self-efficacy, to the point that they have become advisers to others in the community on farming.

6.3 Changing aspirations in North Bengal

Using the empowering change framework, we describe how aspirations in the North Bengal communities have changed over the course of the SIAGI project based on various anecdotal evidence. We thereby demonstrate how the framework can be applied to higher level concepts (i.e. changing aspirations, as opposed to more ground level changes such as a change in crop type) at a community level.

One of the key changes observed in the North Bengal, as noted in the Report 5 of Volume 3 of the final report of LWR/2014/072 (SIAGI) final report, was the increase in aspiration level in the communities. Prior to the SIAGI project, the aspiration level of the communities was very low due to lack of confidence. Dhaloguri had been subject to many initiatives by both state and non-state agencies in the past, none of which seemed to have made any meaningful differences to their lives or livelihoods. The farmers in the village were therefore rather sceptical of the SIAGI project in its initial stages, with statements from farmers such as '*several initiatives have come and gone but our plight continues to be as they were for years. The researchers have come about, but nothing significant has happened*' and '*our plight is going to be the same – no big change is anticipated*'.

During our initial engagement it was observed that farmers in Dhaloguri were not optimistic about intensification considering the current environment – persisting dry spell, dependence on traditional technologies, weak and indifferent extension services and blurred policy prescriptions. In terms of the empowering change framework, the situation could be represented as a low sense of self-efficacy and agency, and poor motivation due to disappointments in past initiatives (poor expected outcomes). Bad experiences from past engagements with projects and from agriculture in general may also squash any aspirations they may have had (i.e. lack of desire to change situation). As one farmer explained: "...*Our crops suffer because of unpredictable climate conditions; we often suffer market fluctuations owing to unpredictable market. Minimum support*

prices and assurance against crop losses and glut are completely absent. Under such circumstances dreaming for a clear future is like day dreaming and cruel joke."

The initial situation in UC was different from Dhaloguri in that the village had not been the subject of initiatives or projects in the past. Nonetheless, the community in UC also had very low aspirations, particularly with respect to agricultural intensification. It was observed that crop production was very low as was enthusiasm for crop activities. In reflection of the previous situation, a female farmer from UC noted that in the past she simply had no plans to grow vegetables, as no one else in the village did. From the framework's perspective, this points to a low desire to change the situation, and low agency and self-efficacy, at least in part due to a lack of (vicarious) experience in agriculture in the village.

The SIAGI community engagement activities in both Dhaloguri and UC included capacity building through training and demonstrations, and exposure visits to farms in other villages, as well as building linkages between the community and relevant institutions and state agencies. Initially the farmers were provided with a lot of support in diversifying their agriculture and improving farm practices, however the need for this hand holding has decreased with time and farmers are taking their own initiatives to solve problems. Therefore through their link with the SIAGI project and CDHI, members of both communities were able to have direct and vicarious experience in diversifying crops and improving their agricultural practices, and improve their skills and knowledge (human capital). Accordingly, both communities have seen a rise in aspirations related to agriculture.

In Dhaloguri, recent observations have included greater enthusiasm in crop production, with the men and women posing challenges against each other in selection of crops and wanting to do better than the others. Women are also more active in discussions around profitability or contesting for equal wages. In UC, the physical landscape has changed, from rather barren land to fields with a diversity of crops. The social landscape has also changed, with people actively and enthusiastically engaged in agricultural production, and starting their own initiatives such as constructing greenhouses. These observations in both communities suggest increases in agency, self-efficacy and motivation to change.

6.4 Discussion

In this section we have demonstrated the framework for two narratives, although we have developed other applications of the framework (see Appendix).

6.4.1 The importance of social networks

The Empowering Change framework emphasises the importance of social networks, particularly relationships with family, friends and neighbours, and membership to groups or community based organisations such as SHGs and farmer collectives.

Social networks can drive positive change through several pathways. They can expose farmers to new ideas (e.g. new crops, farming practices, or market opportunities) and provide opportunities for farmers to learn from direct or vicarious experiences. For example, farmer collectives may trial a range of crops giving members direct experience, whilst neighbours who observe their work may learn vicariously. Social networks can also be a source of encouragement leading to greater belief in one's efficacy and/or agency; conversely social networks that discourage can erode efficacy and/or agency. Social networks can also influence access to resources, for example, better access

to agricultural inputs through self-help groups or farmer collectives. As an organised group, farmers are more likely to have their voices heard and demands met, and collectively they have greater capacity to mobilise and increase access to resources, including government and financial services. Collective action may also improve access to economic opportunities (e.g. new markets). Social networks are also an important source of information and learning, thereby helping an individual to build their human capital. Conversely, conservative social norms may restrict social networks of some people and constrain their access to resources. Therefore, not all social networks or relationships have the same influence, and some relationships may lead to disempowerment or the status quo.

6.4.2 Characteristics and dynamics of effective individuals and groups

Although the framework concepts and relationships have been described above in terms of change in an individual farmer, the framework can also be upscaled to a group, organisational or community level (as demonstrated in the narratives above). For example, if we consider a farmer group and its empowerment in reaching new markets, all the same concepts apply but collectively. At a group level, self-efficacy is the collective belief of the group's ability to accomplish a task. Social networks can include the group's connection with other groups, collectives, clubs or intuitions. The qualities of groups that may influence self-efficacy include the presence of 'change makers', leadership, group dynamics (coordination and cooperation), and its inclusiveness. Table 4 lists various qualities of both individuals and groups and how each quality can facilitate or enable change.

Table 4 Ideal qualities of individuals and groups, and the potential outcomes corresponding to each quality.

	Qualities	Outcomes
Individual	• Agency • Self-efficacy • Assertiveness • Problem-solving • Resilience • Creativity • Entrepreneurship • Readiness	• Make a decision for oneself • Make decision to perform the task and act on it • Tell providers what I want; get the support needed • Find solutions to overcome issues faced • Cope and recover from difficulties • Find innovative ways to carry out tasks • Turn ideas into action • Try new things
Group	• Good leadership • Presence of change makers • Inclusive • Shared vision • Effective teamwork • Influential • Transparency • Reflective • Linkages to important players	• Inspire, rally and nurture the team • Create momentum to change • Everyone can contribute to decision making • Efforts focused in the right direction • Work together to define and achieve collective goals and to resolve conflicts as they emerge • Attract support, and can affect change • Trust; keeps the group intact • Adaptive learning and more strategic planning • Greater access to facilities and opportunities

6.4.3 Stages of the change process

The framework can also be applied to different stages of the change process, from initiating change to sustaining it. Change is first initiated through the exposure to new ideas (via vicarious

experience), and motivation to change is triggered if expected outcomes match up with the person's or group's goals. This motivation needs to coincide with self-efficacy, agency and access to resources for change to occur. This change can be further catalysed by drivers of these factors (e.g. social persuasion, vicarious experience, personal attributes). It is hypothesised that change is sustained if it leads to desired outcomes or progress towards aspirations, thereby reinforcing self-efficacy and agency. Change may be sustained even with unsuccessful attempts if that experience leads to learning that improves self-efficacy.

6.4.4 How empowering change underpins local water management and inclusive value chains

The critical link from the empowering change to local water management is through *Agency* and its link to marginalised actors *Input to Local Institutions*. In Sekendarkhali and Khatail, the community demand for more freshwater was evident from the get go and in facilitating the development of the WSMC, SIAGI has invested much effort into building the capability and agency of women, landless and small and marginal farmers to truly participate in the WSMC, and through this institution, build effective relationships with policy makers and other stakeholders.

The empowering change framework has many direct links to the IVCA framework (see red text and links in Figure 10), namely through social capital, human capital, agency and the links from these concepts to multiple points of the produceability and marketability pathways, as well as *Capacity to aggregate to buy and sell*. In all SIAGI case study villages, the SIAGI teams' key interventions have been working with community to build agency to strengthen production and marketing.

7 Visioning of Futures

7.1 Scenario development process

Scenario analysis was used as a way to explore some of the future pathways and uncertainties of the communities in our case study sites. Here, we refer to scenarios as alternative images or stories about how the future might unfold (Nakicenovic et al. 2000). There are several forms of scenarios, including quantitative and qualitative scenarios, and explorative and normative scenarios. Quantitative scenarios rely on formal mathematical models that represent the key features of the system as numerical values. Qualitative scenarios are often in the form of narratives, which can describe the more complex dimensions of the system and its development path, including changes in behaviours, values and institutions. Narratives are more easily communicated to a broad audience and offer texture and richness in describing the future. On the other hand, quantitative scenarios provide structure, discipline and rigor in the process (Folhes et al. 2015). This study adopts the Story-And-Simulation (SAS) method by Alcamo (2008), which combines both quantitative and qualitative models.

Scenarios are also classified as normative or exploratory. Normative scenarios are those that start with a vision of the future (which may be good, bad or neutral) and then 'backcast' to think through how that specific future vision might be reached. This can help us identify activities to help achieve (or alternatively avoid) this future. Exploratory scenarios, on the other hand, start with the present, and progress through a sequence of events (What if this happened?). While exploratory scenarios are theoretically 'value-free', it often recognised that planning for the future is inherently a value-laden process. Therefore, normative scenarios are increasingly being used in sustainability and climate futures research. Normative scenarios were selected for use in this study, especially given that the core of SIAGI (i.e. social inclusion) is about values.

At the SIAGI project meeting in Kharagpur in September 2019, we undertook a scenario visioning exercise with the team. Social Inclusivity and Agricultural Intensification were suggested as critical dimensions to address in the scenarios, given the main objectives of SIAGI (Figure 18). As a group, we agreed that agricultural intensification is likely to happen in the communities in the future, regardless of interventions. Therefore the scenarios developed in the workshop described two alternative futures in 2030 where agriculture intensification has happened: one with low social inclusivity ("Few winners, many losers") and the other with high social inclusivity ("Thriving community").

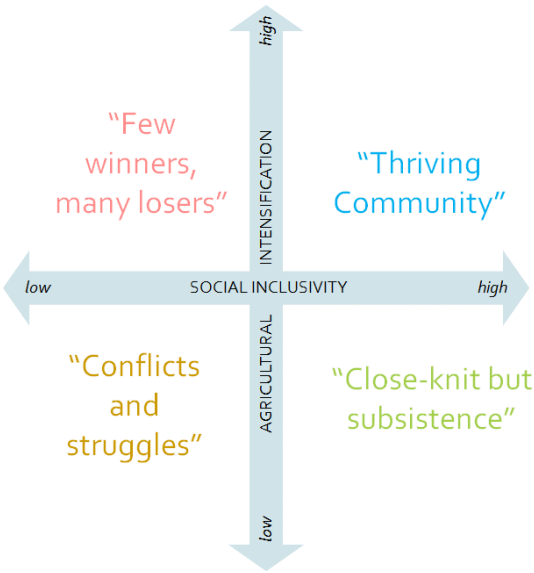


Figure 19 The two critical dimensions discussed in the scenario visioning exercise. The scenarios developed focussed on the two top quadrants.

The team split into three breakout groups – Bangladesh, North Bengal and Bankura – and each group developed narratives that described the two scenarios (*high* and *low* social inclusion) in their respective communities. The scenario development process was guided by a couple of broad questions: (1) What are the key differences between this future and how things are today? (2) What are the key steps (events/processes) needed to achieve this future? During the visioning exercise, each group was also presented with a surprise "disruptor" (e.g. extreme climate event) and asked to discuss how the community, under each scenario, would respond or be impacted by the disruption. Each group presented their scenarios to the whole team at the end of the workshop. Later, the scenarios were documented and sent back to the respective groups to revise and check; the final scenario narratives and some preliminary analysis using FCM are presented in Section 7.2.

7.2 2030 Scenarios

7.2.1 Bangladesh futures storylines

The Bangladesh scenarios were described for the village of Sekendarkhali, where 91% of farmers in are landless, small and marginal farmers. Before the SIAGI project, there was a low level of agricultural intensification in the village. Since the project, intensification has gradually improved. The first scenario is called [চাষী হবে উৎপাদক] "Farmer to Producer", and describes the community in 2030 with high social inclusion. In Bangla, a "producer" is considered to be more prestigious than a "farmer", which reflects that food is being grown for the commercial market (e.g. high value crops) as well as for consumption in the home or community. The title suggests this scenario involves a shift from being farmers who work on the land to food producers who manage and operate the land. The second scenario is called [কৃষক হবে শ্রমিক] "Farmer to Wage labourer", and describes the village in 2030 with low social inclusion. Under this less optimistic scenario, there is a stark gap between the large-holder farmers and the small and marginal farmers, with many of latter group becoming wage labourers. A tropical cyclone was introduced as a disruptor to the Bangladesh scenarios, and the group was asked to describe the aftermath of the envisioned community with this disruptor.

চাষী হবে উৎপাদক "Farmer to Producer" – High Inclusion Scenario

In this scenario the livelihoods of the local people continue to improve, including that of small and marginal farmers. High intensification is achieved through increased diversification (including high value crops, saline tolerant crops, poultry, livestock and fish culture) and increased access to inputs. Freshwater availability will also increase with the continued functioning of the WSMC, which gives the community ownership of the water and operation of the sluice gates.

Strong social cohesion also leads to greater collective agency, with the community more confident in reaching out to government officials for support. The improved government support helps the community get better access to inputs, especially farm machinery and land, and more control of the sluice gates. Many of the farmers work collectively to gain benefits of mechanisation. Collective-sharing of machinery is common place, and without conflict, and with some government support and the good will of community, boundaries of land are reducing. The scale of production and the opportunity to diversify crop production increases as a result. Some farmers will also engage with private companies for input support in market based HVCs production.

In addition to improved production, farmers also receive better prices for their produce. The farmers in the community have better access to markets due to improved infrastructure. An important addition is the new port constructed near Sekendarkhali, which increases access to export markets. One impact is

an increase in consumer prices for the community; however this is not a major problem as the incomes of the people also increase.

With the new port, a lot more employment opportunities are created for the community. Although some of the small and marginal farmers chose to work at the port, the others that remain in agriculture now operate on much more land than before. Many of the wealthier, larger-holder farmers no longer work directly in agriculture, and instead work in or run businesses related to the port and lease out their land to the small and marginal farmers that remain. Many of these small and marginal farmers collectivize and together are involved in contract farming.

While there has been a reduction in the number of farmers in Sekendarkhali, farmers can now stay in farming for longer as mechanisation has reduced the labour intensiveness of the work.

With Tropical Cyclone Disruptor:

Cyclones are of common occurrence in the region, so the community has resilience and traditional knowledge to cope with these events. By 2030, resilience and the coping mechanisms are strengthened with everyone working together in solidarity; this includes better negotiation with the local government to gain access to support. Also, people who are in need or are facing difficulties can come forward, and will receive help from others in the community.

Capacity building training to the community on disaster risk reduction/coping mechanisms, conducted by the NGOs, will reach all members of society and households. Trainings include plinth level rise, dry food and seed preservation, life savings, saving livestock/poultry, homestead gardening, vertical and floating gardening/vegetables, integrated farming, adaptation to saline tolerable crops, migration to high land, and movement to high rise buildings and cyclone shelters.

Government initiatives for emergency response, pre and post disaster, are designed and implemented taking into account the local context of the community. The community, local government and NGOs will plan ahead and reserve funds for disaster response in the community in case there is a future emergency or devastating tropical cyclone. The constituted mandate of WSMC will evolve to include the building of community capacity to cope with tropical cyclone and natural disaster. The community knows to protect embankments and manage sluice gates from the risk of tropical cyclones, and undertake necessary actions in preparation for the impact of the cyclone.

The community are able to shelter during the cyclone and storm surge in constructed schools cum cyclone shelters at the community level, and there are very few injuries and loss of life compared with past disasters.

Salinity in the canal will increase due to the storm surge and damage to infrastructure. However, with the WSMC functioning well the canal is quickly re-excavated and the canal returned to freshwater conditions.

Although there are negative impacts to the village, recovery is much quicker than has occurred in the past as the close community use their linkages to regain control of the situation. Households can send some members to urban or other rural areas to earn income until land and water resources recover. Following the cyclone, the Community-based disaster management committee, Union Disaster Management Committee and Upazila Disaster Management Committee all activate and work effectively with each other and the community. The village will receive government aid for consumption requirements and rebuilding of homes. This aid is distributed amongst the community on a needs-basis.

কৃষক হবে শ্রমিক "Farmer to Wage labourer" – Low Inclusion Scenario

Under this scenario agricultural intensification increases in Sekendarkhali, but the benefits are not shared equally in the community. The social structure of the country means that it is difficult for larger farmers to capture all the benefits, for example from the canal operation, unless they have linkages to government as well as political parties. So under this scenario, the larger farmers use power and politics to control the WSMC, and therefore the canal water. Shrimp farming by larger farmers will increase, as it provides better profitability for them, and as a result less freshwater is available to the wider community.

There is heightened conflict in the community over freshwater vs saline water, and the control of the sluice gate. It is only because the large farmers have land on both sides of the canal that they do not convert all the canal to brackish-saline water. The large farmers are likely to allocate some of the canal water to crop farming in some proportion of their land. Only some of the small and marginal farmers with land on this side of the canal can benefit from freshwater access. Most small and marginal farmers, however, are unable to survive as farmers and turn to wage labour. The larger farmers on the other hand, become wealthier with shrimp farming and/or commercial and contract farming.

With the construction of the nearby port, opportunities in other industries will increase giving people other employment options. However, with increased costs to living, it will not only be men but also the women who are forced into seasonal migration. As a result, the children are left to be raised by grandparents or extended family, instead of their parents.

With Tropical Cyclone Disruptor:

The government initiative for emergency response (pre and post disaster) are as for the previous scenario and the local government and NGOs have reserved funds for disaster response in the community if there is emergency or devastating tropical cyclone. However, any capacity building training on disaster risk reduction/coping mechanisms by the NGOs, will fail to involve marginal households or those with only children or grandparents remaining in the village. So these groups are more vulnerable than ever to injury or loss of life from a cyclone/storm surge.

The cyclone damages crops, livestock and fisheries and so people are immediately dependent on external relief. However, the distribution of funds and other aid is not reaching those members of the community who most need it; this is because the relevant committees are not activated or are not working with each other, the WSMC or broader community. Disruption of transport and communication systems further exacerbates the delivery of aid.

The poor sluice gate and polder management, by community and government respectively, will see embankments fail, sluice gates damaged and heavy tidal flow increase saline intrusion. In the months after the cyclone, crop lands are submerged for a long period of time with saline water, reducing crop productivity to the point that there is negligible profit and farmers lose interest in farming. Freshwater for irrigation and drinking becomes either too expensive or not available. The lack of freshwater for drinking/bathing, unavailability of daily necessities, lack of health and education facilities means that private companies, NGOs and other change agents or development workers are discouraged from working in the community. Seeing this, the younger generations migrate at higher rates in the search for better livelihoods.

The two 2030 Bangladesh scenarios were tested in the extended IVCA FCM (shown in section 5.3), which includes some concepts from the empowering change framework. The scenarios involved changes to several concepts within the model, drawn from the narratives (listed in Figure 20). The results of the model run are consistent with the narratives. The 'Farmer to Produce' (high inclusion) scenario generally led to improvements across production and marketing factors and reductions in costs to the farmer. Whereas the 'Farmer to Wage labourer' (low inclusion) scenario generally led to reductions in capacities in production and marketing, and increases in costs to the farmer.

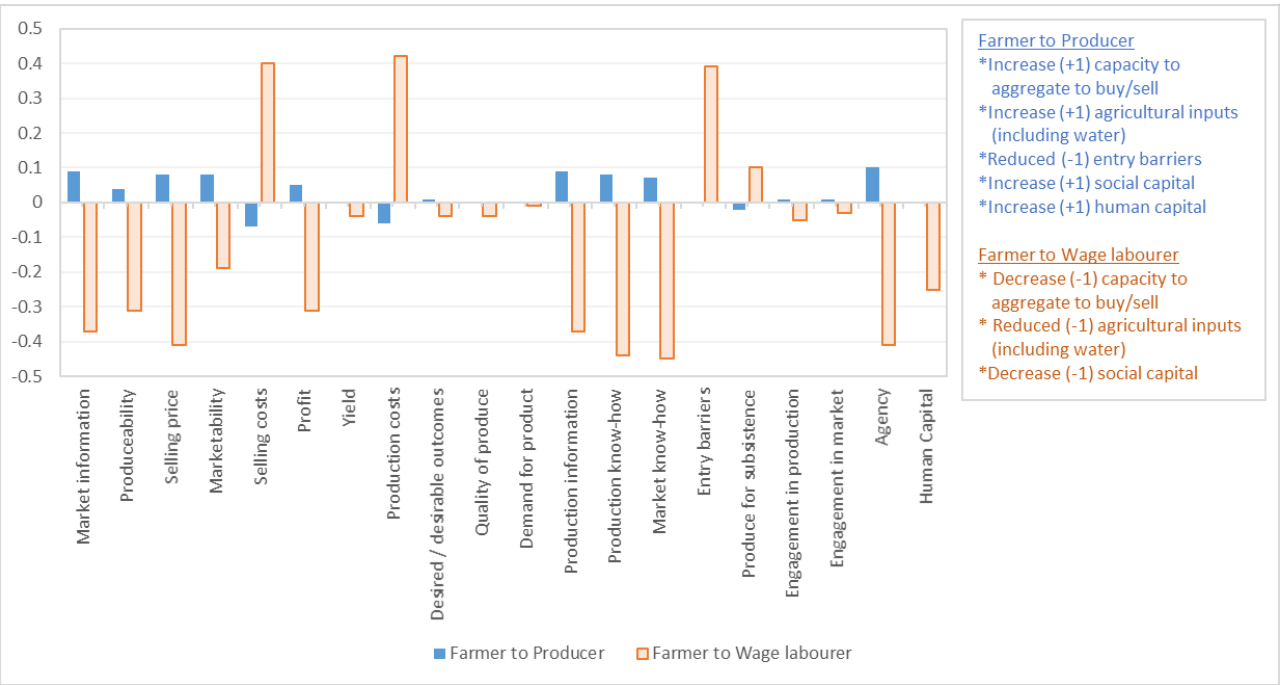


Figure 20 Relative effects of the two 2030 Bangladesh scenarios on the FCM variables. The scenarios involved changes to the FCM concepts listed in the box to the right.

7.2.2 North Bengal future storylines

The North Bengal scenarios were described for a non-specific community in the area, similar to Uttar Chakowakheti and Dhaloguri. The baseline 2019 scenario for this North Bengal village was described to be similar to Uttar Chakowakheti in that agricultural intensification has started to occur over the last few years. The recent changes experienced in the baseline scenario include an increase in cropping intensity with more vegetables grown, and a slight increase in income, and the community has greater linkages with institutions. Women are working more (including going to the market), but are treated with greater respect and have more self-worth. The two 2030 scenarios describe the future of this community under high social inclusion ("Thriving community") and low social inclusion ("Few winners, many losers"). An E-mandi (an electronic agricultural market) was introduced as a disruptor to the North Bengal scenarios.

Thriving community – High Inclusion Scenario

In this scenario, the options and agency for community have increased as a result of further intensification and improved agricultural and other livelihoods. Farmers have more power to sell their product when it suits them, those who want to exit agriculture entirely are moving towards their goals, and those who want to remain in agriculture are entrepreneurs. Women are no longer underrated members of households or society and those from families who have substantially increased their income do not need to work in agriculture. Family members who had to migrate previously now have the choice to come back and live and work in the community. There are increased welfare outcomes, evidence by elevated spending on education and 'better life' and increased consumption of nutritious food. The positive changes in the community have been the result of increased income from increased yield and production, reduced production and marketing costs and diversified livelihoods arising from three interlinked pathways. For example, increased demand from Bhutan for meat and dairy products has led farmers and the community to diversify and invest in livestock production as well as agriculture, providing an additional income stream.

Scaling of technology for crop production has been achieved with proactive farmer clubs and farmers who are technology savvy. Not only has this increased individual and community yields and production, and reduced per unit production cost, but a diverse range of produce including high-value crops are now grown. Initially there may be a shortage of land available to lease although over time this land availability may increase as some farmers choose to transition out of agriculture and chase other livelihood opportunities. In addition to scaling up technology and activities, functioning and proactive farmer clubs have created an environment with better markets and market linkages for farmers and avenues to obtain farmer friendly credit. This has increased the confidence of farmers to diversify their crop production. Policy makers have been seen the activity and performance of these clubs and have invested in the community through building better roads which has further reduced market costs for the community. The number of farmer clubs and participating farmers are enough to support the formation of FPOs which allow for development of infrastructure allowing farmers' timely access to the inputs needed for crop production and marketing.

Through collective farming, farmers are forming different clusters of crop and using the common resources in a more systematic and sustainable way. They are investing their surplus income in some productive assets such as custom hiring centre and opening different food processing units where the landless can work as labourers and excess produce can be used as an input.

With E-mandi Disruptor:

The West Bengal government, through their commitment to the National Agriculture Market (NAM), has invested in integrating markets through the electronic trading portal e-NAM and setting up the infrastructure, facilities and. Recognising that the district has a growing reputation for the quality production of high value crops, a Mandi close to community has been declared as the Market Yard.

The District Collector has set up a Direct Purchase Centre at the Market Yard level, which provides a direct connection from farmers or sellers to the buyers, thus reducing the role of middlemen. The community aggregate their product and have a vehicle registered in the e-NAM system for bringing the community's produce to the market. The community demanded, and actively joined in, training activities provided by the District Administration (with support from the State Government) on the use of the e-NAM mobile app and the process for taking produce to the Market yard. This has allowed them to participate effectively. Some farmers are accessing information about commodity prices via the e-NAM app on their mobile phones while others are availing themselves of computing facilities made available to them at the Gram Panchayat. They are well-placed to judge whether their produce is likely to sell, and if so whether it is at a good price, if taken to the market yard.

There have been no technological distortions of note and so community have benefitted through enhanced market access, increased and more stable selling prices, and reduced selling costs which together have seen their incomes further increase. Farmers, including women, are receiving timely online payments directly into their bank accounts.

Few winners, many losers – Low Inclusion Scenario

Under this scenario, people have become marginalised with a high incidence of distressed migration and reduced spending on quality food, education, social activities (e.g. weddings). This happened because people ended up in a debt trap. Increased intensification had meant farmers had higher financial requirements and some financial institutions had offered high interest loans and encouraged farmers to take loans before they actually needed it, which led to them spending the money on other things.

Many tenant farmers lost access to land as, when they were seen to be benefitting from agriculture, landlords took back their land or outside farmers came in and took leases.

Many farmers invested in infrastructure – further intensifying agriculture at a household and village level – because they had seen others do well initially and the Government also provided sprinklers at a very cheap rate. This led to overinvestment in infrastructure and unsustainable groundwater use, and so the water table decreased and the cost to pump water increased. For poorer farmers this meant they were unable to fully irrigate their dry season crops and so production areas and yields decreased over time. With less water available, social discontent and conflicts increased around the distribution of water.

Rapid intensification, with poor land management practices caused widespread soil degradation, which also impacted crop yields and their quality. With intensification, middlemen were attracted to the area and became more involved in the market which had mostly negative impacts for the community. Market conditions became ever more unfavourable for most farmers, namely through reduced bargaining power and constrained access to markets. Women, who had been enjoying new-found freedom and respect from going to market were once again excluded as farm produce was sold at unfavourable rates at farm gate to middlemen. Combined with reduced yields and poor quality produce, farmers were forced to accept low selling prices.

Ultimately the cycle of poor yields, spiralling debt and increased reliance on distressed migration lead many in the community to lose hope and sell out to tea gardens, and become labourers on these gardens. This shifts from one debt trap to the trap of adverse inclusion in that they are subject to the behaviours and control of the big tea garden operators who took over their properties. The tea gardens will have further long term impacts on the land and environment (a 'degradation trap').

With E-mandi Disrupter:

An E-mandi was introduced as a perturbation to the 'Few winners, many losers' 2030 scenario.

The West Bengal government, has invested in integrating markets through the electronic trading portal e-NAM. The district encompassing the community is designated as a major production cluster with a Mandi in the district being declared as the Market Yard.

Accessing the Mandi is not easy for the marginalised members of the community, especially women farmers, due to distance from the village and poor social networks which prevent them from aggregating their produce and taking it to market. The government has not implemented interventions to facilitate more direct connection from farmers or sellers to the buyer. With poor internet connectivity or access to IT infrastructure (computers or mobile phones), there is unequal access to information about commodity prices which is exacerbated by a lack of training tailored to the needs of the community, especially women farmers. When they do take produce to the market, the poor yields and quality mean they receive low prices or fail to sell it.

Initially the establishment of the E-mandi further 'intensified the intensification', and so accelerated the negative social and environmental impacts. Under low social inclusion, any benefits are not shared with the bulk of the community.

These two 2030 North Bengal scenarios were tested in the extended IVCA FCM (shown in section 5.3). The scenarios involved changes to several concepts within the model, drawn from the narratives (listed in Figure 21). As with the Bangladesh scenarios, the results of the North Bengal scenario runs shown in Figure 21 are consistent with the constructed storylines. The 'Thriving community' (high inclusion) scenario generally led to improvements across production and marketing factors, increased profit, reductions in costs to the farmer, reduced market entry barriers and reduced urgency of need. Whereas the 'Few winners, many losers' (low inclusion) scenario generally led to reductions in capacities in production and marketing, reductions in selling price and profit, and increases in costs to the farmer.

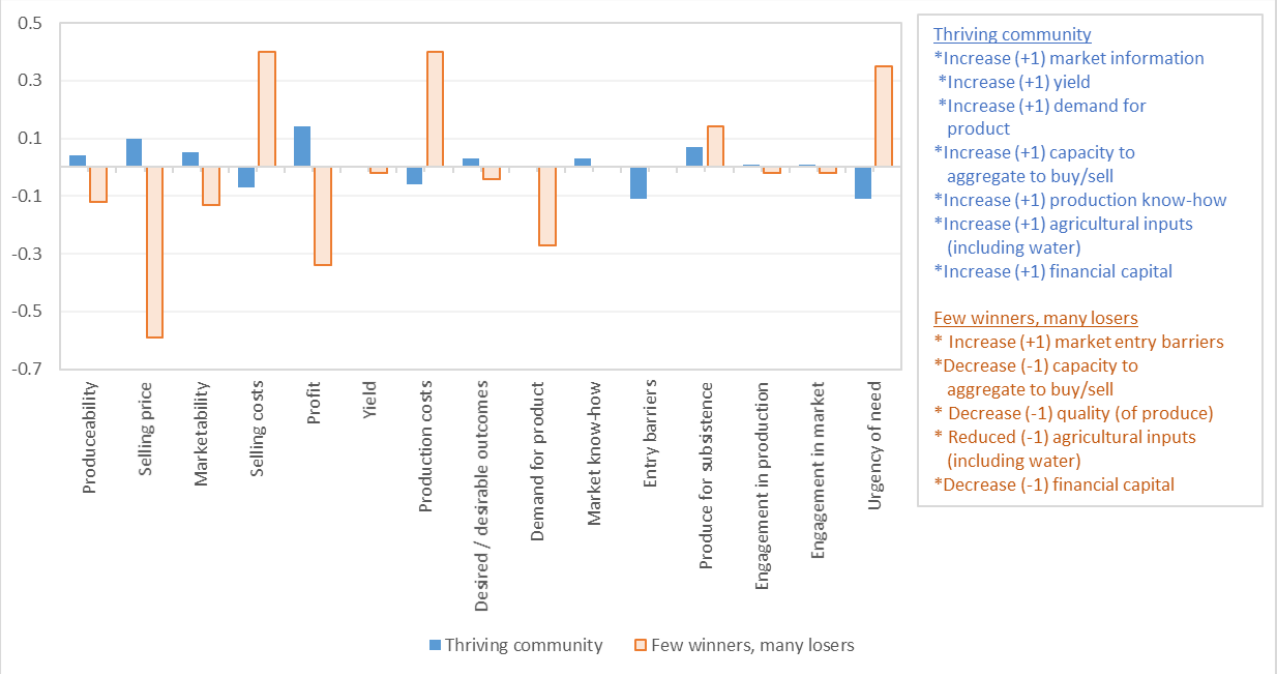


Figure 21 Relative effects of the two 2030 North Bengal scenarios on the FCM variables. The scenarios involved changes to the FCM concepts listed in the box to the right.

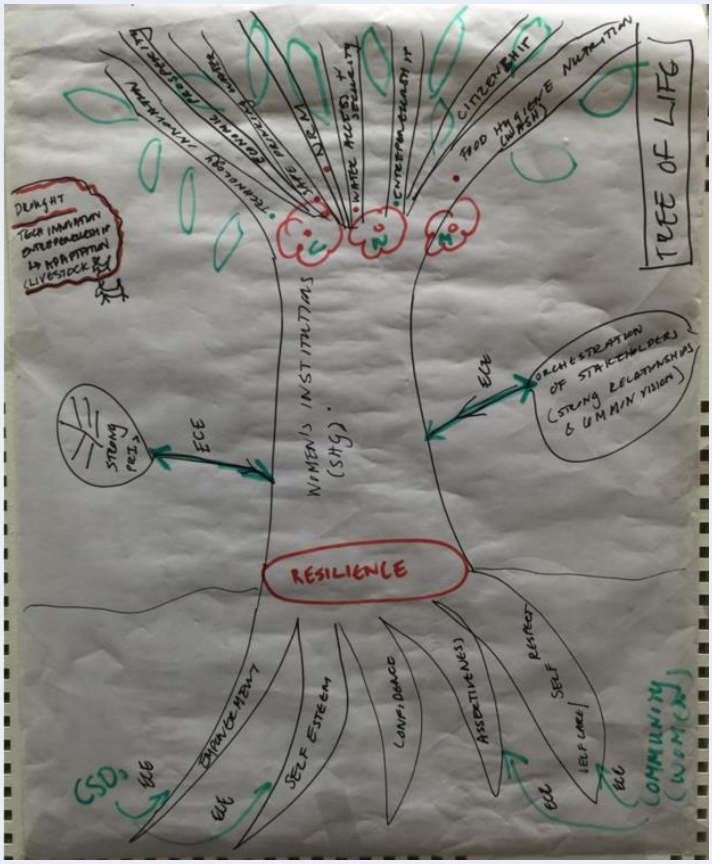
7.2.3 Bankura future storylines

The Bankura scenarios were described using both pictures and narratives. Drought was introduced as a disruptor in the community.

Tree of Life – High Inclusion Scenario

The story of the Tree of Life starts with the roots which represent agency. Empowerment, self-esteem, confidence, assertiveness, self-respect and self-care are the founding strains through which this tree blossoms. Civil society organisations (CSOs) continue to build these community strengths through ethical community engagement. All of these create community resilience from which the trunk grows. The focus of the engagement is on empowering women.

The trunk represents strong women's institutions (e.g Self Help Groups (SHGs)). It has on the one hand the Panchayati Raj Institutions (PRI), and on the other hand it has the collaboration with other stakeholders. These women's institutions have very strong reciprocal relationships with the PRI and other stakeholders with whom they have a common vision. These strong relationships have enabled the branches and flowers of the tree to grow and flourish.



The branches of the tree represent:

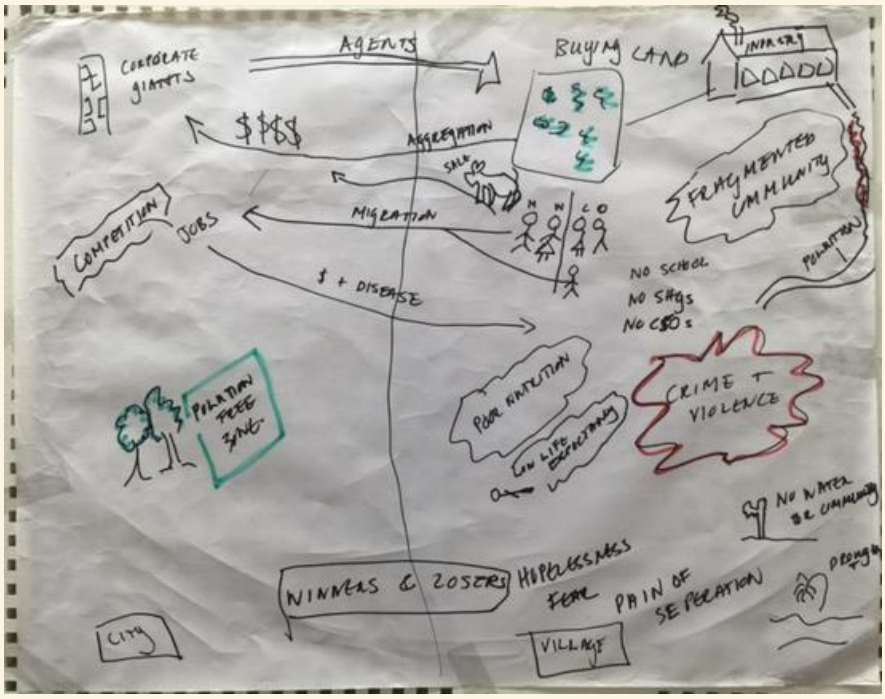
- technological innovation
- economic prosperity
- safe drinking water
- integrated natural resource management, which deal with issues such as climate change
- water access and security, including water for irrigation
- entrepreneurship – for example entrepreneurs who bring mechanisation services to the community
- citizenship – this is not just about giving or demanding, it's also about offering – for example, how can we safeguard the natural resources to pass to the next generation?
- food, nutrition and WASH – water, sanitation and hygiene – there will be investment in understanding and proactive practices.

All of the above will be blooming, creating this tree of life.

<u>Drought as a Disruptor:</u>

As the community has strong roots and resilient institutions, they are able to adapt to the drier conditions. The farmers firstly adapted by selecting less water intensive crops and varieties, and also together they learnt how to reduce water usage and improve water conservation through technologies and practices such as drip irrigation, composting and mulching. As the drought intensifies, other technological advancements, coupled with entrepreneurship within the community, helped many members to shift to other livelihood options – for example boat building and poultry farming.

Winners and Losers – Low Inclusion Scenario



There will be division into two areas: the urban area (city) and the rural area (village).

In the urban area, corporate giants will send agents to the rural area to buy land for commercial production as well as for industry. Commercial agriculture results in a high level of monocultural production of nutrient-poor staples. Local people do not benefit from commercial agriculture and also do not have access to this food as it will go to the urban areas. The industries will produce pollution in the village, including its rivers. The urban area will contain pollution-free zones created for the city dwellers. The corporate giants are not concerned with the pollution in the rural areas.

Due to fragmented land and the fragmented communities in the rural areas, many villagers will migrate and look for work in the urban areas where they will find a low salary/wages due to high level of competition. Both the male and female adults of the rural families, along with the male children, will migrate for work. They will send money back home, however they may also bring home diseases (e.g. STIs - sexually-transmissible infections). Meanwhile the female children will take care of the older persons who remain in the household (thereby limiting their capacity to attend school).

Both male and female children will not have access to school. There will be no women's empowerment, through SHGs etc, nor will there be CSOs who try to work with the rural communities, as they will work with other communities where there is more hope and willingness / ability to engage. Due to the fragmented community there will be more crime and violence. Due to more infectious diseases, pollution (water and air), and a lower level of production in agriculture at a household level (as most land has been captured for industrial purposes), there will be poor nutrition and health, and lower life expectancy. All these factors will lead to fear and hopelessness in the rural community, as well as pain of separation due to distressed migration.

<u>Drought as a Disruptor:</u>

Drought as a disruptor in this community will exacerbate existing social, economic and health problems. For the few households that remain dependent on agriculture, they experience poorer yields and are unable to produce enough food to feed their families for most months of the year. This leads to more pressure to migrate for work. Local food prices increase due to low supply, and households, including those with family members working in the city or elsewhere, increasingly struggle to secure enough food for the family. This leads to even poorer nutrition and health outcomes in the community. Fear and hopelessness continues to spread throughout the community, along with crime. It is perceived by most in the community that the only way to achieve better livelihoods is through migration.

7.3 Scenario analysis

The scenario visioning process uncovered a range of uncertainties in the low and high social inclusion scenarios, representing both risks and opportunities, respectively, for the future of the communities. In Table 5, we summarise some common themes that emerged from the scenarios from at least two of the three groups.

Table 5 Common themes of risks and opportunities that emerged from the scenario vising process

	Risks	Opportunities
Agricultural Production	• Corporations or big farmers undertaking contract/ commercial farming or aquaculture; others in the community are not benefitting (exclusion) or are adversely included • Land use change (from agricultural land to urban/industrial land)	• Technological innovation (irrigation, mechanisation) • Diversification of crops (and livestock) • Collective farming or collective sharing of machinery
Economic	• Market opportunities captured by few in the community (large farmers, middlemen)	• Greater access to markets (including export markets) • Urban/industrial development creating more job opportunities
Environmental	• Reduced water availability • Degraded environment (soil, water, air, etc)	• Water access and security • Sustainability/stewardship of natural resources
Social/Institutional	• Increased conflict over community resources (saline vs freshwater, lack of water) • Government and CSOs not working with community	• Increased collective agency; mobilization of resources • More and stronger community based institutions • Community working together with NGOs and government
(Inter)household	• Loss of hope • High distressed migration • Both parents forced to migrate for work, leaving children behind • Forced into low-pay wage labour • Reduced incomes • Reduced spending on food and education • Less resilience to adverse disruptions	• Increased agency • More livelihood options locally (including non-agricultural jobs) • Increased incomes • Increased spending, improved consumption of nutritious food • Greater resilience to climate extremes and natural disasters

The scenario visioning process highlighted that while adoption of technologies and product diversification offer opportunities for marginal farmers to increase production and farm incomes, there is a risk that only a few in the community will be able to capture these opportunities. Under low social inclusion, large farmers or corporations may undertake large scale contract or commercial farming without benefits flowing through the community. Marginal farmers may be adversely included in such commercial farming, through low-pay wage labour, or they may be forced to migrate for work outside the area.

On the other hand, under high social inclusion, it is envisioned that marginal farmers are better placed to gain advantages of agricultural technologies, access to inputs and resources, and access to new market opportunities, particularly through collectivism and community based institutions. This would lead to better incomes for marginal farmers, as well as more local livelihood options, reducing the need for migration (seasonal and permanent) and its repercussions on families and the community. When faced with adverse disruptions such as extreme events, communities with greater social inclusion are generally expected to have greater resilience, due to their ability to mobilise resources including support from government.

8 Synthesis

The role of the IA component of the SIAGI project and modelling was to provide a process, and develop tools, to:

- synthesise and structure the knowledge, data and assumptions from SIAGI component research themes, as well as to
- explore risks and opportunities of agricultural intensification for farmers in the West Bengal and Bangladesh case study villages.

To do this we developed and applied three generalised frameworks covering: local water management, inclusive value chain analysis, and empowering change. The frameworks formed the basis for development of context specific semi-quantitative (FCM) and/or narrative-based applications.

The outcomes of this work are encapsulated as: the use of the frameworks as a synthesis and exploration tool (8.1.1); the emerging parallels between IA and ECE (8.1.2); the convergence between the IA and the Monitoring, Evaluation and Learning (MEL) and the Theory of Change (ToC) (8.1.3); and science contributions (8.1.4). These broad outcomes are discussed in Section 8.1, and Section 8.2 provides some reflections and learnings on IA in the SIAGI project[13]. We conclude with some comments on the risks and opportunities of agricultural intensification that have been highlighted by the IA work and which supports the broader findings of the SIAGI project.

8.1 Outcomes of IA in SIAGI

8.1.1 The frameworks as a tool for synthesis and exploration

The IA development process was effective in synthesising and distilling key information gathered through the various project activities of SIAGI and its sister projects. Some processes or relationships were straightforward to capture and represent in the frameworks. Others were less visible or were fluid in nature, and capturing these required iterations in consultation with domain experts in the project team or through facilitated discussions with the community. The frameworks capture the SIAGI team's understanding to date, and are subject to change as they are applied to different contexts, either within the SIAGI villages or in similar agro-ecological settings.

The frameworks can be used as discussion and learning tools that test implications of system interventions or perturbations and explore how we can improve outcomes in the community. The flipside of this is their use as a tool to check for unintended or adverse outcomes. Scenario analysis can be applied to the frameworks to ensure interventions do not lead to any adverse outcomes within the community – this is in line with the ethics principle of *do no harm*. We demonstrated the application of the frameworks for (1) structuring and comparing narratives, (2) system analysis

[13] This text draws on the MODSIM 2019 papers of Hamilton et al. (2019) and Merritt et al. (2019).

and scenario modelling using FCM, and (3) scoping and structuring the development of storylines in a future visioning exercise.

The reliance on qualitative methods and inputs has forced critical thinking and questioning of the IA framework structure, in particular ascertaining which concepts were 'general' or context specific. It has allowed us to give equal weight to social processes and concepts that are not easily quantified but which are undeniably critical in achieving goals around development, maintenance and distribution of resources, and fair access to institutions.

Narratives: the framework provides a structure (i.e. identifies the key variables and relationships) upon which narratives can be developed. This structured approach can help ensure information is collected systematically and that important details are not missed, and can also enable better comparison between cases. Narratives can provide a rich reflection of the system and relationships, capturing more complex dimensions than quantitative analyses; the Sekendarkhali example in Section 4 is an example of the depth of analysis possible. The other narratives presented in this report demonstrate how the frameworks are flexible in accommodating different depths of analysis as well as being applicable for individuals, groups and communities; see Appendix for links to additional narratives. Narratives were found to be a more appropriate form of analysis when there are not enough cases or information available to quantify a model. However, narratives and quantitative analyses are not necessarily exclusive to one another and can be used conjunctively.

FCM: as demonstrated in sections 5 and 7 of this report, the frameworks can be used to structure FCM models. These can then be used for system analysis (understanding the relative importance of variables in the model) and scenario analysis. The sunflower application highlighted that multi-pronged approaches that target intervention points across the produceability and marketing pathways and address the often low livelihood capitals (financial, social, human, etc) of farmers is needed to achieve real gains in the outcomes of agricultural value chain interventions.

Future visions: in the scenario visioning exercise, the team described alternative plausible futures for the communities in 2030, with and without social inclusion. Scenario futures methodologies are increasingly being used in climate and sustainability research where social values are an inherent part of both the 'problem' and the 'solution'. Social inclusion in agricultural intensification is inarguably value-laden and so lends itself to normative (or anticipatory) scenario methodologies. This activity proved an engaging way for our (largely) non-modelling team to explore future visions for the study communities. The team uncovered a range of uncertainties in the scenarios, representing both risks and opportunities for the future of the communities. Team members were also challenged to think beyond the (largely) positive change that have been observed at all villages over the life of SIAGI and the sister projects, to the potential 'bad' that might happen. While envisioning the negative scenario was a difficult process for some of the team members, it is important for future planning that potential risks and challenges are considered and not ignored.

The scenario visioning methodology is well aligned with some of the activities that NGOs already conduct with community. For example, PRADAN's vision building training with the community aimed to "visualize a desired future state for their society where SHGs proactively look beyond the self and reached out to others … influencing the development discourse in the community". Their activity was intended to invoke reflection, explore pathways to change, gap identification (between current and desired state), and initiate planning. Whilst we applied the approach only with the team, future research could involve NGO partners facilitating a scenario visioning exercise with communities using the frameworks to guide discussions.

8.1.2 Parallels between IA and ECE

In SIAGI, the ECE approach underpins both the frameworks and the process we used to develop them. IA can help with discussing, framing, defining and understanding socio-agricultural problems, which complements many of the processes of doing R4D ethically. The distillation of principles and practices of ECE and work of our NGO partners to empower individuals and groups in the SIAGI communities (and their other work) directly led the IA researchers to work with partners in developing the empowering change framework (see box below).

The inspiration for the empowering change framework

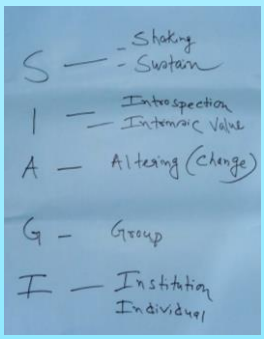
At the IA brainstorming session at the SIAGI team annual meeting, March 2018, the SIAGI team broke into working groups (one each for Bankura, Northern West Bengal, and Bangladesh) to identify key questions for SIAGI. To focus discussions, the groups specified one overarching theme and from this, underlying questions.

The theme defined by the Bankura group was "*catalysing and maintaining sustainable change*" and they grappled with four questions

1. How do you catalyse sustainable change at individual and group level? So you might realise change in nutrition, or income generation or production? [Drawing on themes of group behaviour, empowerment]
2. What are the motivations to catalyse change and sustain it? What are the mechanisms to trigger change? What sustains the change agents?
3. SHGs – how are groups making decisions and does this decision-making progress lead to a desired state? Behaviour change for production and improved consumption. Why is change not happening?
4. What are the factors needed to motivate change? That sustains. For all development actors? For NGOs and for their beneficiaries?

PRADAN uses the phrase "creating unrest" which refers to a state where motivation for action (e.g. learning or action of some type) is such that change occurs. To trigger and sustain agency for change needs introspection, learning and change to occur at four scales: individuals (SHG level), group, individual practitioner and organisation. A new definition for the SIAGI acronym was presented which struck a chord with the whole SIAGI team:

- **S**haking [the status quo]; sustain [change]
- **I**ntrospection; [recognize] intrinsic value
- **A**ltering (change)
- **G**roup
- **I**nstitution; Individual



The empowering change framework has consequently been much more than just a component framework; it is intrinsically part of the IVCA and local water management frameworks. The concepts in the empowering change framework has been used by CDHI to guide discussions with

farmers in a group and individual setting. From the perspective of testing the framework and clarifying concepts, these discussions helped us simplify some aspects of the framework and confirmed the general pathways for individuals developing motivation, self-efficacy, agency and making change for themselves.

There are many parallels between ECE and IA principles and good practice, namely that both aim to draw on multiple perspectives, give a voice and respect to participants, and iteratively and collaboratively co-develop ideas to achieve better outcomes. Many of the key practices of an ECE approach outlined in Report 1 of Volume 3 of the final report of LWR/2014/072 could readily be reframed as IA key practices (e.g. those relating to 'equal partners', 'understanding social, environmental and economic context', 'creating rapport and building trust', 'paying attention to group dynamics', 'spend time answering questions, elaborating on concepts, listening to reactions', 'expectation management' and many more).

8.1.3 Convergence with Theory of Change and Monitoring Evaluation and Learning

As the IA has progressed, there has been a convergence between it and the project's Theory of Change. We have made a concerted effort to ensure the IA process was reflective and focused on both outcomes (i.e. captures finite and measurable change) and impacts (i.e. longer term effects of outcomes). In this way, we avoided one of the common pitfalls of complex systems research – that is seeming like an academic exercise with little implication for practice.

The frameworks can be used as templates that allow researchers and development actors to reflect upon the implications an intervention (or disruption) could have on the broader social and economic system surrounding an actor (i.e. the farming community) and the conditions and contexts that will enable positive outcomes to be achieved. This could potentially be helpful to all stages of a project or intervention from the design to completion, and its monitoring and evaluation. By helping to conceptualise and structure the processes of change and impact pathways, the frameworks may help provide clarity on what evidence (e.g. measured indicators) can be used or sought to evaluate past or future project outputs. Although framed in the positive – that is, the pathways from intervention points to desired or desirable outcomes – the framework can regardless be used to map out 'failed' interventions and help to identify possible reasons for the 'failure'.

As mentioned in Section 5, our IVCA work has focused on the farmer to market segment of the value chain. There are opportunities now being scoped that build on the IVCA framework activities to develop tools to support monitoring, evaluation and learning (MEL) strategies for inclusive business.

8.1.4 Science contributions

The SIAGI project has provided us an opportunity to push representation of social processes and concepts in frameworks beyond the current state-of-practice of integrated modelling. Stojanovic et al. (2016) in a literature review critiquing social-ecological systems research, noted that *"resource extraction, population, and material benefits receive greater consideration [in socio-ecological systems models] than values, equity, non-material and psychological aspects of well-being"*. Our experience from SIAGI is that explicitly incorporating such concepts into the integrated frameworks and FCM applications was feasible and has allowed us to engage effectively with our partners working in this space. This was demonstrated in Chapter 4 through the framing the

governance of local water institutions based on the principles of Lockwood et al., and capturing aspects of social justice defined by Lukasiewicz et al. (2013).

8.2 Reflections on IA in SIAGI

8.2.1 Partner involvement in the development process

Given the interdisciplinary nature of the framework themes, the development of the frameworks entailed integration of data, information and perspectives across multiple fields of study and from the community, practitioners and researchers. All members of the project team were involved to some extent in the development of the frameworks, either through the provision of input, review of the frameworks or direct involvement in identifying and qualifying the key elements of the framework. Involvement in the development or review of these frameworks, required team members to consider the linkages between their usual fields of study to the wider system, thereby promoting interdisciplinary thinking. Through this, IA helped approach a level of conceptual convergence within the team and formalise our understanding of the complex system(s) we are dealing with. Our NGO partners have facilitated engagement with our community partners for the integration research. Rather than directly using the frameworks or models, our partners have discussed with the communities the issues or concepts we wanted clarification on, or used the frameworks to structure discussions or interviews.

There is a particular challenge in trying to develop 'general' frameworks with key concepts and linkages. Typically, we do not want the detail which may be specific to location, actors, etc and this can be challenging for disciplinary experts as it may seem like we are over-simplifying their disciplinary content. Achieving buy-in from the whole team has been critical, but until we could build context and situation specific applications (of the generic frameworks) it was challenging to identify the key concepts. Although it took time, the team have become more comfortable with IA, what we were trying to achieve and how it related to their work. For example, during the reflection session at the conclusion of the project team meeting in early 2018, one member of the SIAGI team identified that integrated modelling itself is challenging for the research team due to their limited exposure to integrated modelling, which was made more difficult given the types of questions SIAGI is attempting to answer. Over time team members realised that they did not have to be fully versed in integrated modelling to be able to participate and provide input in the IA activities. Now, team members are recognising their words in the IA frameworks and being able to use and generate narratives in our work has also helped us engage with partners who have little background in systems thinking or modelling.

8.2.2 Social inclusion in our frameworks

Capturing inclusion was critical in the both the IA frameworks and their applications using FCM or narratives. We have explicitly represented marginalized farmers participation (or not) in institutions in the local water management framework, activities to develop and maintain water resource infrastructure, and the impacts on availability of freshwater resources and marginalised farmers access to those resources. Although we developed the frameworks to be generic across SIAGI study villages and across gender, economic and social categories, the applications for each framework are context specific. The pathways from interventions to outcomes will differ between individuals or groups (esp. poor and marginalised households) as well as for different interventions. Considering gender as an example, women in the case study villages have traditionally been excluded from participating in agricultural institutions and extension activities

and so their development of knowledge and skills for agriculture has been constrained. Therefore in addition to (e.g.) the limited access to physical or financial resources they share with their male counterparts, women farmers face many other barriers to improve their agricultural production.

The frameworks also recognise that each actor has a different set of needs and wants, with the final output broadly described as "desirable outcomes". These can include any outcome that support the capacity of the actor to meet their underlying goals, including anticipated (desired) outcomes or emergent outcomes of benefit to the actor. A wide range of desirable outcomes from agriculture were observed in the case study villages. This included income from produce sold at the market, which was used to pay for health care, housing maintenance or improvements, education, to food and other goods and services. Produce from the farm could also be directly consumed by the household, improving diets and food security. Produce may also be given to family, friends or neighbours, or used as religious ceremonies (e.g. offering part of first harvest to village deity and priest), thereby building the farmer's social and cultural capital. Farmers also reported a range of social and psychological outcomes from engaging in agricultural production and/or marketing, such as new or improved relationships, a sense of freedom, happiness from helping others (e.g. by giving advice on farming) and respect and recognition from others in the community. Agricultural intensification for some farmers also meant that farm income was sufficient to support the household and therefore seasonal out-migration by the husband or other male members was no longer necessary.

8.2.3 FCM

FCM allows the quantification of the strength of relationships although at a crude level. This means the values of the model outputs for FCM cannot be taken as absolute values, but rather in relative terms only. However, this is the case with many models where relationships are defined with mathematical formulae, such as quantitative systems dynamics models, as results tend to be high assumptive and useful only in providing indications of trends (not values etc). In SIAGI, the real strength of FCM has been the ability to draw on the learnings from the various SIAGI project activities to quantify our frameworks. This supports Jetter and Kok (2014) who argued that FCM *"... is most useful when other, more refined methods fail: in broad knowledge domains with only partial experts, in situations with little or no relevant historic data, and in cases where most information is qualitative and fuzzy"*. FCMs are able to represent concepts that are hard (or not desirable) to quantify and have considerable flexibility to model across domains. FCM lends itself to representing belief systems which Singh and Nair (2014) notes can supplement scientific data and be a tool in itself for understanding human behaviour. Two challenges, particularly for application to complex or contested social-ecological problems, are choosing whose knowledge to represent in a FCM (in our case it was the collective project team's knowledge) and deciding how to collect and interpret knowledge particularly in a group setting (Gray et al., 2014). Managing complexity in terms of the number of concepts and connections is a challenge to FCM, as it is with other systems modelling approaches (e.g. Bayesian networks and System Dynamics).

8.3 Opportunities and risks for agricultural interventions

The resulting IA frameworks highlight the complexity of the study systems, which integrate a wide range of social, environmental, market and institutional factors and processes. The frameworks also contained many reinforcing feedback loops, where the cause and effect are difficult to separate. For example poor financial capital can lead to limited investments in agriculture inputs, which leads to poor production and farm income, which then reinforces the poor financial capital.

Conversely, high financial capital can allow more investments in agricultural inputs, leading to improved production and farm income. In another example, poor freshwater availability in a community can lead to more conflict over water use and more unsanctioned water use, which thereby further decreases water availability.

Within complex systems, due to the high number of direct and indirect drivers, it is possible for changes in one variable to have limited impact on other variables including the final outcome. Also if there are several intermediate outcomes between the intervention or driver and the target outcome, this increases the chances of the impact of the intervention becoming dampened by other drivers.

Through running a range of intervention scenarios (section 5.3), we identified a few potential leverage points within the system. These levers or "points of power" are defined as "*places within a complex system… where a small shift in one thing can produce big changes in everything*" (Meadows, 1999). The interventions that showed good potential for positive system changes were: increasing social capital through the formation of community based groups (e.g. SHGs); increase agency through community engagement activities; increase access to financial capital through provision of low-interest, farmer-friendly loans; and increase capacity to aggregate to buy or sell through collective farming/marketing. Although the scenario analysis is based on assumptions that each of the interventions were fully effective, which is unlikely to be true in reality, the results show that these are promising places in the system to intervene. Each of these four interventions have potential to have positive impacts on the farmer through multiple pathways. This means that even if one or two impact pathways fail due to the presence of other drivers, there is still potential for positive change to occur via the other pathways.

Given that the marginalised farmers are subject to a broad range of constraints, it is also likely that a suite of interventions, rather than singular actions are required for these farmers to both remove the risks and take advantage of opportunities in agricultural intervention. The frameworks, particularly the empowering change framework, show that it is not just a matter of the farmers having access to adequate physical resources they also need the self-efficacy and agency to enact changes to improve their lives. Social networks was suggested as the key driver in the empowering change framework, and it is also the intervention point that showed the broadest impacts in the scenario analysis. While not all social networks are the same (including some relationships that may have negative impacts on an individual), there is potential for relationships with family and friends, and membership to community-based groups such as SHGs and farmer collectives to drive positive change through several pathways. Social networks can provide opportunities for farmers to be exposed to new ideas (e.g. new crops or market opportunities), and to learn better ways to farm or market their produce. As an organised group, farmers (especially marginalised farmers), have greater capacity to mobilise and increase access to resources, and influence their community and institutions.

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Appendix

The table below provides links to narratives in Insightmaker, including narratives not presented in this report.

Table 6 Narrative applications of the IA frameworks in Insightmaker

Case	Location	Framework	Link to Insightmaker Narrative[1]
Crop diversification and intensification in the *Rabi*	Khatail	IVCA	https://insightmaker.com/insight/180815
Change-maker farmer (small-holder)	Sekendarkhali	Empowering Change	https://insightmaker.com/insight/180912
Progressive farmer (small-holder)[2]	Dhaloguri	Empowering Change	https://insightmaker.com/insight/172423
Change in agriculture and agency (Female Farmer)	Dhaloguri	Empowering Change	https://insightmaker.com/insight/180752
Change in agriculture and agency (Male landless farmer)	Dhaloguri	Empowering Change + IVCA	https://insightmaker.com/insight/180754
Farmers' perceptions on agricultural production and marketing	Chakadoba & Hakimsinan	IVCA	http://insightmaker.com/insight/180746
Water availability and use in Bankura	Chakadoba & Hakimsinan	Water	http://insightmaker.com/insight/180721
Tribal households in Bankura access and use of water from the lens of empowering change	Chakadoba & Hakimsinan	Empowering Change	https://insightmaker.com/insight/180037

[1] When you click on a link your default web browser will launch the model. To follow the story line, click on the 

(Step Forward) icon at the bottom right of the web page until the story finishes.

[2] This application is for farmer ND whose narrative is presented in Section 6.2.1 of this report.

Report 5: Case Study 1 – Engagement for Participation, Collaboration and Self Efficacy

Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh (SIAGI)

Case Study 2 – Engagement for Participation, Collaboration and Self-efficacy, West Bengal

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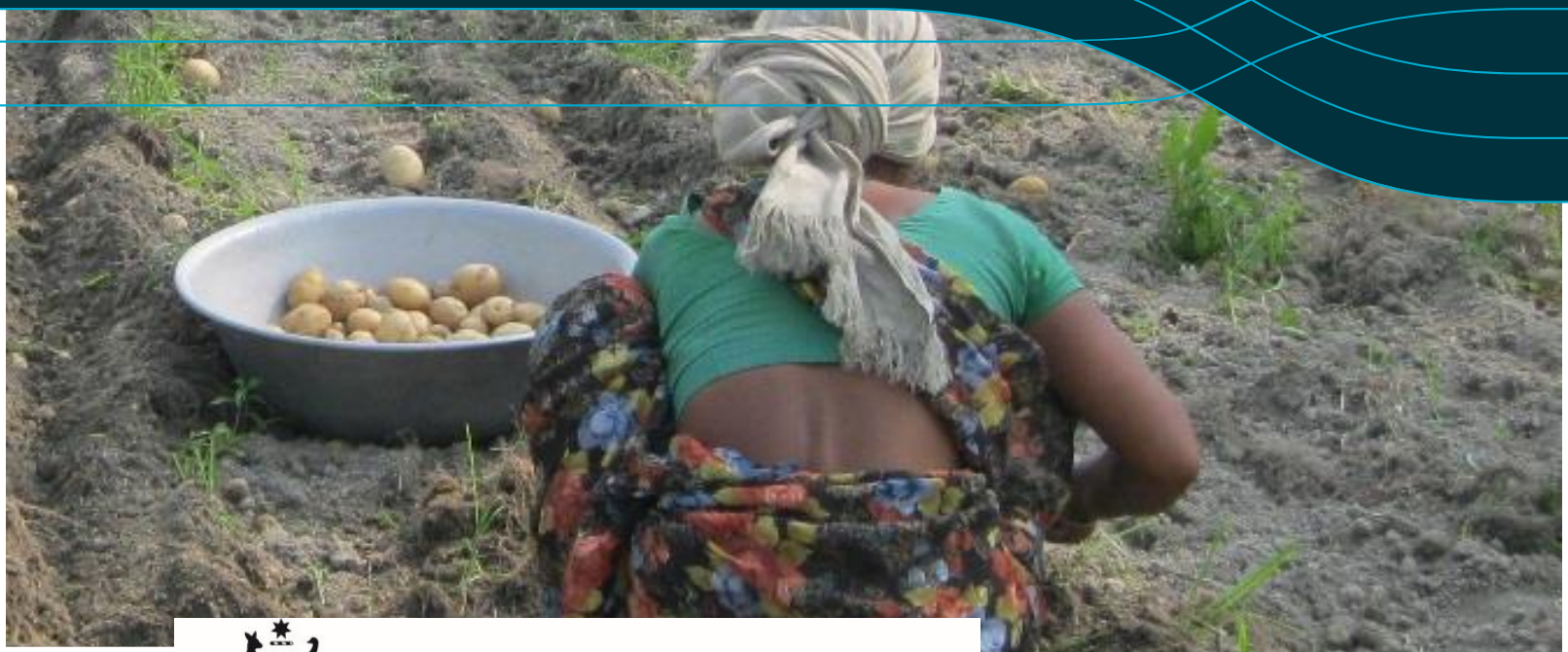

Australian Government

Australian Centre for International Agricultural Research

Case Study 2 – Engagement for Participation, Collaboration and Self-efficacy, West Bengal

Compiled by CDHI and IIT, drawing on SIAGI's fieldwork in Northern West Bengal, India.

Summary

This case offers examples of best practices of engagement for developing effective and empowering partnerships with community to achieve inclusive agricultural intensification. It is based on the perspective and outcome of the SIAGI Research for Development (R4D) initiative. SIAGI's intended research outcomes include:

- development of partnerships with groups who are often excluded from social or institutional events or processes,
- agricultural intensification that is socially inclusive, equitable and sustainable, and
- distillation of best practices in achieving social inclusion and mobilization of community resources.

With the emphasis on collaboration and partnering with the normally excluded groups to achieve sustainable and inclusive agricultural intensification, the Ethical Community Engagement (ECE) approach was adopted to encourage, respectfully acknowledge and prepare the excluded groups, to participate.

Insights from two villages in Northern West Bengal are captured through documenting the process and outcomes of various field and out-of-field events and the analysis of data on physical variables like input-outputs. The sources for developing the insights are SIAGI project activity documents and field notes by various researchers. The community has been integral part of the research in conducting various activities and capturing and analysing the processes and outcomes.

The case adopts a perspective of cognitive justice which determined the direction and outcome of R4D. By emphasizing cognitive justice, ECE proved effective in preparing the excluded groups to participate in the research focused initiative, who were able to understand and analyse the dynamics of inclusive intensification as knowledge production (research) partners.

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1 The conceptual underpinnings of Ethical Community Engagement

1.1 Understanding participation

Participation, in a generic sense, is taking part in a specific social and institutional affair (Sen, 1999), and can be further defined as joining in an event, process and/or situation. Philosophically, the concept of participation expresses the way 'we as persons exist and act together with others, while not ceasing to be ourselves in action, in our own acts' (Wojtyla, 1979). Wojtyla considers participation as relational (in the context of individual and society) and finds it as foundational in importance. In the contemporary development discourse, participation is considered as both a strategy and an instrument to augment and enhance outcome of an action. In this context participation tends to connote a positive state within a social system, reflecting that involving local people is intended as a way to bring about 'social learning' for both planners and beneficiaries. 'Social learning' means the development of partnerships between professionals and local people, in which each group learns from the other (World Bank, 1966).

Participation may manifest differently and may have normative and cultural boundaries. It can be direct or remote (Aslin and Brown, 2004), passive, interactive, self-mobilizing or via consultation (Kumar 2002); it can be intense and entrenched or superficial and nominal. The nature and extent of participation may range from being defined and decided (imposed) by an authority system, a culture and tradition, a social norm, or may be volitional (that is, people deciding on their own whether to participate or not).

Poverty and deprivation cause stress and negative affective states which in turn may lead to behaviours such as not having long term perspective to inform their actions and decisions (Johannes and Ernst, 2014). They may feel hesitant to participate and change their states. On the other hand Robert Chambers considers the marginalized to possess abilities to analyse and reflect, but a strategy needs to be evolved to enable them to reverse their negative world view about themselves and their abilities (Chambers, 1997). Amartya Sen advocates that cultural and traditional prescription, and boundaries, to participate, can be sacrificed in favour of democratic participation with people enjoying freedom to participate in affairs they value and prefer. According to him the people cannot be excluded in the name of tradition. He asserts *"any attempt to choke off participatory freedom on the grounds of traditional values (such as religious fundamentalism, or political custom, or the so-called Asian values) simply misses the issue of legitimacy and the need for the people, affected, to participate in deciding what they want to and what they have reason to accept"* (Sen,1999).

Freedom of participation, however, has complex challenges and the traditional considerations, that Sen mentioned, often come in the way of participation. There are occasions where participation is hedged and blocked, co-opted and misappropriated. Robert Chambers, one of the prominent proponents of participation of the poor and the marginalized, observes that poor have shown – *"... an astonishing ability to express and analyse their local complex and diverse realities which are often at odds with the top-down realities imposed by the 'powers-that-be', especially the professionals"* (Chambers,1997).This is tantamount to blocking participation for inclusive development. He further argues that *"...self-critical awareness [of the professionals and local people] and changes in*

concepts, values, methods and behaviour must be developed to explore the new high ground for participation" (Chambers, 1997).

1.2 Engagement for participation

Chambers (1997) recognition of ability of the poor to express, reflect, construct and reconstruct their realties is in consonance with Bandura's human capability theory (Bandura, 2006) suggesting that humans have the potential to reorganize and reconstruct their realities. The tradition, culture, social power structure, however, are barriers to them in recognising their abilities that plays on the (self-)perceived lack of abilities of the poor as a reason for intermediaries to hedge and block their participation (Mishra, 2016). Their ability to analyse and express are illegitimately usurped by intermediaries called variously as professionals and experts. Ashish Nandi, an Indian scholar laments '...as more and more areas of life are 'scientised and professionalised' and taken out of the reach of participatory politics they legitimize the 'expertisation' of public affairs (Nandi, 2000,116). Ceri J Davices, emphasizes cognitive justice and need for community university collaboration in knowledge production (Ceri, J Davices 2016). Mishra et al (2017), citing examples and evidences from the field, observed that marginalised have unique power to transform their situation.

To respond to the concerns of the poor and the marginalised, not being allowed adequate voice and space to express them and participate in the discourses which concern them, several initiatives have been made. Paulo Freire (1970), for example, with his seminal work –'Pedagogy of the Oppressed' offered pedagogical tool for the poor and the oppressed to help them express themselves clearer and louder. He recommended 'dialogic' as opposed to banking method of teaching and dispensing knowledge. Robert Chambers and others spearheaded participatory approaches and succeeded, to a significant extent, in preparing high ground for their (poor and marginal's) participation (Chambers, 1997). These approaches suggest that the poor and the marginalized need to be engaged to help them reflect around their situation and remind and convince themselves of their abilities to participate and be precursor to change and transformation themselves.

Engagement, in this context, becomes critical to collaborate with the community and prepare ground for their participation (Carter, 2018b: Mishra, 2016). *Engagement and participation are related to each other; however, they are not the same. Engagement is a strategic tool to prepare and cultivate ground for participation.* Engagement, in the present context, is all about reminding and celebrating the ability of the poor and marginalised and encouraging them to participate in opportunities that others have, unjustifiably co-opted. Engagement needs to have strong ethical elements (SIAGI partners, 2016) which, inevitably, means that due acknowledgement is to be made to such abilities of the poor and treated on par with those who have self -assumed positions of holders/sole owners of such abilities. The evolving paradigm evolves as –***'engagement-participation-change'*** cycle.

1.3 SIAGI and ethical community engagement

SIAGI is a Research for Development (R4D) initiative which presupposes and positions research as precursor to development. This (development) is a condition, among other things, characterized by people's abilities to understand and analyse their situation and act upon them to turn adversities into sustainable opportunities. *SIAGI's planned research outcomes include building partnership with the excluded groups, intensification that is socially inclusive, equitable and sustainable and best*

practices in achieving social inclusion and mobilisation of community resources. Working with excluded groups and attempting socially inclusive intensification would call for perspectives and methods which acknowledge and encourage the participation of excluded groups. SIAGI, therefore, adopted ethical community engagement as its overarching perspective and approach to develop and design R4D in relation to agricultural intensification. Partnering and collaborating with the community, in a research enterprise, has been an evolving process. The perspective not only helped ensure participation of the excluded groups it also offered an opportunity for inclusive knowledge production and cognitive justice (Vishwanathan, 1997). Under SIAGI, no 'concrete' interventions (physical infrastructure, agricultural inputs, and financial support) were made; for these, SIAGI's reference point has been interventions by sister projects also funded by the Australian Centre for International Agriculture Research (ACIAR), who did make concrete interventions (e.g. first-generation polyhouse structures, the eight initial solar irrigation pumps). However, SIAGI has catalysed production of substantial 'knowledge' interventions through ECE and facilitated two-way links with the tenets of social justice, inclusive value chains, bioeconomic modelling, market analyses, and integrated assessment research (Figure 1).

Figure 1 Some of the research activities undertaken using an ECE approach.

2 Case study and methodology

2.1 Case study villages

Marginal and small farmers constitute around 80 percent of the total farm households in India (Dev, 2012) and so the future of sustainable agricultural growth and food security, in the country, depends on the performance of small and marginal farmers. To explore the risks and opportunities of agricultural intensification, SIAGI identified the two villages predominantly consisting of small, marginal and land less communities falling within the small and marginal land holding categories. The research is based on the two villages of North Bengal: Dhaloguri is under the Cooch Behar district while Uttar Chakowakheti falls under the adjoining district of Alipurduar. Dhaloguri is dominated by the Scheduled Caste while Uttar Chakwakheti (UC) has Scheduled Tribe as its majority population. Key characteristics of the villages are listed in Table 1.

2.2 SIAGI engagement with community

SIAGI's R4D initiative emphasized collaborative and participatory approach where the first activity was to prepare a level playing field. To deal with the entrenched elements of indifference, sense of dependency, hesitation, subdued responses and culture of silence, SIAGI adopted an Ethical Community Engagement (ECE) perspective that shaped the approaches and tools we used. *ECE did not involve only positive feedback but reflecting, questioning, challenging and handholding were carefully used to pursue, remind and convince the community of their abilities to observe, reflect, analyse and construct their realties and fearlessly question and express doubts before the professionals. This was a challenge and researchers had to reorient themselves –their attitude, behaviour, tools and practices which are necessary for the ECE perspective to work.* SIAGI project teams showed adequate sensitivity and preparedness to adopt the ECE approach in their R4D activity (Mishra, R, 2016, 2017, 2018, 2019; Roth et al. 2018; Ray et al. 2017, 2018, 2019; Schmidt (2017, 2018) and Merritt et al, 2019). It took efforts and time though and can be considered as a work in progress.

In concrete terms the approach, in practice, included:

1. Developing shared perspective on the goals and objectives of the research initiative with the community. It also jointly evolved and authenticated the research agenda, strategy, tools, processes and analysis and captured and analysed the process and outcome collaboratively,
2. Carrying out, collaboratively, baseline identifying village realties social, agricultural biophysical, economic, entrepreneurial, climatic etc. The process helped capture gender relationship, leadership, power relationships etc,
3. Collaboratively laying out the research protocol and design including variables and analytical framework.

4. Identifying interventions aimed at ongoing agricultural intensification through the existing agencies-an international project, state agencies and NGO and University initiated[1],

5. Analysing the process and outcomes centred on the research variables using qualitative, and where appropriate quantitative, methods. Co-reflection between the community and project team on learnings from our research activities was a key component of the research.

Key methods, strategies and tools are shown in Box 1 and activities and impacts are shown in

[1] This involved, for example, SIAGI partners and community engaging with different stakeholders such as government officials, entrepreneurs, market players, technical experts etc. for learning and integrating different perspectives on the potential interventions and co-developing the actual activities.

Table 2.

Table 1 Key characteristics of the SIAGI study villages.

Key characteristics	**Dhaloguri**	**Uttar Chakwakheti**
Demography	Scheduled Caste	Scheduled Tribe
Gender relationships	Men traditionally had the decision-making power but now power relationship between men and women is changing in favour of the women.	Gender equality –women enjoy more freedom. Traditionally tribal women have been enjoying more autonomy relative to non-tribal communities like Dhaloguri.
Social networks and capital	Social and cultural groups, farmers club, farmers collectives.	Social and cultural groups, farmers club, farmers collectives.
Nature and extent of inclusion/exclusion	In absolute terms the village is excluded from the mainstream but there is no relative exclusion within the village. There is contest, however, of interest and opportunities between early and late settlers' majority of whom have migrated from Bangladesh.	Being a tribal village there is strong element of exclusion from the mainstream, due to their isolation and other's perceptions of them as a tribal community. Located at the forest fringe they suffer onslaughts from the vagary of nature. In the community there is homogeneity and little exclusion of individuals reflecting the majority have migrated from the erstwhile Chotanagpur.
Land holding	Average one acre per household	Average two acres per household
Village institutions	School, village Panchayat, child centers, SHGs,	School, village Panchayat, child centers, SHGs,
Livelihoods	Agriculture/ labour	Agriculture, forest produce, quarries, labour
Cropping Pattern	Paddy, vegetable	Paddy, Vegetable
Institutional linkages	Linked to NGOs/University/Farmers Club	Linked to NGOs/University/Farmers Club
Entrepreneurship	Men and women entrepreneurs belonging to the SHGs are diversifying vegetable production and establishing linkage with markets.	Men farmers diversifying agriculture, trying new crops and methods. Women farmers emerging as business women especially in vegetable business.
Access to state programs /opportunities	Irrigation infrastructure and seeds from the Government agencies. Credit to women groups under livelihoods support program.	Various entitlements, notably, caste certification and land rights. Irrigation infrastructure and seeds from the Government agencies.

Box 1. Key methods, strategies and tools of ECE in Dhaloguri and Uttar Chakowakheti

The approaches of ECE are including the following -

a) Collaborative situation and problem analysis
b) Participatory planning
c) Stakeholders consultation
d) Validation by the community
e) Issue based training
f) Integration of social and bio-physical aspects
g) Peer learning and exposure

The strategies and tools for ECE are -

1) Listening to the marginal
2) Provoking and challenging
3) Evolving and working on joint agenda
4) Facilitating and supporting interface with the authorities
5) Celebrating achievements and outcome

Table 2 Activities and their contribution to impact.

Activities	Contributing to	Impact
Entry level/community visits meetings and Project sharing	Familiarity and introduction Sharing of intentions Games and plays Sharing of project goals Perspectives and Implementation strategies	Familiarity developed Relationship developed Ease in collaboration worked out Ground for participation evolved
Entry level/community visits meetings and Project sharing	Familiarity and introduction Sharing of intentions Games and plays Sharing of project goals Perspectives and Implementation strategies	Familiarity developed Relationship developed Ease in collaboration worked out Ground for participation evolved
Situation analysis	Understanding situation –demography, cultural practices, Social relationship Kinship and network	Situation understood Understanding consolidated Relating SIAGI with the situation
Climate narratives	Climate in retrospect Climate events Climate changes Cropping changes over time River course shifts Support at time of climate catastrophe	Gathering climate narratives Identifying climate champions Understanding climate history and support availability Comparing and analysing situations along different time lines
Institutional analysis	Nature of institutions Number of institutions Leadership and functions current situation Governance and impact	Nature and types of institutions understood, Need for their strengthening and reorienting identified
Action planning for SIAGI	SIAGI unpacked Planning for implementation Responsibilities Preparing implementation	Action planning process embeds learning Responsibilities and accountability Monitoring protocol Resource and support sharing
Stakeholders consultation	Identification of stakeholders Sharing of project goals, perspectives, processes and impact Inviting collaboration and participation	Informing stakeholders about the issues Informing agencies about the progress and outcome Exploring possibility of support and collaboration
Crop planning	Current cropping situation Possibility Priority Technical and professional support Inputs and logistics mobilization Monitoring	Analysis of cropping system Suitability Potentials of new crops Plan for laying demonstrations Plan for trying crops Logistics and resources requirements
Exposure	Visit to farmers groups Visit to experimental sites Visit to research stations Visit to service centres	Shared learning and renewal Strategies for adoption Seeds for innovation
Lobbying and advocacy	Conversation with the local governance system Conversations with the Government /non-government agencies Conversations and dialogue with the service centres and agencies	Informing agencies about the issues Informing agencies about the progress and outcome Seeking policy support
Joint meetings & night stays in the villages/Jalpaiguri	Inter village visits and night stays Peer meetings at Jalpaiguri and might stays	Consolidation of networks & social relationship Shared learning Sharing of insights Evolving exchanges

3 Observed changes in the community, government and CDHI

The SIAGI project has promoted agricultural intensification in both study villages through the ECE process and working with the collectives set up initially by DSI4MTF and those that have since been formed. Over the last four years we have collected data and observed changes in community and the government stakeholders through interaction with the community, field visits and the use of participatory appraisal tools. We (CDHI) have also changed as individuals and institutions. These changes are summarised in Table 3 to

Table 5.

Table 3 Changes in the government since ECE approach began.

Before SIAGI project	Now
Prior to SIAGI project, there were almost no visits of government officials to the farmers' field in the project location.	Now government officials from different departments are visiting and doing follow up of certain activities.
Local level institutions (women self-help group, farmers club) initiated by government were not so functional due to lack of supervision and monitoring.	Local level institutions are activated by using ECE approach. Now officials from government line department are visiting farmer field and providing training and technical support to strengthening them.
Government officials were reluctant about the active participation of women in the field of scientific subjects and training organized by government department	Now women are quite involved in govt. department like District Rural Development Cell, Agriculture Department and Minor Irrigation department. Women are engaged with scientific subjects and participating in government programme.
Weak relationship between govt. departments and project community resulted in lack of trust and conflicts.	Now they (trust) have improved and so has functional relationship. Both are now collaborating on common agenda and interest.
Govt. officials especially agriculture department and irrigation department had no clarity on collective farming.	Now they are quite comfortable with the performance of collective farming group. Now they are initiating Water User Associations (WUAs) in collaboration with CDHI in both project villages.
Government departments especially Agriculture and Minor irrigation department did not consider the project location has potential to explore the agriculture.	After some innovative piloting, govt. officials have realized it and now they are coming forward to explore local resources in the project location.
Government facilities like caste certificate, seeds, fertilizer, irrigation systems were difficult to access.	Poor farmers are accessing govt. facilities and schemes.
Government officials were not familiar with ECE approaches and principles.	Now they are aware of ECE and slowly using it in their respective areas although there is hesitation in practicing it.
Farmers' knowledge was not recognized: Govt. officials were ignoring project farmers in adopting new technologies.	ECE created the self-efficacy and farmers are adopting new technologies resulting in enhanced crops intensification. Now government officials are respecting the farming community and valuing the farmers' experience and knowledge.

Table 4 Changes in the project community since ECE approach began.

Before SIAGI project	Now
Aspiration level of the community was very low due to lack of confidence.	Community aspiration level is increasing – some of the farmers evolved as progressive farmers including landless women due to enhanced aspiration.
Community members were very hesitant in communicating and visiting the government departments and other agencies.	Now community members are visiting different government departments and office of the district authority.
Self-efficacy was low in adopting new technologies and communicating with outsiders.	Self-efficacy created by using ECE approaches resulted in level of happiness is increasing.

Issue based (livelihood) social bonding was lacking before the SIAGI.	Now community members are more organized in livelihood based activities. Strong relationship built among the rich, poor, tenant farmers.
Women were limited to women self-help group. Capabilities of women were not identified.	Women are involved in different activities and included in collective farming, farmers club, direct marketing etc. The capabilities and skills of women are recognized by the male dominated society.
Before the SIAGI, community had no women groups and farmers club in the project location.	Now they have more group like water user association (WUAs), collective farming group etc.
Community based institutions and local NGOs were not aware about the ECE approaches and principles.	Now community based institutions along with government department are aware of ECE and they are applying it in their respective fields.
The community members were not exposed to different technologies and tenants / marginalized families were not included in mainstreaming development.	The tenant and marginalized farmers are included in mainstreaming development and adopting new technologies to enhance their crops intensification and income.
Prior to SIAGI project, community did not emphasis on cross cutting issues of environment, climate change, market value chain, conjunctive use of water, nutrition sensitive agriculture etc.	Now community members are aware of these issues and including them in their planning process for implementation.
Innovative activities among the farming community were lacking though it was their wisdom to enhance the family earning.	ECE helped them in introducing new crops like spinach, coriander, broccoli, maize etc in adopting new technologies like poly house cultivation, new and improved irrigation methods etc.
Record keeping or maintenance of books was totally missing among the farming members resulted in low risk taking capability.	Now they are maintaining their farming and marketing records. It helped them to do cost benefit analysis as well as supported them to take new challenges and risks.
Earlier farming community members were not communicating with wholesalers / trader / farmers producer organization (FPO) directly for selling their products.	Farmers have been building relationship with different kinds of buyers for direct selling in gaining more profits from their product. Sometime buyers like FPO at distant location are directly purchasing harvested crops from farmers' field.

Table 5 Changes in CDHI since SIAGI project began.

Before SIAGI project	**Now**
Although CDHI has been practicing Ethical Community Engagement (ECE) but it was not highlighted and recognized.	SIAGI and CSIRO offered confirmation of the ECE approaches.
Practiced ECE to achieve the success of the project activities within CDHI.	Now supporting to other stakeholders like government departments, local governance / Panchayat Raj Institutions (PRIs), community based institution (CBOs) / Farmers Producer Organizations (FPOs), local NGOs to practice ECE in their respective areas.
Practiced ECE as a conventional tool.	Faith in ECE consolidated and practiced more scientifically.
CDHI conducted training on ECE for empowering its own working team members / project staffs.	Organizing ECE training for other stakeholders for scaling.
CDHI did not publish the periodic report on ECE.	Published the periodic reports on ECE and shared with different service providers including govt. departments and CBOs.
ECE approaches and principles was not included in CDHI's Safeguarding Policy	ECE included in CDHI's Safeguarding Policy.

4 Outcomes of ECE

The R4D, as conducted under SIAGI, led to rich insights on the elements as described under (1-5) above. They are covered under various reports / literature generated over time. This case presents the process and outcome resulting out of the adoption/ application of Ethical Community Engagement as perspective and method. In this section we highlight the most salient (nested) outcomes which are summarised in Figure 2.

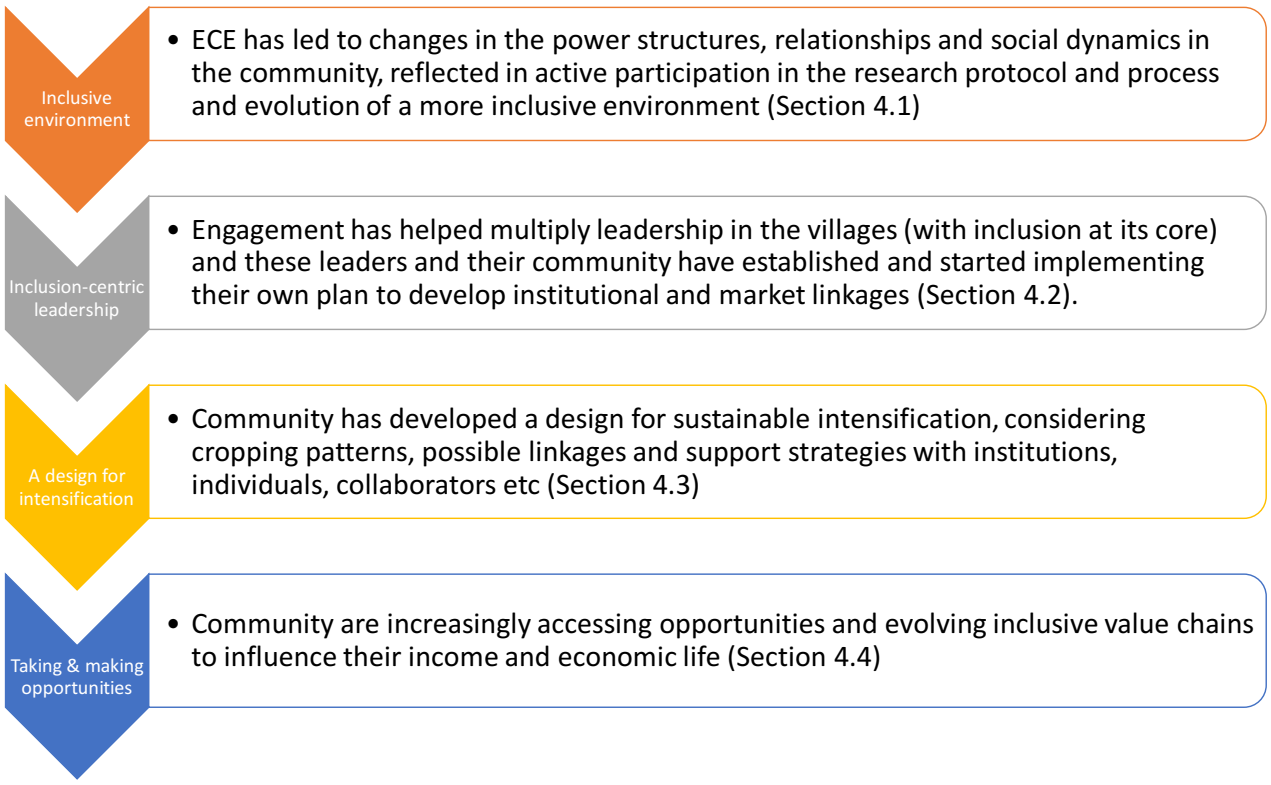


Figure 2 The nested outcomes for community

4.1 The impact of ECE, on the existing power structure and social dynamics

The two villages have been research locations in the past for both action and theoretical researchers. As 'respondents' and 'subjects' the community members acquired a distinct identity (as respondents and subjects) and orientation to pass on information as asked for/ requested. The first question that they would ask the researchers, usually, was 'what do we get out of the project'. This question was not strange as most projects had involved concrete physical interventions such as seeds and manure for an experimental plot, some agriculture or irrigation technology to experiment with, or a small hatchery. Dhaloguri, was called a traditionally 'adopted village' which meant it became a cradle for experiments. Most of the research activities were the 'scientific' work of the researchers and the community were passive respondents. Several baseline surveys, using lengthy questionnaires, were carried out, the results of which could invariably, be conflicting and baffling to both the community and the researchers. If a crop, under and intervention / experiment, failed

farmers had little qualm and maintained a 'stoic' attitude. If, at some point, questions on research failures, were raised 'farmer ignorance' and 'neglect' used to be the frequent and prominent alibis given by the researchers. The farmers would not take the blames seriously and considered them as something they were habituated of attracting such blames.

Under these circumstances the village had a few recognized 'enlightened minds' *(in the research and academic parlance 'opinion leaders')* that would represent the respective villages and participate in various activities and events. These (events) could be at different locations in the villages or at prominent locations where they were invited to meet with some 'wise men and women'. At such events opinion leaders could be advised/asked to bring others with them which was routinely responded to. However, the same people would always accompany these opinion leaders and they would happily enjoy this position as recognition of their solidarity with the opinion leaders. The villagers, at that point in time, could be divided into four categories – (1) *the most enlightened soul* or the omnipresent opinion leaders, (2) *the companions* who were subservient to the opinion leaders with 'yes' brother/sister stance, (3) the *fence sitters and star gazers* who would remain critical but would like to look for opportunities, and (4) *indifferent souls* who were oblivious of what went on in the villages. This can define the structure of the village and power acquired through such participation of the 'opinion leaders'.

When SIAGI project was initiated, the project team was faced with the first usual question ('what do we get out of our involvement') as well as scepticism *('nothing happened in the past –we came across several such projects and programs nothing changed for good of the community').* The researchers, then, had to explain the nature of the SIAGI's initiative, namely its perspective, agenda and goals, how community's participation was envisaged, and what it would lead to in the long term. Initially, this did not receive any encouraging response and, with patience, the researchers would again return with a renewed plan and multiple strategies to invoke interest of the communities. In some situations, undertaking a SWOT analysis of the respective villages brought out issues and opportunities which communities themselves could achieve. Another strategy was to question and challenge their attitude and argue that if they move beyond their past demoralizing experiences, then they could realize the positives and negatives of their involvement and indifference. These helped in creating reflective environment.

Early on, when some villagers made a positive response to participate, others would raise general problems such as 'the school is not functioning well, we are not getting facilities under the government schemes and so on and so forth'. Implicitly, the sense from most used to be ***'nothing in the past, has changed and nothing will ever change'.*** This could be frustrating to researchers but this was not the occasion to get annoyed- they proceeded with the process of engagement. For example, in one of the villages a villager complained that there was lot of dirt and filth around the irrigation pump provided by the government. In another village the opinion leader complained that the villagers were not willing to attend meetings of the club. These cynic tantrums were taken in stride and constructive anecdotes were used to provoke reflection on glaring issues of the villages. During the long conversations and frequent visits some people (not the opinion leaders) were annoyed by such tantrums as they felt addressing these problems was the responsibility of the villagers and not somebody else including the research team. This worked and the villagers agreed to discuss issues and evolve consensus on the best way to address the issues.

In response to the dirt and filth, around the shallow well, mentioned above, one of the farmers was seen irritated who shot an anecdotal question-'if you play football who should shoot the goal –the players themselves or the audience'? To the questions on farmers not attending the meetings similar questions were retorted back. Such moments were outcome of reflection and offered silver lining and it seemed the impact of engagement was catching up! Building on such observations and

opportunities was important and the researchers succeeded in convincing that it was the villagers who could change their state of marginalization- the need was to think through participate and evolve insights.

Some positive support like helping the villagers in obtaining caste certification, in one village; and training the farmers' club members, in another village worked positively to build credibility and demonstrate the intent. Another major initiative was taking the farmers from the two villages to the farmers led initiatives in other villages which evoked positive response and opportunity for reflection. These were turning points and the state of despondency seemed to be turning toward collaborative action. Positive actions, not only related directly to the SIAGI initiative but important for the villagers, changed the social environment within the villages.

The earlier opinion leaders were soon joined by others, not only the companions but also by the fence sitters and star gazers. The opinion leaders, surprisingly, found the new set of leadership as enriching and supportive. Their fear of getting their power and authority infringed upon proved wrong. In effect the emerging leadership added to their strength in helping achieve the larger collective goals of the respective villages.

Our learning from the two villages can be summarized as-' persistence and consistency matched by flexibilities, logic, questioning and challenging, offering examples, opportunity for exposures and showing and maintaining continued solidarity with the community could help prepare an environment of trust and good will between the researchers and the community. This is what Chambers calls –'high ground for participation' (Chambers, 1997). The evidence from the two villages also suggests that, as a result of the engagement villages' power structure also changed from a few self-assigned leaders to more well-intentioned individuals with constructive intent evolving in the process. The power, in the changed circumstances, evolved around construction and creation rather than co-option. The process may prove time taking and sometimes arduous, but this alone can ensure a level playing field and high ground for participation and collaboration'. The two villages of Dhaloguri and Uttar Chakwakheti stand testimony to this!

4.2 ECE helps multiplication of good intentions through the emerging leadership and a proactive environment

The emergence of new leaders brought people forward with their capabilities and drive. They also enjoyed communities' confidence and trust as they have evolved through a reflective process. Such leaders demonstrated high level of commitment as they represented the aspirations and priority of the respective villages. Interestingly, the existing village leadership, who were quite limited in their world view and future, did not feel threatened. The process created sensitivity and enlightenment and could allow them the opportunity to see a larger picture for themselves and also their village. They gradually realized that their personal aspirations are strongly linked to the larger good of the village and perceived the new leadership as support to them.

> In Dhaloguri, Kunal (name changed) has been chasing an ambiguous and uncertain goal, for the cooperative, he claims, has formed, without much success. He has been pretending, however, that he was endeavouring for the villagers' larger good. The external world recognized him through the cooperative which he was managing as his pet organization. Villagers were aware about it but never had the guts to question him and his legitimacy got established and confirmed. The researchers would always look to Kunal and were dependent upon him. The dysfunctionality got carried over and multiplied. The

engagement by the SIAGI team of researchers helped Kunal analyse his position who realized it was time to open up which he did. This saw emergence of new leaders who showed equally good or better articulation and commitment. Once, others got prominence and offered a composite world view and insight about the village they were well appreciated. This made Kunal feel jittery, in the first instance, but soon he realized that his leadership could shine further and be more useful if and only if he worked as part of the village collective. With this observation, Kunal decided to go with the new realities and not only appreciated and supported the emerging leaders but also channelled and collaborated his efforts through them. His legitimacy remained intact, and others got more involved in the village plans. It was an example of a 'win –win' situation for Kunal's personal leadership and evolving synergy. Similar situation was witnessed in UC where only Ratan (name changed) was representing the village. UC, now, has collective leadership where authority and accountability are distributed. Ethical Community Engagement helped create a reflective environment in which everybody was seen positioning himself/herself as a functional individual with acknowledgement of and appreciation for others' contribution.

Under such a positive environment and distributed leadership vision for their integrated village appeared quite clear and the R4D initiative an opportunity to have participation of the community. The villagers regularly involved themselves in planning different activities including research and analysis of both the SIAGI and DSI4MTF projects. Location of the experimental sites, design and execution of different components including data collection and analysis got internalised by the villagers in collaboration of the researchers comprising of the bio-physical and social sciences. There evolved a relationship of mutual appreciation and respect. Scientists would sit together for crop planning, process analysis and conclusion. Differences of opinion were openly expressed and discussed-dialogue rather than instruction became way of functioning.

When zero-till method was used in UC germination of the mustard was seen to be poor. The scientists from the University made cautious moves and discussed what must have gone wrong. Every minute detail was considered, for example 'maybe the moisture or may be the depth of the ridge was responsible'. When an international soil scientist visited and discussed the factors there was near unanimity among the farmers', local scientists and the international expert–the depth of the ridge could be the factor (Roth et al., 2018). On a reflective note the local scientists from the university found the operator of the zero-till machine and his over confidence on him as responsible. The farmers did not blame the scientists –they took the failure in stride and decided to continue with zero-tillage for the next season. And they did not prove wrong- 'with care they were able to have good harvest'. The zero-till became popular.

Similarly, when the polyhouse in Dhaloguri crumbled, the farmers blamed themselves for having purchased cheaper polyethylene. The farmers, subsequently, decided to partner with the project and contribute toward making new structure with the better quality polyethylene.

What lessons do these examples offer?: *The ECE perspective, as applied in the two villages, brought to the fore several realities, with a critical one being the initial context of co-option of village leadership by individuals in connivance with some fellow-farmers. The respective villages were thus deprived of others who had leadership potential. Individual interests dominated and much of the community preferred to remain indifferent. This affected village cohesion adversely and so research or extension interventions proved unproductive and inconsequential. ECE created a reflective environment where people joined and collectively analysed the situation and shared their views. This helped in expanding leadership base and a more constructive environment in the village evolved. The changed environment allowed creative participation of the community in designing and implementing research intervention including interpretation and analysis by the farmers, encouraged and supported by the scientists and the professionals. The scientists were better able to validate the data and scientific observations and the farmers felt encouraged to learn from their success and failures-a condition necessary for developing entrepreneurship and innovation*.

4.3 ECE and evolving design for intensification

The previous section offered important insights into how the poor and marginalized can be reflective and build through their potentials and move from strength to strength and evolve a collective aspiration. In our analysis the initial success, characterized by professional support and group solidarity, might lead to aspirational buoyancy-'let us move further up and wide scenario'- as there is perceived cushion and safeguards to withstand any possible fall. The buoyancy, to result fruition, would need wherewithal and support system. Trust is a great social capital which the farmers from the two villages had started cultivating and enjoying. The trust was in terms of interpersonal confidence in each other at the community level and confidence as shown by the scientific community in their efforts. These were logical drivers for attempting further experiments and trials. Farmers from both the villages started spreading their wings to explore opportunities. They reached service providers, credit agencies and most importantly fellow farmers undertaking experiments and actual practice in their respective fields. There were mixed responses –positive responses regenerated confidence while the negative ones taught them to look back and decide on options and alternatives. This offered opportunity for trying further and expanding their efforts at intensification.

1. It all began with the use of zero-till machine which was initially arranged by the scientists from the UBKV (an Agricultural University) through agriculture -service agency. The farmers developed familiarity with them and some of them even developed business links. The service providers let them be aware of the good agriculture practices in the region and that helped them undertake initiatives which added to intensification,
2. The NGO-research partners (CDHI) also facilitated developing linkage with the government's regional research station where they could observe what could help them augment and diversify their agriculture. The scientists from the regional agriculture research, seeing some experiments going on, in the remote villages, developed curiosity and, in turn, visited both Dhaloguri and UC and offered insights and plans which could suit their respective villages and their available land sizes.
3. Several small and marginal farmers, individually and in groups, were pursuing few micro-level experiments using local technologies and practices that have worked for them. The farmers from the two villages visited such micro centres, observed them, interacted with the proponents and came back to their respective villages with ideas and resolve to try. Following discussion in the villages several such experiments around crop and technology were tried successfully.

What lessons can be drawn? *Engagement encouraged the community for participation in the research and developed and expanded leadership with adequate abilities. The initial experiments, with mixed bag of success and failures, helped them learn how to deal with them. Constant encouragement and support led to aspirational buoyancy and a strong urge to explore. Explorations led to identification of agencies and peer farmers. Equipped with the diverse and rich experiences and finding a supportive environment they were ready for further trials and experiments. New technologies-poly-houses; new crops-spinach and broccoli; management strategies –collaborative and collective, all created a composite impact on their agriculture choices. Gradually, there was appropriate environment for intensification and diversity.*

4.4 ECE and inclusive value chain

This section focuses on the ECE with community around inclusive value chain. An extensive program of value chain and market research in Northern West Bengal has been undertaken within the SIAGI project. A discussion of some of this research is given in Report 2 of Volume 3 of the SIAGI final report.

The farmers, in the two villages, tried and experimented with various technologies, cropping choices and practices. In a collaborative arrangement the farmers, the physical and social scientists worked together valuing each other's insights and perspective. This seems to have helped intensification to this point in time, as there is evidence that agriculture is an enterprise that can support the family as a profitable livelihoods pursuit and can further economic opportunities. Mustard, for example, helped them meet their edible oil consumption needs and also fodder for the cattle. Broccoli and spinach added to their income kitty. To consolidate their economic situation the produce, needed a market and price which could be remunerative and profitable.

We are aware of the rural markets and their volatility, especially for the perishable produce. Marginal farmers, initially, had little hope that they would ensure a profit from the market from the new crops they had experimented with. However, the news of niche products from the two villages had already started spreading and the market actors were eyeing them as opportunity. At this point, the market conditions were not conducive to good outcomes for the farmers. Selling the produce in the local village markets was not profitable and the wholesale markets had their own mechanism not favourable to the small and marginal farmers. Also, the niche produce was not attracting market and consumers as their prices were higher than the general produce the consumers were familiar with.

Based on the experience of the key farmers (who were also partners in SIAGI) and constant reflection a favourable market strategy for an inclusive value chain was thought through. The traditional value chain concept may usually consider evolving a value chain (from farm gate to the consumer) in order to ensure a remunerative price for the farmers. Here, again, the lion share of profit goes to the intermediaries in the name of grading, packaging, advertising etc. Our approach was to look at the opportunities where grading and packaging were low cost or could be handled by community and where formal advertising was not needed.

In case of SIAGI partner farmers, they first tried the local market which did not offer a remunerative price to them. Then they moved to external farmers' collectives such as Farmers Producers Organizations (FPOs). FPOs, though positively inclined, were remote and cost on transport and carriage minimized their margin of profit (CDHI, 2018). With their growing aspiration and keeping in mind their size and volume of the produce the farmers kept reflecting and exploring. They thought through various options.

During their visit to an experimenting farmer and his cropping cycle, the farmers from Dhaloguri learned that they could have higher profit if they try crops off-season variety when the market has limited availability. Some of the vegetables such as spinach, capsicum, cauliflower, broccoli and leafy vegetables were in high demand during festivals and people fancied them as niche vegetables. The economics from the experimenting farmer suggested that they could earn a decent price. Using protected farming they tried, one season, and reaped high profit. Working with this chain proved quite remunerative. One can see the margin of profit in Table 6 and Table 7which is quite encouraging. Earlier they were using open field cultivation which yielded profit margin less than the protected technology. The protected technology helped them change the cropping pattern to niche ones allowing off season cultivation which fetched better price. The margin of profit can be attributed to their off-season cultivation using protected technology on a smaller area.

Table 6 An illustrative view of income using open field cultivation.

Crops (Open field)	Yield (kg/ha)	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net return (Rs./ha)	Profit margin (%)
Tomato	14655	60785	73275	12490	17%
Cabbage	17385	52495	78233	25738	32%
Chili	6525	45820	110925	65105	58%
Taro	9085	45295	136275	90980	67%
Elephant Foot Yam	8780	64385	193160	128775	67%
Brinjal	9452	78500	113424	34924	31%

Table 7 An illustrative view of profit using poly house cultivation.

Crops (Poly house)	Yield (kg/48 Sq M)	Cost of cultivation (Rs./ 48 Sq M)	Gross income (Rs./48 Sq M)	Net return (Rs./48 Sq. M)	Profit margin (%)
Capsicum	92	1398	5510	4112	74%
Coriander	23	833	3000	2167	72%
Spinach	47	780	1400	620	44%

Using their backyard waste, dung and vermin-composting for manure, they recycled waste into important manure as input. The growing consciousness about organic produce caught attention of the consumers and the produce became niche with high demand. The farmers also shared the first yields with the neighbours and relatives which was a moral transaction. But it worked a better media to disseminate the availability of quality of produce which also tasted -'original' according to some of the consumers. There is concern and disenchantment with the produce using high chemical fertilizers which, according to several, do not taste original. The new product is perceived as ***'return of original'***. The message travels by word of mouth and the market looks for such produce as special with a different price and brand tag.

> We had an interaction with the women farmers from UC who, for the first time, visited the market with their produce. They had no clue about the price they should ask for and looked bemused for their newly introduced broccoli. The first visit, however, helped them sensing the market. Rita (name changed), the women leader from UC, informed that she felt lost during her maiden visit but soon gained confidence. She considered the visit and profitability as secondary but her confidence and growing appetite to face the market and her act of negotiation as something extra-ordinary.
>
> Rita further revealed that the local market and some of the selected customers awaited her arrival, now, with her special produce. Her leafy vegetables are liked and preferred for the taste and aroma. Rita said she did not need any advertisement. With her growing familiarity and contact she also identified seeds for future and they are really guaranteed for quality

Rita's story and story from the Dhaloguri, men and women farmers are pointers to understand value chain perspective from an inclusive and evolving lens. In the modern market sense, in a neo-liberal

economic framework, value chain process veers around market professionals which allows larger profit to the intermediaries. The use of advertisements and media, as sales promoting strategies, brutally isolates the producers from the end product and the consumers. The inclusive value chain, in case of small and marginal farmers and wide spread consumers, point to a win-win situation where the producers and the product and consumers remain connected being sensitive to both the quality and price. For the small and marginal farmers this seems to be a better deal. The case offers opportunity for the professionals to analyse and suggest how the small and marginal farmers could be supported and hand held to develop further competencies to be active and effective partner in evolving value chain and influencing the local economy and the market to the benefit of the small and marginal farming communities as well as the consumers. There is evolving concern for their prosperity and wellbeing. Subsidies, cash transfers and institutional development strategies are on the anvil. Availing them is complex and tricky. The case suggests that an inclusive and empowering element needs to be seriously and strongly integrated. This is crucial, especially in the context of the marginal farmers spread over far flung Indian geographies and hinterlands.

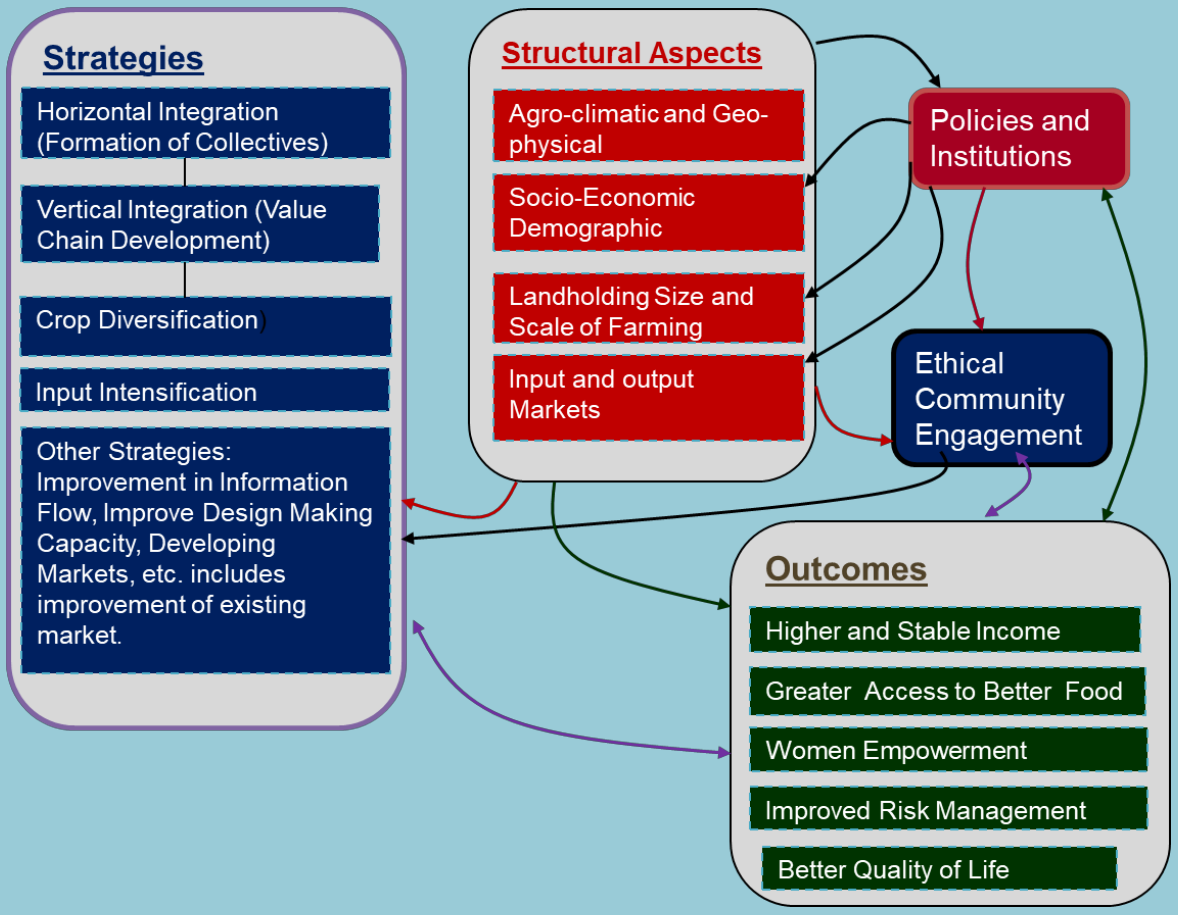
Generalization, based on the two villages, may be questionable and analysis needs to go deeper into the micro-realties in India's decentralized village economy. SIAGI has the opportunity and challenge to flag this off as a research imperative for the future. Some opportunities identified by the SIAGI researchers are listed in Box 2.

What lessons can be learned? The case of an inclusive value chain offers important lesson. The marginal communities may suffer lack of confidence to face the market and negotiate in the manipulative environment. Engagement helps them see value for their product and also demand it. The engagement helps them travel on the untrodden paths as Rita from UC narrated. Ones quality is acknowledged in the market and consumers' trust established this helps in winning the battle.

The task that stares us is to validate this and look for and evolve strategy where the marginal farmers are enabled to make right crop choices, seasonality and disseminate the information about the available product. The marginal needs to be trusted for their wisdom and tenacity to negotiate and face market volatility which is often manipulated by the middlemen. A pro-marginal policy may need to shift their focus from doles and subsidies to reposing and demonstrating trust in their capabilities in building inclusive value chain.

Box 1. Key methods, strategies and tools of ECE in Dhaloguri and Uttar Chakowakheti

Under the given agro-climatic and geo-physical state, socio-economic and demographic background, landholding size and scale of farming, and input and output markets, certain strategies are needed for developing inclusive value chain through better market linkage. These strategies may be horizontal integration such as formation of collectives, vertical integration such as value chain development, crop diversification and input intensification. Other strategies of importance may be improvement in information flow, developing new markets and improving existing markets.



These strategies if co-designed and implemented using ECE with farmers, policy makers and institutions may lead to greater empowerment of community members to move towards achieving the outcomes they want (which might include higher and stable income, greater access to better food, and better quality of life).

5 ECE's impact on the research outcomes of SIAGI

SIAGI's approach emphasized participation of the marginal farming community in every sphere of the R4D initiative, with an aim of promoting socially inclusive intensification. The farming community, in both the villages, were not familiar with such initiatives and therefore were hesitant to relate and participate. Every such intervention, in the past, carried a message of physical and financial dole/incentive coming to the village with their passive position as recipient(s). Also, earlier research initiatives, through research institutions and individuals, were limited to collecting data through administering pre-structured questions which they often responded to orally or through nods and bodily expressions or through interpreters. In the recent times some researchers organized focused group discussion as a method of eliciting response.

An examination of the ECE perspective, as discussed earlier in the case, is focused around establishing an empathetic relationship with the marginalized and excluded (those not allowed adequate space in research) and offering an encouraging environment for them to express themselves and relate with the issues in the existing environment. The case is from the two villages-Dhaloguri and Uttar Chakowakheti. While Dhaloguri has Scheduled Caste as the predominant population, Scheduled Tribes dominate the UC population. From among them the emphasis is over small, marginal and tenant farmers. We have found the growing participation of these marginalized groups in research activities and intensification. ECE has prepared ground for their participation. Logically, therefore, the excluded groups are the core partners, as collaborators, in understanding and pursuing intensification. All evidences point to the fact that excluded groups have not only participated in the research but have realized empowerment and self-efficacy to negotiate with the risks attached to intensification initiatives. The research has impacted their livelihoods and other opportunities to a significant extent.

Four main questions can be formulated when reflecting on ECE in the SIAGI project

1. To what extent SIAGI's projected research outcomes including building partnership with the excluded groups, socially inclusive intensification have been realized and best practices in achieving social inclusion and mobilization of community resources have been realized,
2. How and to what extent the above have led to empowerment of the farmers in the two villages and what is the emerging vision for their well being
3. How the impact, as perceived by various partners-Government agencies /Universities/ NGOs is showing potential for scaling-The ECE being considered as a perspective for sustainable intensification, self-efficacy, empowerment and well-being.
4. What are the challenges and limitations of ECE approach in practice?

These questions are used to structure the following discussion.

5.1 Factors that drove ECE to work

We are considering the drivers specifically in the context of the two villages we worked with. The facts and evidences support the ECE perspective being useful as adopted under SIAGI. In an R4D

initiative, participation of the primary stakeholders is crucial as their own perspective would determine the nature and direction of the outcome. The poor and marginalized are often hesitant participants because of socio-cultural and structural blocks. ECE helps the poor deal with power asymmetries within the given socio-cultural and structural contexts. The evidences suggest that ECE has helped prepare ground for their participation. It would be naive, however, to assume that processes and practices, under ECE, are simple and linear which can produce uniform result. Our experience suggests that the outcome would depend upon the commitment and sensitivity of the facilitators.

There is an emerging trend and practice, more among the researchers, in general, to visit the community members at a convenient location and carry out some participatory exercises which may yield some information about the community depending upon what the community would like to share. This, the researchers may call anything: PRA, community engagement or participatory exercises or may be Focused Group Discussion (FGD). However participatory exercises may not truly mean engagement where engagement may lead to greater participation. Engagement is an empathetic process and may continue for some time. ECE, in this context, is not used to elicit information but to enable the community to look at their situation, reflect around them, analyse them and evolve a trajectory and plan to change their situation positively. In this process they evolve understanding of their realties which may be useful for the researchers and planners in the equal vain. This we learned from both the villages. Our contention is supported by the evidences from Bankura where the PRADAN's team of field facilitators have established an empathetic relationship with the community spread over various project periods (Mishra, 2018). Both Hakimsinan and Chakadoba (in Bankura) show the strong strives the community, mostly tribal, have been able to make. Our experience from UC and Dhaloguri are duly authenticated. PRADN's long years with the community, beyond SIAGI, has helped consolidate not only the solidarity among themselves and with the PRADAN's team but has also developed confidence to look beyond one specific initiative. The engagement with the UC and Dhaloguri famers has helped open possibilities which transcend specific time and program.

Another factor responsible for the ECE to work in UC and Dhaloguri has been the skill sets of the facilitators and their ability to immerse with the community. Sharing habitation, meals and travelling together has created a sense of equality, togetherness and confidence. Reflection and sharing could become all natural-clear, transparent and constructive. For example, when the farmers would visit CDHI campus they did not suffer sense of isolation –they would use the facilities and the space without inhibition. There has to be space for flexibility and freedom and both the facilitators and the community learn to use this. Robert Chambers suggested that there is no rule of thumb–it has to be decided according to a given time and space (Chambers, 1997). He suggests- 'use your best judgement all the time'.

Consider a contrast from a hierarchical bureaucratic organization where hierarchy defines ones behaviour all the time. One is not sure about outcome of one's action. The 'boss' is all whose will and preference would prevail and matter. There is hardly a space for questioning and flexibility, in such organizations, and there is often a 'make believe' situation which may baffle the community. Several bilateral and multilateral organizations advocate participation fully aware that it would only be notional. Bureaucracy and participation sound antithetical in nature and intent.

In UC and Dhaloguri, however, SIAGI seem to be successful, in a limited sense, in influencing bureaucratic collaboration at the ground level. The departments of agriculture and water resources could witness the impact in the farmers' fields and compared their own performance of similar interventions. Their department envisaged implementation of irrigation development activities. There was no understanding nor wherewithal to engage with and organize the community which

was already available under SIAGI. They joined and launched their group based program using ECE via SIAGI. The success is widely appreciated and celebrated. This offers a hope for influencing a bureaucratic initiative via lower bureaucracy.

5.2 ECE – an empowering framework

In the preceding section we discussed how participation is essential and how ECE can help encourage participation of the marginalized communities. We also noted, with examples and evidences, how intensification progresses driven by an enabling environment and the emerging leadership. We also found how intensification has shown potentials for market and income. At the next level let us now try transcending beyond income. The SIAGI team have been developing integrated assessment frameworks, and this includes the empowering change component (Figure 3, see Report 4 of Volume 3 of the SIAGI final report for further detail. Insights from all SIAGI case studies are important to understand what has contributed to marginalised farmers' self-efficacy and empowerment. Backed by the available literature (e.g. Bandura 1977) these learning shaped the development of the empowering change framework. The framework can be used to map and capture further insights from community and individuals.

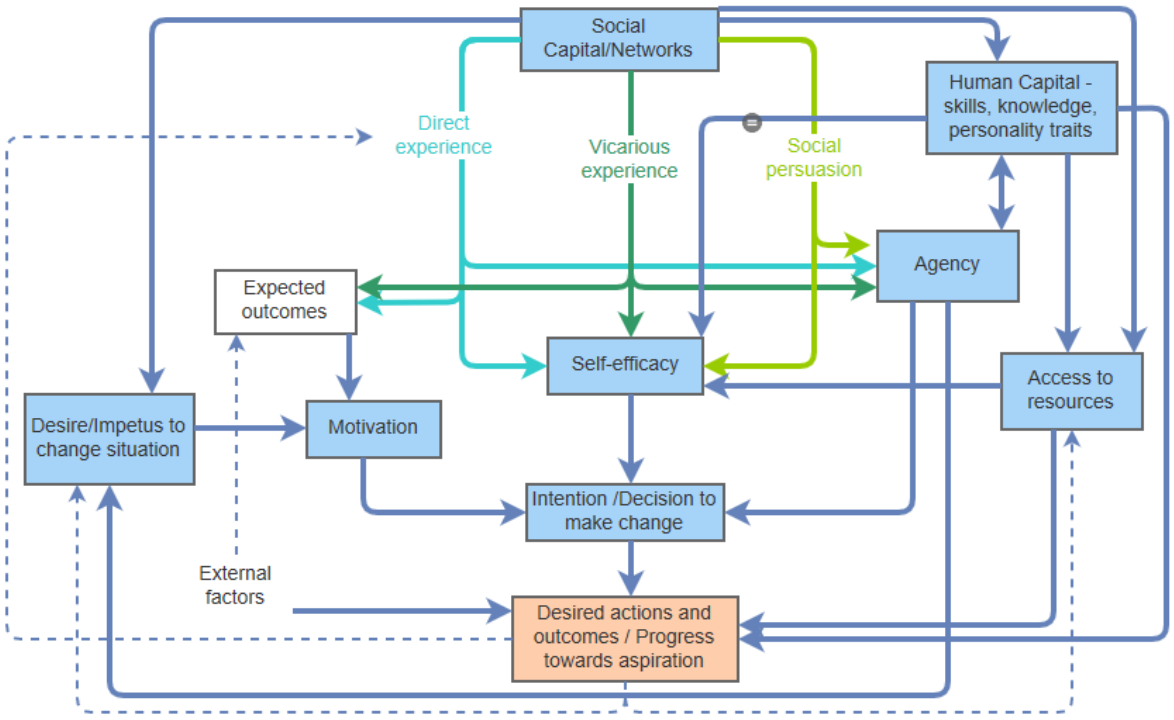


Figure 3 Empowering change framework developed by SIAGI, drawing on outcomes from ECE project activities and critical literature.

Based on our interaction with some of the key actors – men and women farmers from both the villages there evolve a wide spectrum of reflections around what has really contributed to their present state. There have been vicarious as well as experiential elements that led to their current status which, according to majority of them, has changed to a better one. Exposure, visits and counter visits, market connections have all contributed to their current status in their own way. We observed, in case of UC and Rita, (name changed) how market connection led to developing a sense

of self-efficacy –connecting with the market offered opportunity to observe, analyse and reconstruct her realities outside her village. But she stands changed internally, she could influence the market and she could do it better-a characteristic of self-efficacy. Another woman with a steely resolve - she could wade through adverse circumstances and established herself as leader at the top of the world. Men (Vimal, Ramji etc-name changed) not to be left behind - found the opportunity and engagement, during the project, as inspiring and efficacious not because they received physical doles and largesse but because their abilities were recognized and celebrated. Trying of various crops, participating in the measurement of water flows and opportunity for monitoring crop growth and sitting face to face with the scientists, planning various activities, filled them with self-worth. In summary, initially there was spectrum of indifference now there is sense of urgency to join groups and contribute. The issues may relate to their sense of articulation which, as marginal communities, they might miss'- is important to consider '. This helps understand the possibilities and opportunities for an R4D initiative with ECE as a perspective!

5.3 Scaling ECE perspective

ECE perspective, based on the experiences from the two villages, has positively influenced participation of the community in SIAGI's R4D initiative. Do the experiences, from the two villages, offer some pointers to the possibility of scaling of the perspective? In a generic sense scaling implies particular strategic efforts, such as intensifying actions in support of farmer use of new technology; replicating these actions in new places; and encouraging others (NGOs, governments, private sector, other research programs) to promote the approach or technology through their programs and policies (Millar and Connell, 2010). Scaling has various strands including scaling out, scaling up and scaling deep.

Scaling out is the spatial spread and expansion of the knowledge and impacts including perspectives, strategies, methods, tools, institutional development etc. The spread can be considered in terms of households-from one household to the other and across the village, habitations-from one village to the other, administrative units-from one Panchayat to the other and from a development block to the other on to the districts, regions etc. The spread may take a formal as well as an informal path. Scaling up, according to (Ridell and Moore, 2015), is considered, in terms of, integration of the impacts, protocols and processes of the interventions in to the existing policies and practices of the state and non-state institutions.

Riddel and Moore (2015) informed, using experiences from some practitioners, that changing narratives, reframing and reorienting their work, changing their culture, beliefs and value system proved important as strategies for scaling. This, they termed as scaling deep. If the communities change their culture, value system and behaviour as a result of an intervention it goes much deeper into the socio-psychological realities of the community. The impact getting deeper is quite important to consider as without such intrinsic changes scaling out and up may not sustain and therefore may get erased from the cognitive spectrum.

Seen in the above context do the two villages leave any evidence to suggest that intervention has scaling potential?

The impact of SIAGI's research has influenced various stakeholders. We, (Mishra, 2018a and Mishra et al. 2018b) found communities changing their culture of indifference to active participation and dependency to action. Roth et al. (2018) and Schmidt (2018) identified the instrumentalities ECE underpinning such culture change. The culture change, to begin with, has instilled and entrenched these values and people have taken the message rather seriously. The insights have travelled to the

neighbouring villages and communities. In both the villages areas of cultivation and other interventions have expanded as has been discussed under the intensification section characterizing scaling out.

We are not sure if the learning has influenced the state and its policies as there are mixed responses for us to consider. However, our perspectives and strategies have positively influenced the local line departments of agriculture and water resources who have decided to launch their respective interventions requiring community's participation. As evidence of this, in Dhaloguri, 16 shallow tube wells have been installed as farmer-managed shallow tubes. In the lead up to this, the collective that had evolved, critically analysed their situation and earlier practices. Based on this reflection they evolved their institutional goal, vision and strategies. Initially, the farmers were often dependent on the outside to define what they should do. Following ECE application they were able to evolve their vision and strategy and that convinced the line departments to offer the groups the 16 shallow tube wells. Similarly, in UC the agriculture department offered all the inputs and technology for a larger area after seeing the pace of intensification already picked up in the village.

A contrast can be seen in the region where a multi-lateral project is going on which has similar irrigation and agriculture components. The involvement of the community has been prescribed and notional in the sense that norms and prescription for their interventions have been provided by the implementing agency-a government outfit. One can see the difference in the level of cohesion and solidarity in the community. Our observations are that in the multilateral project, there is rush for meetings during the visit of the project officials, but on normal days the excitement about the project does not seem intense or regular.

The stories from the two villages suggest that scaling out has been possible: (1) because of perception of relevance, quality and use; (2) the quality of outcome has been because of participation of the community in the process who could convey the message, with confidence and clarity, using their local modes of communication. Their participation could be possible through engagement in an enabling environment creating confidence that they could do it.

5.4 Challenges and limitations

We understand that our focus has been the two villages which allowed us to concentrate. The near homogeneity within the respective villages, in terms of demography, cultural beliefs and practices and social power structure limit generalization as we could see ECE functioning only under a situation of homogeneity where power asymmetries are minimum. We have no direct insights from the villages where power asymmetries are wide and potentials for inter and intra-community power conflict could have taken the course in a different direction. India's multi-caste composition of villages might generate different narratives and conversation. The case suffers from this limitation.

It was possible to spread wider in the adjoining areas. Our efforts at influencing state policy, in case of WBADMIP-West Bengal Accelerated Development of Minor Irrigation-a World Bank supported project, did not go beyond conceptual sharing and presentations, case sharing, demonstration on the ground and even eliciting positive support in favour of ECE from the field functionaries. So far as CDHI is concerned there has not been any concrete proposal and plan for collaboration to try ECE with ADMIP on the ground. We could have analysed the process and outcome of engagement via a bureaucratic processes. ECE, however, has created interest of the central leadership of the project and we have been engaged in the awareness building and policy dialogue. Being part of the research initiative (SIAGI), which allowed us sharing of our learning and presentation of our understanding at the field level, we can claim some impact.

Bureaucracy is mammoth and hierarchically structured where authority runs through layers of positions. An NGO located in a small place has limitations in traversing the layers convincingly. This is a reality that building momentum and building the community of changemakers including NGOs takes time. However, we do think there is a growing community of researchers and practitioners that are being influenced.

We organized a training program, with other SIAGI partners from India and abroad, to create awareness and strengthen skill among various partners. This helped initial understanding of the perspective and facilitation skill. We proposed to organize more such events to sensitize and skill young researchers and hand hold them for practice. Investing more systematically in this than we did may have taken the concepts and process to the next level. Happily, some researchers and practitioners from outside SIAGI, attending the first training have started putting the perspective in use in their work areas (Mishra, 2019).

Participatory perspectives and practices, on development, are faced with multiple challenges. One of them is conceptual ambiguity and lack of sensitivity and seriousness to them. Ethical Community Engagement (ECE) is important for collaborative knowledge production. For the SIAGI's R4D initiative this is crucial in the face of the existing hierarchical knowledge structure. Publication and use of more literature including methods and tools as well as practical hand books could have been useful which we proposed. We could not do this either.

Adoption of ECE as an overarching perspective was a bold decision showing commitment to cognitive justice (Viswanathan, 1997; Ceri J Davices, 2016). The research team soon reorganized the action plans and activities. This shows an incredible sense of urgency and solidarity among the team members who belonged to different disciplines. However, the team could meet only during planned events with limited implementation agenda. ECE should have been opened for a larger discussion to get the perspective authenticated. The collaborative and inclusive knowledge production system has attracted large number of researchers representing universities and institutions. At least limited number of seminars and conferences could have helped larger reflections and more clarity would have evolved among the research partners as well as among the fellow researchers and academics in general.

5.5 Opportunities

As we can see there is interest being shown by the line departments of the government who have taken advantage of our field-based learning. Being part of a top down bureaucratic system they really do not follow the approach across board neither do they have where withal to do this systematically. However, seeing the impact they felt attracted as this helped them achieve their 'target' which otherwise was proving difficult. Our sense is that if the positive learning travels up to the top and gets vetted there is possibility of up-scaling in the long term.

The impact of our training on ECE has attracted a large NGO from the neighbouring state (Bihar) which has restructured its implementation strategy and in fact has launched intense community engagement process to identify issues and evolve initiatives. Into its second year the NGO feels the ECE perspective has great opportunity to spread.

As the outcome of the ECE has impacted ground realties agencies and practitioners seem to be showing interest in adopting the perspective. CDHI has already organized two training programs for the grassroots workers who feel inclined to take it forward. CDHI is producing relevant literature and case booklets to help them. This seems an opportunity.

6 Synthesis

Even at the cost of being repetitive we are inclined to reiterate that SIAGI's decision to adopt ECE, as its overarching perspective, has been 'timely and wise'. Reorienting the team (with multi-disciplinary orientation) could be challenging but went seamless demonstrating their commitment to the perspective. To some it may appear that ECE occupied a centre stage leaving its goals in the dark shadow. What would SIAGI, without ECE, would have looked like and achieved? We could have counted plants and pumps, we could have interviewed a number of male and female farmers to let us know how many acres of land has been under cultivation before and after the project and whether there was adequate participation of women and so on and so forth. This information is important which we might obtain otherwise. What ECE has done then? To us ECE has offered a dynamic view of how the intensification has taken place and how and to what extent the community felt empowered to take the intensification journey forward. On the ECE, we can confirm that it has been a powerful perspective for the SIAGI project - as a R4D initiative - to produce collaborative knowledge on intensification and inclusion. An empowering perspective is evolving which would be an important addition to the growing literature on collaborative learning.

Let us try revisiting the impact trajectory - the revised trajectory, after adoption of the ECE perspective, it had predicted the impact as - SIAGI plus - where the trajectory is shown tapering off with other impacts evolving. Examining the trajectory, now, reveals that SIAGI, as a R4D initiative realized the SIAGI plus impact in terms of communities' collaboration in the research endeavour evolving inclusive knowledge for inclusive intensification.

We have also seen (in the earlier section) the evolving empowering framework which explains how the community felt empowered as result of their participation and collaboration. Needless to say ECE has been the key instrumentality to let the community realize and enjoy their participation. The learning from SIAGI heralds a paradigm shift in making participation and collaboration work for the marginal communities who have been at the receiving end as the conceptual underpinnings have amply demonstrated, supported by rich evidences.

In terms of achieving goals of SIAGI we may say that the goals of – (1) developing partnership with the groups who are often excluded and (2) realizing conditions for inclusive intensification have substantially been realized. They can safely impinge upon the third goal (3) -distilling best practices. ECE and its practice seems to be an example of one of the best practices.

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Report 6: Case Study 2 – Ethical Community Engagement to Improve Nutrition Links

Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh (SIAGI)

CASE STUDY REPORT

Ethical Community Engagement to Improve Agriculture-Nutrition Links in Bankura

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Executive Summary

Though India is one of the fastest growing economy, still half of the population suffers from unacceptable undernutrition. Many families continue to be locked in an intergenerational cycle of multiple deprivations. Hunger and unavailability of nutritious food remain the immediate contributing factors, while underlying causes crosscut across other determinants such as education, sanitation, drinking water, health, gender, caste and class which have a complex socio-political interplay.

This case study demonstrates how the ECE approach was applied to the planning and implementation of NSA principles in Bankura district, West Bengal India.

Equity and inclusivity as they relate to research participation, ethical engagement processes and practitioner conduct has not been explicitly addressed previously in NSA frameworks. Scaling ECE practices within an NSA research case study provides opportunity to combine considerations of equity in research and practice through more locally-driven and self-directed community mechanisms.

Though India is considered one of the fastest growing global economies, hunger and unavailability of nutritious food is widespread. In Bankura, undulating topography, climate variability, a lack of farming skills, dependency on manual labour, poorly developed markets and insufficient infrastructure for irrigation make agriculture a risky proposition. Insufficient food production and low awareness of effective farming practices result in a life of abject deprivation and insecurity where women remain the most affected because of the existence of gender stereotype norms.

Scaling ethical community engagement practices (ECE) practices[1] within an NSA research case study provides opportunity to combine considerations of equity in research and practice through more locally-driven and self-directed community mechanisms.

Emphasis on local wisdom and peer knowledge of poor women are the building blocks of self-help groups (SHGs) formed, each comprising 10-20 rural women. In Bankura, these SHGs were initially formed by government programs and are now nurtured by PRADAN to shape them as strong platforms for women to enhance their livelihoods. In addition to SHGs, PRADAN has now established women-managed water user associations (WUAs) in the Bankura region with members joining from SHGs.[2]

Our previous experience has been that the implementation of livelihood projects had led to food security and higher incomes, but they did not necessarily lead to a reduction in discrimination and injustice, which contradicts earlier assumptions.

ECE has facilitated a rediscovery of hope in a community's ability to change their condition and influence their future. ECE in SIAGI has become a collaborative journey where researchers and community become co-travellers in a learning journey which has led to better targeted action research. The learning cycle has become a continuous process where community and researchers

[1] https://siagi.files.wordpress.com/2019/10/2019-09-siagi_rdi_ece-prinicples-and-practices_final.pdf

[2] WUAs were formed under the West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP) and promoted by the Department of Minor irrigation. They have no functional linkages with the SHG system.

become co-contributors and where each learning cycle completes with an aspiration of higher order learning, mentioned here as Kolb's learning cycle (see page 13 for description).

A key challenge has been to balance multiple objectives simultaneously. Initially, this activity sought to achieve multiple outcomes including: to build the capacity of PRADAN staff to identify nutrition-sensitive agriculture (NSA) pathways; to test suitable NSA approaches not previously used in comparable settings; to do so using an ECE philosophy; and to look ahead to scale both NSA approaches and ECE processes if these proved to be successful. In following this vision, and to develop a clearer understanding of the current situation, surveys along with multiple focus group discussions were conducted.

The research conducted revealed availability and access to quality water (for drinking, domestic use and irrigation) remain a major concern in the community. While women are better crisis managers, mostly men remain act as household decision makers. Women's' shyness and entrenched social taboos create barriers in availing proper medical services. Climatic uncertainty directly affects the availability of water sources for crop production thus diversification of crops is a real challenge and most families grow a single crop of paddy.

Given this knowledge, PRADAN prepared plans with the SHGs of project sites. These plans included: physical asset creation in the villages to increase access and availability of water; introduction of pulses to make protein available on the food plate; second crop plantings for pulse and oilseeds (e.g., lentil, mustard, niger); utilising residual moisture after main crop harvest; perspective building of women SHGs on nutrition and diet diversity and; field level agriculture training to SHG members. CSIRO has also effectively engaged with PRADAN to build their internal capacities for effective engagement in the community following a path of ECE.

Changes have been observed in the spheres of government, community and PRADAN. Local government has become more proactive for creating space for marginalised groups, especially women. Community have become more aware and starting to adopt technologies to reduce drudgery, use safety measures in agriculture and have become more confident to negotiate with stakeholders. PRADAN is now more people focus, more sensitive towards community needs, patient and persistent, and engaged as a co-traveller with community, including engaging with a wider range of stakeholders for mutual enrichment.

The scaling of both ECE and NSA requires patience to be executed well, allowing time for the community to reflect and decide on changes that affect them. ECE must be a process-focussed endeavour. The challenges of both ECE and NSA are more complex in resource poor communities (e.g. poor tribal villages), where income generation might not be the immediate pathway to improved nutrition.

Given that knowledge of best (field) practice of NSA is still emerging, approaching the scaling task with a minimum 'do no harm' (to nutrition outcomes) philosophy remains valid. Having clear research objectives where effort is best spent on integrating existing knowledge sets has yielded good outcomes. ECE can be a time- and resource-intensive endeavour where building on partners' strengths is crucial. Our experiments need to continue for at least three more years.

PRADAN's learning has emerged from interactions and cross visits with other research partners including the community. While for NGO partners CDHI and Shushilan, SIAGI has triggered market

perspectives, technologies and internal processes in the community for self-sustaining changes, ECE practices[1] as shared by the community has triggered much reflection and learning within PRADAN. It remains a mutually enriching journey for all actors involved in these processes.

Introduction

India is one of the fastest growing countries in the global economy. Despite this growth, more than half of India's population suffers from unacceptably high and persistent undernutrition characterised by insufficient access to nutrient-dense food, inadequate maternal and child care practices and poor sanitation environment. Nutritional security is critical to sustainable development, is a foundational pillar for gender equality and a basic human right. Ensuring nutritional security is met is especially critical for women, girls and children, who are locked in an intergenerational cycle of multiple deprivations[3]. Women's health and nutrition and that of their children are closely linked given the reproductive and care- giving responsibilities of women and their families.

Hunger and food scarcity are two major contributing factors towards malnutrition, and much of the current debate today is focused on making agriculture more nutrition-sensitive (Ruel et al., 2013; Dorward, 2014). Addressing food and nutrition security requires a multi-pronged strategy that addresses the immediate and underlying causes of malnutrition along with other social determinants (Solar and Irwin, 2010). Immediate and proximal determinants that affect nutritional status include food security at the household level, access to food within households, living conditions and co-morbidity (co-occurrence of multiple health conditions), home care practices and access to quality health care. Gender, education, economic conditions, and the political situation are significant factors that determine how the other determinants play out (CSDH WHO, 2010; UNICEF, 1990).

Known agriculture-nutrition impact pathways include: improving women's control of income and decision-making power; increasing household expenditure on nutritious food or health-related services; improving women's ability to care for themselves and their families; improving hygiene and sanitation; and ensuring access to nutrient-dense food for consumption (Herforth and Ahmed 2015; McDermott et al. 2013). This requires cooperation among complimentary sectors such as education, water and sanitation, social security, early childhood development and health care (Ruel et al., 2013). While results of interventions for impacting nutrition through other pathways such as home production, general development or market processes have been mixed and inconclusive (Berti et al., 2003), women's empowerment has been identified as a critical component for improving the nutritional status of families (Ruel et al., 2013; Haddad, 2013; Berti et al., 2003).

Renewed international interest in NSA to enhance nutrition outcomes has seen the proliferation of international frameworks and knowledge platforms which support agricultural R4D programs to incorporate nutrition considerations in the planning and delivery of interventions (Carter & Peishi, 2018). While agricultural research-for-development programs (R4D) which seek to improve overall food production are necessary, unless other determinants of nutrition are addressed (such as dietary diversity and safe access to water), human development goals are unlikely to be fully reached (Herforth and Ahmed 2015; McDermott et al. 2013).

While elements of inclusivity (and equity) are sometimes highlighted in NSA frameworks, questions about equity remain limited to the collection of largely quantitative data to meet equity indicators.

[3] Addressing India's Nutrition Challenges-Report of Multi stakeholder Retreat (2010), Planning Commission, Government of India: http://planningcommission.nic.in/reports/genrep/multi_nutrition.pdf accessed on 21/03/14

Equity and inclusivity as they relate to research participation, ethical engagement processes and practitioner conduct is not explicitly addressed within these frameworks. Scaling ECE practices within an NSA research case study provides opportunity to combine considerations of equity in research and practice by investigating, for example, how nutrition outcomes can be advanced through more locally-driven and self-directed community mechanisms.

Momentum is now building to support R4D programs to incorporate nutrition considerations in the planning and delivery of interventions (World Bank 2014; FAO 2016). Various frameworks have been published to support NSA research design, capacity building and implementation (e.g. FAO Toolkit). Experiences and lessons from international partnerships experimenting with these frameworks and methods in the field are emerging. SIAGI has been ideally placed to explore how current international guidance on NSA plays out in very resource poor communities.

This report describes SIAGI's ECE approach to incorporating NSA thinking at scale. While the geographic focus is presently Bankura, the team has worked hard to document a process and approach to design that could potentially be trialled across multiple sites.

The Bankura Context

Bankura has a sub-humid climate with average annual rainfall of 1,200 to 1,300 mm. However, due to the high variability of monsoon rains, low moisture holding capacity of soils, an absence of developed aquifers due to the hard rock substrate and high run-off due to the undulating terrain, agriculture is fraught with risks. Even in years of "normal monsoon" with overall rainfall around the long-term average, farmers are often faced with total crop failure due to long dry spells at critical junctures in the crop cycle especially during the wet season when almost 90% of crops are cultivated.

Average landholdings are 0.75-1.5 hectares (Bankura District Human Development Report 2007) with very little irrigation facilities. Many residents are recent adopters of settled agriculture and have not yet mastered sufficient farming skills, resource husbandry, or accumulated the capital to develop their land. Poor farming skills combined with a poorly developed resource base has resulted in low productivity. These circumstances set in motion a vicious cycle of low self-confidence, poor husbandry and low investment leading to even lower productivity. Most of these families are not able to produce enough food from their own land due to: a lack of knowledge and skills; low quality of land and water resource; lack of access to capital and other inputs and lack of access to fair output markets. An inability to plan systematically due to uncertainty further compounds the problem making farming an almost hopeless proposition.

The project site comprises of 57% of schedule tribal and scheduled caste groups with 49.8% of families living below the poverty line (India census 2011). These communities have food security from 6 to 9 months (number of months in a year where they are certain they will have at least two meals a day). For the rest of the year they eat less, migrate or carry out menial labour for wages. As a result of these circumstances they lead a life of abject deprivation and insecurity.

In this region, among the poorer families, the conditions of women are worsened by a lack of decision-making power, income and access to food within the family. Illiteracy, malnutrition, poor sanitary conditions and scarcity of safe drinking water have also aggravated their situation. Anaemia,

reproductive health complications, oedema, malaria and premature birth are common health problems among women. Women face difficulties in discussing their health problems with doctors, most of whom are men. As a result, even minor health problems, which might be easily treated in the initial stages, develop into chronic and serious conditions. For example, unattended gynaecological problems in adolescent girls often lead to terminations or other complications or even death during delivery. These conditions result in the family spending a lot of money for expensive treatment outside the region. Aside from money, the family misses out on agricultural and wage work due to preoccupation with healthcare treatment in distant locations. Common conditions caused by malnutrition and related recurrent infections in families include diarrhoea, pneumonia, skin infections, and low birth weight. Men typically suffer from gastroenteritis, skin infections, weakness and malaria.

Women in these families play a central role in agriculture, livestock management and gathering forest foods. Food shortages affect women most, both physically as well as emotionally. As homemakers and mothers of small children, they bear the emotional trauma of coping with hungry children, and are most likely to receive less food or go without food in times of shortages. As men migrate in search of work during lean seasons, women bear the burden of supplementing incomes by foraging in forests and borrowing food from neighbours. We have encountered numerous women who are isolated in their home or confined to the private sphere of reproductive activities and denied access to the public realms of workplace, market place and public decision-making forums. Women's participation in activities outside of the home, their access to information, resources, physical mobility and public voice are severely limited. They are seldom acknowledged and appreciated as farmers and remain as mere conduits of implementing development programs.

In 2017, during one of CSIRO's visits to Bankura, open discussions were had with one of the very poor communities in this district. The visible effect of extreme poverty and hunger was visible to the visiting team. The children (especially girls) were malnourished, the women very fatigued and undernourished due to insufficient dietary intake. It was also evident that malnutrition not only affected the current generation but had shifted from one generation to the next. Following this visit, the SIAGI team reflected on the situation they witnessed, and began work on better understanding the nutrition and health landscape in Bankura, the key agriculture-nutrition links, and the likely impact pathways for improving nutrition outcomes in the study sites.

Figure 1 shows the team's initial mapping of known agriculture and nutrition pathways to the Bankura situation following FAO-developed NSA guidelines, recognising that income remains a main pathway (along with own consumption) but that increase in income will be mediated by the level of women's empowerment gained. The team's understanding of the food environment developed as the project progressed and in time, our understanding of agriculture-nutrition links in Bankura was refined. The shift[4]s in our thinking are described in the later sections of this case study.

[4] The FAO Toolkit guided much of our early thinking on agriculture-nutrition pathways in Bankura. http://www.fao.org/nutrition/policies-programmes/toolkit/en/

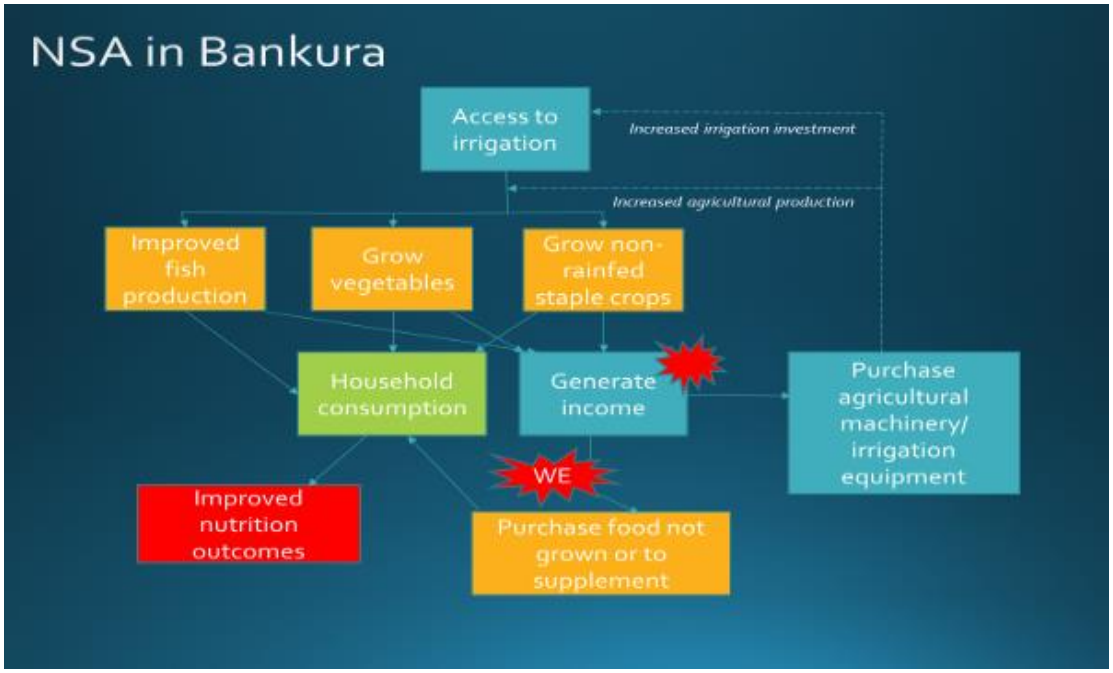


Figure 1 Agriculture-nutrition links as they presented after the team's first visit, following initial preliminary data collection.

Formation of Groups

Self Help Groups (SHGs) of rural poor women in India today has emerged as the largest microfinance programme in the world, creatively combining local wisdom and peer knowledge of poor women with the enormous resources and professional competencies of commercial banks to effectively provide financial services to the poor in India. SHGs are informal associations of 10 to 20 rural poor women, who come together, carry out regular weekly or monthly meetings, pool together their meagre savings and conduct internal lending out of the corpus created. Promoters of SHGs- NGOs, government agencies, banks themselves and individuals, facilitate the formation of these groups and put in place appropriate financial and management systems for the smooth functioning of these groups. Mature SHGs are given supplementary loans by commercial banks for a variety of purposes including food consumption during distress and livelihood enhancement.

In Bankura, SHGs were formed by the Department of Panchayat and Rural Development under the Swarnajayanti Gram Swarozgar Yojana (SGSY) program and later under the Anandadhara program. PRADAN began working in Bankura in March 2005, starting with engaging with government-promoted SHGs. Initially PRADAN's role was to intensively engage with these SHGs to help them to develop an understanding of the purpose of coming together around the activity of savings and credit.

The following step-by-step methodology is followed by PRADAN over time for the purpose of livelihoods promotion through SHGs:

i. Promoting SHGs as a robust group around savings and credit following the five principles (locally known as Panchasutra):

- Regular meetings and attendance

- Regular savings
- Regular loans to group members during time of need
- Timely repayment
- Up-to-date accounting

ii. Developing SHGs as financial intermediaries – setting up linkages with banks and other financial institutions

iii. Livelihood planning with families and groups

iv. Interventions in various livelihood sectors

v. Leveraging credit on a large scale from commercial banks and other financial institutions

PRADAN's key focus for SHG development is to enhance livelihoods. Until 2016, PRADAN assisted SHGs to become acquainted with new agricultural technologies (for example, direct-seeded rice technique, trellis method of cucurbit growing, rain shelter for growing tomatoes, etc.) including training and developing linkages with the input dealers. To date, PRADAN is working with 2,160 SHGs in Bankura, covering 25,583 women.

Another type of local association PRADAN works with is Water Users' Association (WUA) formed under the West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP). These WUAs are promoted by the Department of Minor irrigation and have no functional linkages with the SHG system. While SHGs are permanent in nature, WUAs are very project specific. It is expected that these WUAs make a plan for creating irrigation infrastructure or horticulture and then implement the work. PRADAN has now established women-managed WUAs in the Bankura region with members joining from SHGs. To date, 34 WUAs have been formed.

Engagement Process

Until 2016, PRADAN had involved SHGs for large-scale promotion of sustainable livelihoods. The expectation was that in the process of promoting sustainable livelihoods, it would lead women in poor communities to become more conscious of and assertive about their rights and entitlements and in the long-term, society would thereby become more equitable.

In implementing the SIAGI project, PRADAN had begun to reflect and brainstorm about using an ECE approach with poor communities to stimulate change in very poor women. As individuals, these women often feel powerless and have a deeply limiting sense of self. Researchers in SIAGI began viewing the poverty landscape in the project area with a different lens. It was understood that the poor are increasingly those 'disconnected' from mainstream due to historical phenomena, such as social exclusion and (often also occupational) segregation, resource misappropriation and cultural incursions by more powerful groups, with structural changes in the economy leaving some individuals and groups further isolated. It was understood that exclusion and isolation were structural phenomena bearing the imprint of generations of social and economic disadvantage affecting one's sense of `being'.

With this new insight PRADAN collected empirical data which clearly indicated that while implementation of livelihood projects did lead to food security and higher incomes, these projects did not necessarily lead to a reduction in discrimination and injustice in the family or society nor the communities PRADAN worked with.

The focus on complex techno-managerial aspects of livelihood promotion had led PRADAN professionals away from the agenda of enabling communities and enhancing their sense of agency. PRADAN professionals have mostly remained engaged in project implementation without realizing that in the process the community has become dependent on them. This realisation was further confirmed by recent experiences from other projects across PRADAN.

For example, the UN-WOMEN Gender Equality Programme (GEP) helped PRADAN to understand the primary focus on women and their collectives must not be the central instrumental goal. This program across project locations helped PRADAN to understand the roots of discrimination, inequity and injustice. We began delving deeper into SIAGI's ECE approach. In SIAGI, ECE plays a pivotal role in the quest for more equitable and sustainable development. Initiatives which meet the community where it is, with what is has, and with whomever is present is an ideal starting point for building meaningful relationships with communities.

As a concept, ECE recognises that the poor and marginalised, including women and the landless, are typically excluded from development processes and do not reap its benefits. As a process, ECE strives to facilitate the inclusion of individuals and groups in collaborative and participatory decision-making. ECE is about empowering community organisations to take control of their futures to achieve enduring outcomes. It is an empathetic process which instils a greater sense of confidence and self-esteem in marginalised communities. As an outcome, ECE facilitates a rediscovery of hope in a community's ability to change their condition and influence their future.

With renewed energy and focus PRADAN began interacting with SHGs using a new perspective along with fresh perspectives of ECE. PRADAN began working with communities by developing vision-building training and decided to work together to create an inclusive society where even the most marginalized individual could feel that she counted, that she was capable of influence and that she had a voice. These trainings facilitated the group to visualise a desired future state for their society where SHGs proactively looked beyond the self and reached out to others (vulnerable and marginalized individuals) influencing the development discourse in the community.

As a result, SIAGI partners began assisting each other with exposure visits, reflective workshops and training on ECE to enhance collective understanding and in the process co-creating a cohesive knowledge base. The details and steps of the broader engagement process undertaken in the past two years are provided in Table 1.

Table 1 The steps used by PRADAN to strengthen SHGs underpinned by ECE principles

GOAL	METHOD (USING ECE PRINCIPLES AND PRACTICES)
Enhance individual members' own sense of agency and self-esteem as a woman	Women in our sites were at the receiving end of all forms of discrimination as they believed this to be their "fate", accepting injustice and inequity as a natural given. Over time, women strengthen these social norms and these beliefs and attitudes were passed on to the next generation. This perspective arose from a self-belief that change was not possible and that one had little control and influence over one's circumstances. A woman's low self-efficacy affects her wellbeing. Her (non)contribution to her community perpetuates these inequities. PRADAN's more empathetic engagement approach with these women triggered a search within them to identify themselves as being larger than their current selves. Women began to understand their own blind spots and view norms, rituals, and community traditional practices as unjust and discriminatory.
Sensitize women about the need for coming together and creating robust social capital	With proper capacity building events women began to realize that there were other women within their own community who shared the same experiences, beliefs, and discriminatory practices. With PRADAN's facilitation, women found connectedness with other women, proactively coming together to form a collective/group with similarly-affected women in their same neighbourhood. This group provided women with a familiar space where they did not feel threatened, could share their lived experience and listen to others, change their perceptions about themselves and their environment and develop a group consciousness to build a more just and equitable society.
Build a clear and shared vision of the institutional goals to perform as a group.	Define facets of empowered collectives and have the opportunity to prioritise the desired change that they want to affect in their lives. This includes defining the role of the SHG, the cluster and federation to create an environment to realise, achieve and exercise this change.
Gap identification and planning.	Facilitate the group to identify critical gaps between the group's current state and their desired state. Then help the group work backwards to make long term, medium term plans. Following that, detailed short-term plans could be made which included details such as when, how, who and where.
Collaborate with other stakeholders	Help the community to appreciate the role of other stakeholders and build a mutual relationship with them facilitating developmental outcomes in an upward trajectory.

The groups were then assisted to prepare a task-actor matrix around an activity plan identifying the following –

> *What the community could do alone*; *what could be done by the community and PRADAN / other actors and; what PRADAN / other actors could do alone to help the community*.

The planning process followed Kolb's learning cycle (published in 1984) to guide a co-learning and co-creation process:

In this process, the women are assisted to reflect and walk through their rich lived experiences in the framework of Kolb's learning cycle (CE→RO→AC→AE). Women in the collectives articulate their concrete experiences around the issues of nutrition, health, hygiene and their efforts around nutrition-sensitive agriculture. Individuals and groups reflect on these experiences (i.e. gather data, analyse and build their experiences with supporting facts like frequency of such experience in life, how long it has perpetuated, personal feelings, beliefs and assumptions, hindering and facilitating factors, why it happens and its root cause, who has created this, counter questions, etc). In the stage of abstract conceptualisation, groups think through the logical steps, develop patterns from the data and assimilate to formulate generalised statements along with its cause and effect. Once group reaches the stage of AC, it becomes clearer on the action steps with new ideas and then group plans for bringing a change. Then collective agree upon the action steps for a new experience with a different set of assumptions, belief and values.

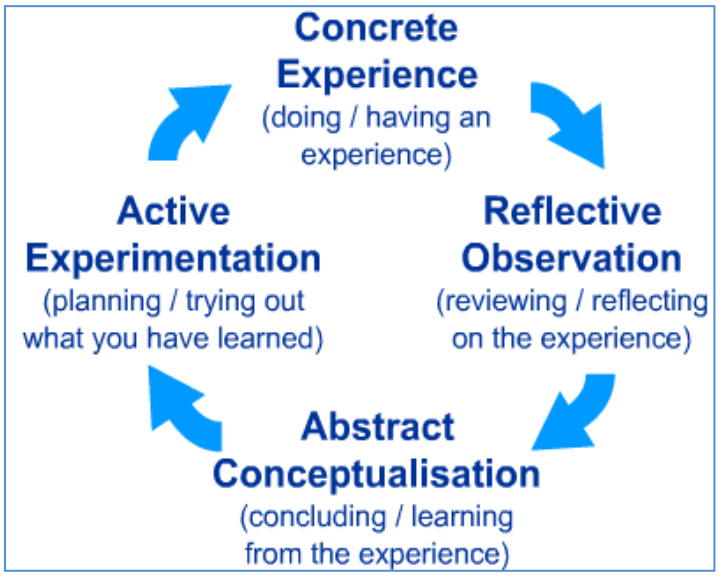


Figure 2 Kolb's Learning Cycle as a guide to the group learning and engagement process.

Table 2 below highlights the various engagement milestones for PRADAN from 2015-present.

Table 2: PRADAN Engagement Milestones 2015 - present		
Time line	Milestones	Significance
Apr'15	Visit to Bankura to understand project suitability of the villages	This was the first visit to Hakimsinan & Chakadoba - to understand the suitability of the villages for SIAGI.
Feb'16	Inception workshop	The inception workshop helped to build clarity on how this project is distinctly different from other agriculture research projects (i.e., focus on socially inclusivity and ethical community engagement) and to develop a shared vision of SIAGI.
Aug'16	Value chain analysis training workshop	Develop an understanding of principles of VCA and social inclusion in VCs.
Sep'16	HH typology categorisation	This exercise assisted us to better understand the families' self-view as well as supporting conditions and to investigate the on-ground situation further.
Jan'17	FGDs on priorities of men and women	This exercise assisted in developing a deeper understanding of the community's areas of concern (for both men and women) in respect to food and nutrition, drinking water, health, education, shelter, migration, income, savings and comfort.
Feb'17	Value chain FGDs with community and traders	This exercise developed a contextual understanding of the mango and tomato value chains - especially how market influences the entire chain.
Feb'17	Initial conception meeting on NSA	The meeting on NSA helped to seed the idea of how to move forward with NSA in Bankura and it was also effective in bringing additional contextual understanding
Aug'17	Value chain workshop	Helped to develop a conceptual understanding of *inclusive* value chain approaches.
Nov'17	Inception of NSA in Bankura	From this meeting it was decided to work on NSA in Bankura and an initial workplan was developed.

Feb'18	FGDs with men and women on water use and management	Created an understanding of the different aspects of water use for both men and women and their priorities around water.
Mar'18	Visioning on NSA	This exercise helped the community as well as the team to visualise aspired states for NSA.
Apr'18	Household level water survey	This exercise allowed a detailed understanding of water access, usage, nutrition intake and communities' health concerns
May'18	Training on qualitative research methodologies	This training offered a deeper understanding of qualitative data analysis and planning for further phases exploring semi-structured questions on WASH and crop choices - earlier our quantitative survey was insufficient for the purpose.
June'18	Exploration with semi structured research questions on WASH and crop choice	In an area availability of quality drinking water, hygiene practices, Sanitation measures and crops grown (which goes to the food plate) directly affects the health and nutrition scenario of an area. This activity revealed information about diseases suffered, current WASH practices, perceptions about water quality, perceptions about diseases, food intake etc.
July'18	Partnership with ADMIP grounded	The partnership created opportunities for livelihood asset creation in the villages.
Aug'18	NSA workshop	This training built conceptual clarity on NSA which further helped to cement the NSA pathway for Bankura
Oct'18	Exploration of ECE from the communities' perspective	This activity enabled PRADAN and SIAGI to see ethical community engagement from the perspective of the community.
Nov'18	Discussion on upscaling ECE	A note on scaling ECE was reviewed which helped to sharpen the strategies moving forward.
Dec'18	Discussion on adopting ECE approaches with ADMIP	A workshop was held with WBADMIP to share experiences and learning around community engagement. In that workshop, representatives from PRADAN were present and shared their experiences with WBADMIP in relation to Bankura – helping to draw out learnings from the community engagements especially how women have managed their own Water User Associations and taken charge of the implementation process.
Jan'19	Guidelines issued by WBADMIP in favour of marginalised tribal women	In Bankura District, the DPMU had not sought the services of a contractor to implement the Orchard work and the WUAs (Water User Associations) were entrusted to directly implement those schemes. The women-managed WUAs, especially in Hakimsinan and Chakadoba, set an example of community taking charge of their own work. On

		13.01.19 the Project Director, WBADAMIP circulated a new guideline on prioritising SHG women (especially ST & SC) for the establishing of new WUAs. This is an example of community- focussed pro-poor policy formulation to nurture large-scale socio-economic change in favour of the marginalised. This will help many poor women of this region to join hands in the change process initiated by WBADMIP and facilitated by SIAGI.
Apr'19	Human dimensions embedded value chain exploration	We wanted to explore value chain beyond enhancement of income at different nodes of the value chain. We also wanted to probe deeper on other dimensions (social, psychological, etc.) which human beings consider as more valuable than just enhancement of income under a particular context.
June' 19	Orientation of the women around vegetable cultivation	It was observed over the years that paddy being the staple crop was reflected in the plates of the people. Vegetable consumption was very low by villagers as they could not afford the same from the market and cultivation of vegetables also became limited due to unavailability of water for irrigation. Thus, there was an attempt to utilize rainwater and plan around the vegetable crops that could fetch them good productivity as well as help them to bring in more diversified food habits.
July' 19	Handholding around preparation of nursery and trellis demonstration	Handholding around the same was needed as quality sapling and trellis was needed for good yield and to have disease resistant plants.
Aug' 19	Documentation of the transformation around ECE	In our day to day engagement, it become very difficult for us to reflect on the process in which we were engaging. Documenting our experience provided a tool to help us as professionals understand transformation through the lens of ECE.
Sept' 19	Perspective building on Health and Nutrition	Developing the understanding of women around health and nutrition.
Sept' 19	Workshop on skill development around documentation and presentation	Developing professionals' skills around presentation and documentation.
Oct' 19	Planning around pulse and oilseed cultivation	Village level planning on utilization of fallow land and linking with a perspective.

Dec, 19	Implementation of cattle floor	Implementation of cattle flooring has started in Hakimsenan. This will help to reduce women's drudgery and maintain hygiene. It will affect a betterment of livestock and women's health also.

The engagement process allowed PRADAN and SIAGI to understand the food environment in each site, plan some discrete and targeted research activities, and map a 'best bet' intervention pathway for NSA in Bankura. Figure 3 shows two 'best bet' intervention pathways for NSA in Bankura (access to irrigation and WASH) and the relationship between those. Each of these diagrams demonstrate a snapshot of our thinking, research and planning journey as it evolved. It was important that these stages were documented so that MEL could occur, but they also served as a record of decisions we could use to verify our thinking when deciding on next steps.

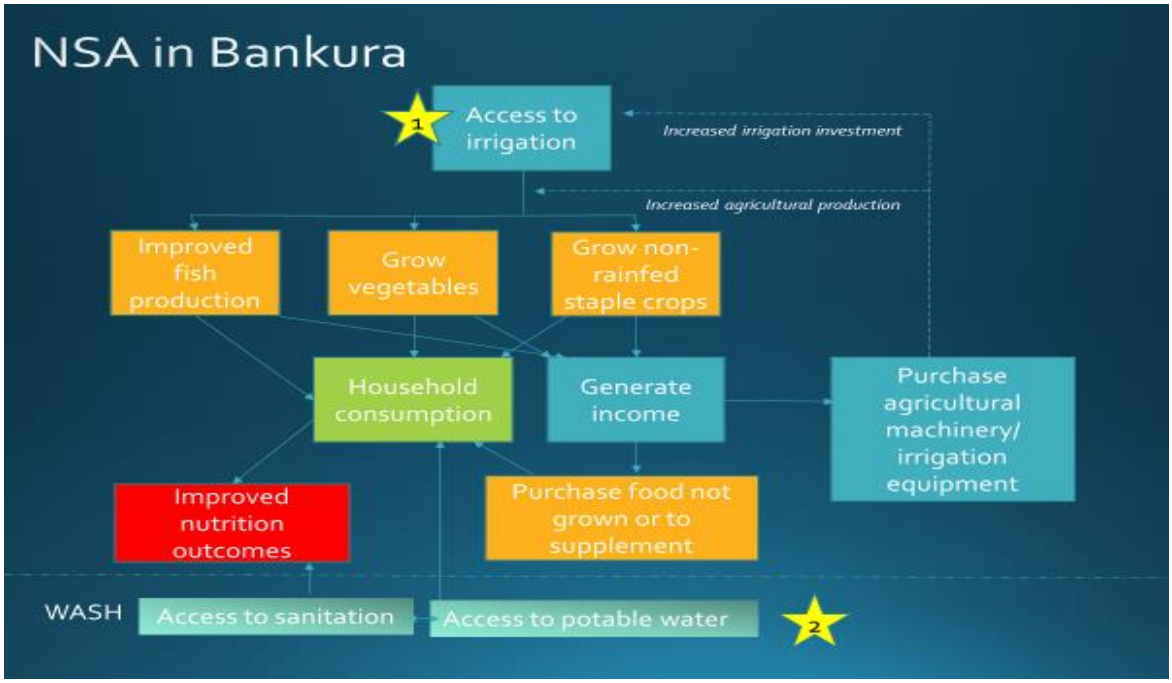


Figure 3 Identified impact pathway for improving nutrition outcomes in Bankura following reflection and additional data collection.

Planning for Interventions

The exposure trip of the CSIRO team during 2017 triggered the SIAGI team to begin work on jointly developing an NSA strategy alongside establishing a new value chain to empower marginalized women and create a conducive environment for gender equality.

The first step towards building this strategy was to identify the drivers to 'nutrition-blind development' and its broader impact. The diagram below shows our thinking:

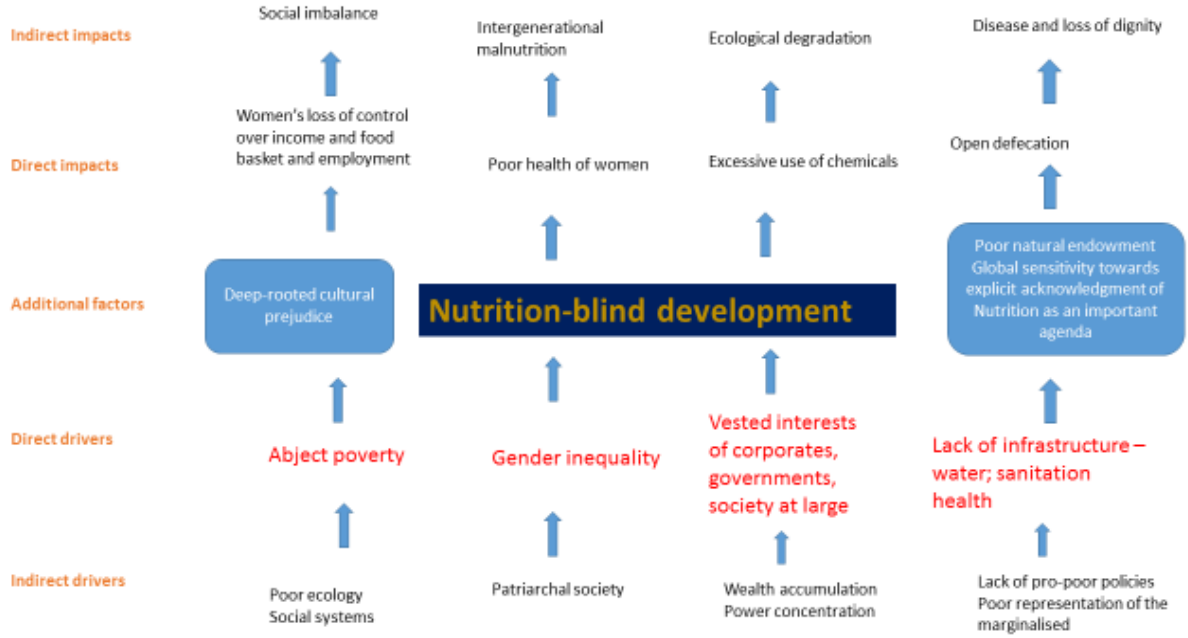


Figure 4 Identified drivers of nutrition-blind development.

During discussions a review of the literature was undertaken and it was decided to adopt Herforth and Ballard's simplified impact pathways framework demonstrating links between agriculture interventions and enhanced nutrition outcomes (Figure 5 below). This framework was later refined by the FAO and is now part of an NSA toolkit available here http://www.fao.org/policy-support/resources/resources-details/en/c/884011/

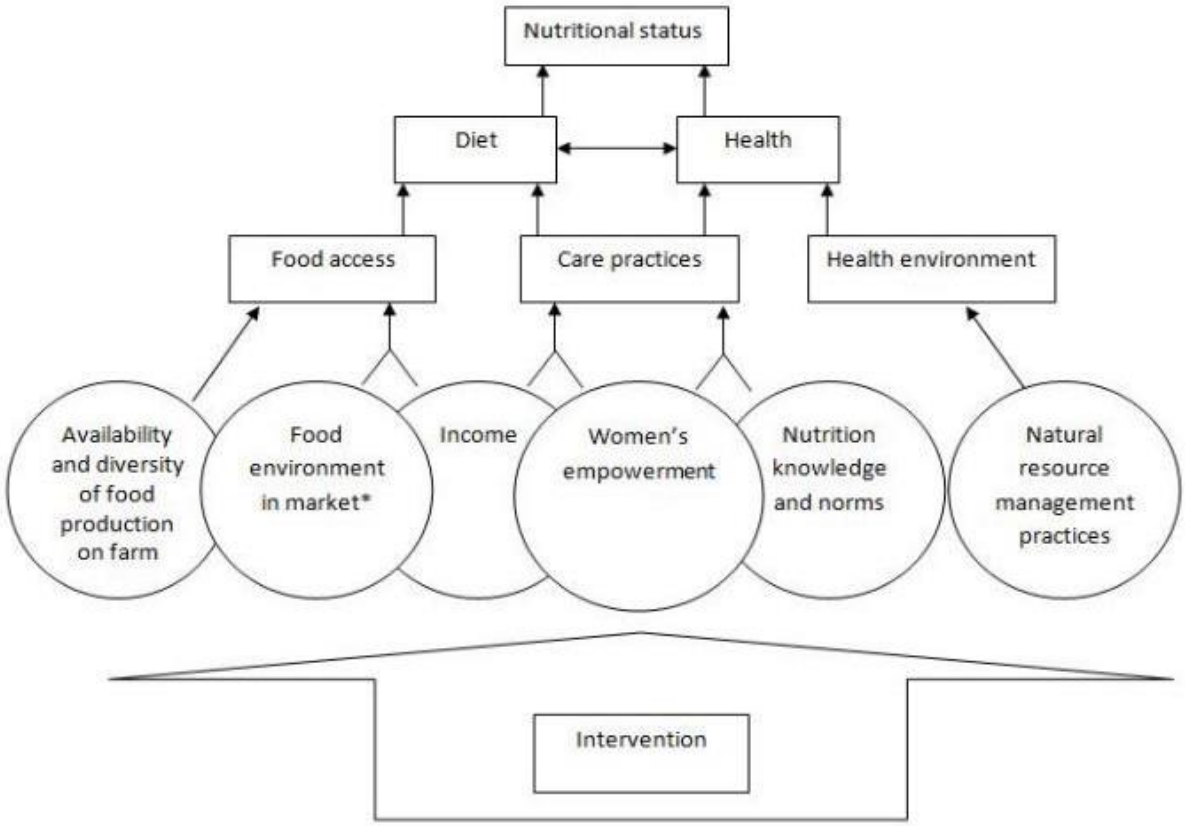


Figure 5 FAO-recognised agriculture-nutrition impact pathways.

As a team, we considered this framework contextually relevant to our Bankura sites especially given the focus on three key indicators of nutrition security:

1. **Food access** through improved access to nutritious foods on-farm, increased availability and lower prices of diverse nutritious foods in markets, improved food safety, and income which can be spent on more diverse nutritious food *if* such food is available, affordable, and convenient.
2. **Care practices** through empowerment of women (particularly if they can control income, their time and labor), and through incorporating behavior change communication.
3. **Health environments** through management practices that protect natural resources (water in particular), and safeguard against health risks introduced by agricultural production

CSIRO and PRADAN jointly devised a plan consisting of a phased, adaptive approach to improving the food environment. Essentially, the plan followed internationally recognised NSA guidelines while striving to balance community needs and keeping mindful of existing resource constraints. Our primary objective was to devise an evidence-based NSA program that over time, could be scaled to other districts. Two villages in the Bankura district of West Bengal - Chakadoba (Hirbandh block) and Hakimsinan (Ranibandh block) were selected. It was imperative that international pathways and principles informed the most appropriate NSA action plan and uncovered the most direct pathways

for improving the food and nutrition environment of these two sites. The larger goal has always been to scale NSA programming more widely if it proved successful. Building the capacity of PRADAN staff to empower community leaders and trainers to implement the plan (using ECE approaches) was considered a key scaling strategy.

A key challenge has been to balance multiple objectives simultaneously. Initially, this activity sought to achieve multiple outcomes including: to build the capacity of PRADAN staff to identify NSA pathways; test suitable NSA approaches not previously used in comparable settings; do so using an ECE philosophy; and look ahead to scale both NSA approaches and ECE processes if these proved to be successful.

The following research stages were identified as given below:

STAGE 1

Aim: To understand the food and nutrition landscape in context. (Formative research)

1. Identify and collate existing (secondary) data and information on selected villages, identifying the knowledge gaps.
2. Select appropriate methods and tools to fill these knowledge gaps using participatory methods.
3. Using existing knowledge and experiences with the village, describe the institutional landscape.

STAGE 2 (Participatory research)

4. Co-design a suitable NSA plan containing possible entry points for NSA intervention(s) informed by previous analysis and underpinned by internationally-accepted conceptual frameworks.
5. Identify additional partners (eg, NGOs, government) to assist in the resourcing, delivery or management of the plan.

STAGE 3 (Action research)

6. Build the capacity of PRADAN staff to empower identified community champions to implement the plan.
7. Identify enablers to policy and program action engaging government and industry stakeholders as appropriate.

Formative research undertaken revealed some important links between water (quality, access and management practices) and its effect on food production, women's empowerment, care practices and the health and sanitation environment for the villages under study. It was quickly realised that these factors in turn directly impacted community diets and health status and therefore nutrition outcomes.

A situational analysis on Health, Water and Nutrition allowed PRADAN to gather baseline data which identified knowledge gaps and informed the direction of further work. Baseline data were collected and combined with census data, along with FGDs, visioning exercises and interviews.

To find out more, the team re-purposed a data collection tool (Figure 6 below) to better understand the food and health environment at the village level (with a focus on water). This exercise enabled the research team to identify general themes for further investigation while following a recognised agriculture-nutrition pathway. The tool also allowed the team to conduct research using an ECE

philosophy where research remained focused on understanding issues relevant to justice and equity, and was sensitive to limiting research burden for farmers, but also PRADAN staff. This work helped to inform the next step - determining community aspirations to inform a plan for NSA action.

Secondary data sources revealed that more than 50% of children in the age of 0-6 years are malnourished and more than 45% of pregnant women do not avail themselves of health facilities from government hospitals (Bankura District Human Development Report 2007).

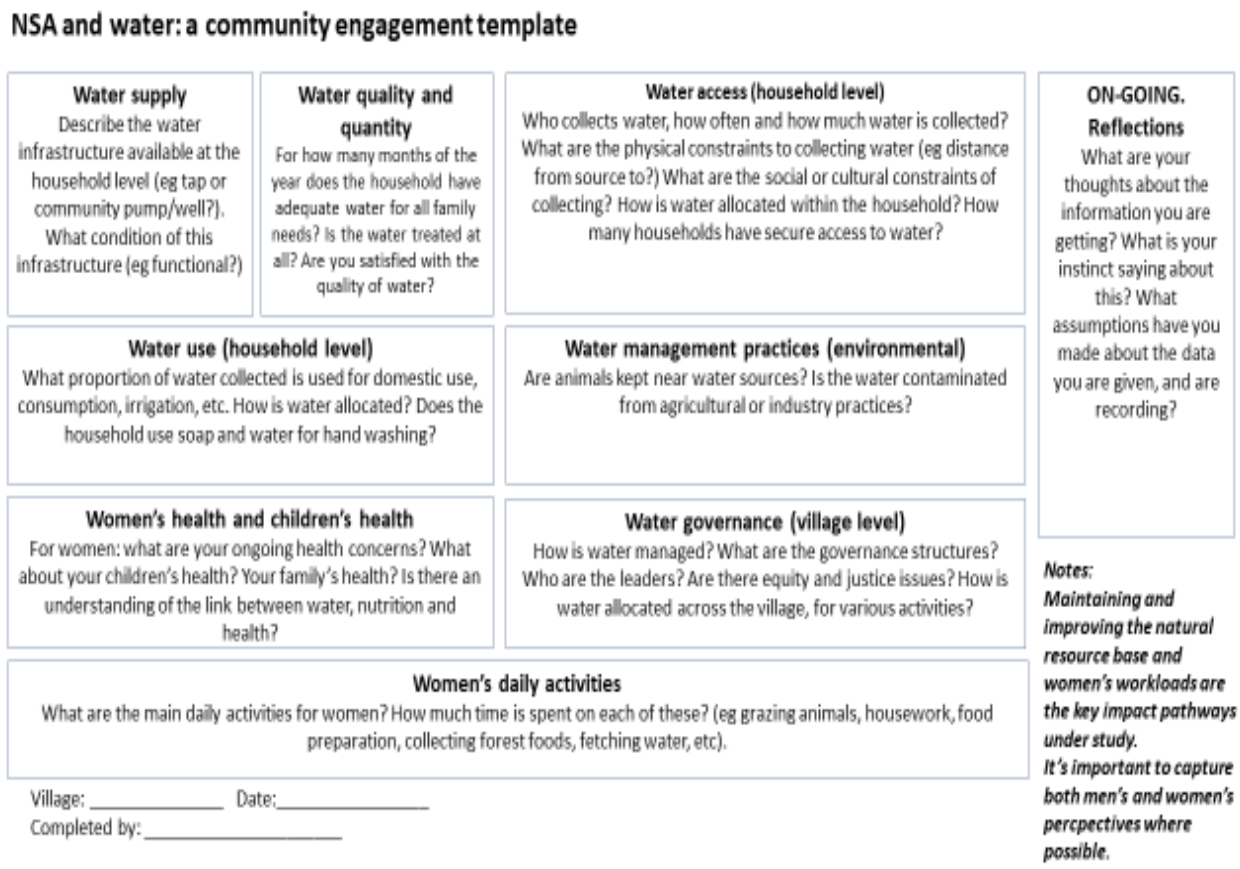


Figure 6 A community engagement template for determining links between water, NSA and justice.

Table 3 below provides an overview of the NSA-related data collected.

Table 2. Summary table of NSA-related data collected.

Dataset	Method	Target participants	No. of participants	Detailed Explanation	Our Analysis
NSA	Semi-structured Survey	Women (other household members joined later)	Chakadoba-11 households Hakimsinan - 10 households	Centered on various diseases suffered, perception around quality of water available, diets, availability of restrooms and the changes around these they would like to see.	1. Lack of awareness and shyness among women contribute to the worsening of women's reproductive health problems. 2. Some villagers hold superstitions and seek treatment from an exorciser in Hakimsinan. 3. Most of the villagers fail to think about and analyze their situation with regards to the reasons they are economically worse off
Water Survey	Structured Survey	Women	Hakimsinan - 159 women, 7 men Chakadoba - 83 women (1question by 28 men)	Access to water, its various uses, preference of water usage in times of shortage, water management practices, how the availability of water is related to production choices, nutrient and health concerns.	Expenditure decisions were largely the domain of men in both villages, women took decisions in women headed families. The views of the villagers on safe drinking water methods were varied and lacked awareness of safe drinking principles.
Food, Health and Environment	FGDs	Men and Women	Chakadoba - 12 men and 20 women Hakimsinan - 12 men and 10 women.	Different aspects of water like consumption, access, quality and quantity, water management, water governance, water scarcity health- related issues and role of caste, class gender in water distribution.	1. Water is the major concern in the lives of people in Hakimsinan and Chakadoba 2. Women are better water managers in times of crisis.

Interventions

In both villages, a lack of quality drinking water as well as water for domestic use is a challenge. While the community access drinking water from tube wells, from a shallow depth it cannot be guaranteed as safe water. Similarly, major household domestic water consumption for cooking, cleaning utensils and clothes, taking baths, washing hands, etc. is managed from open wells or open ponds which are contaminated by several means. Additionally, the availability of sufficient water especially in the dry season (March to June) is of great concern as most of the open wells face scarcity of water. This has led families, especially women and girls (the data shows that women mostly collect water) to fetch water from distant places. Fetching water is physically demanding and time-consuming work where women stand in long queues.

Since there are only 1-2 tube wells in each hamlet, most of the women have to bring water from afar. The situation is aggravated in the summer months where women sometimes travel further to other habitats. Over a period of 365 days, men carry water 10-12 times, only when women are absent or in ill-health.

Child marriage was a common issue in these villages and women experience many difficulties with their physical health. More than 90% of families in these villages practice open defecation. This practice, along with chemical inputs used for agricultural production contaminates existing water bodies. As a result, diarrhoea, dysentery, cold and fever were the most common illnesses suffered by the villagers at both sites. However, women also suffered from back pain, low blood pressure, weakness and various other hormonal imbalances resulting in women's reproductive health problems. Some children were suffering from malnutrition.

Menstrual hygiene was not a priority for women. The reasons for some of the diseases were not quite clear to many women; however, they were aware of their own unhygienic practices and the pond water being polluted by fertilizers and sewage water and the link to some waterborne diseases. Lack of awareness and shyness among women create communication barriers to express these issues among themselves and also with others (health professionals). This lack of discussion aggravates the situation.

While malnutrition was an identified concern for many villagers, a general lack of nutrition and health knowledge prevented villagers at both sites from identifying foods of high nutrition value (e.g. coloured vegetables) and the importance of a balanced diet. Also, no importance was given to consuming adequate amounts of drinking water throughout the day.

The Bankura area is rainfed and erratic rainfall coupled with climate uncertainty directly affects the availability of water sources for crop production. Given this situation, many families tend to grow a single crop of paddy. Though a few families have more recently started growing vegetables for consumption in courtyard land, these are limited to the rainy season (July to September). Given these constraints, the food plate for most of the time is made up of nutrient-poor carbohydrate, mostly rice. Knowledge around nutrition and health is very poor which also contributes to the narrow focus of crop choices. Maintaining hygiene, sanitization and cleanliness are real challenges.

Though there is huge potential for growing a wide variety of food crops, villagers were not initially oriented towards this endeavour.

One potential pathway identified to improve this situation is based on access to irrigation and durable asset creation focusing on diversification and intensification of agro-horticulture to improve crop diversity. However, such an intervention needs to be coupled with actions to improve women's decision-making

power, nutrition knowledge, and understanding gender discrimination to challenge customary taboos and myths.

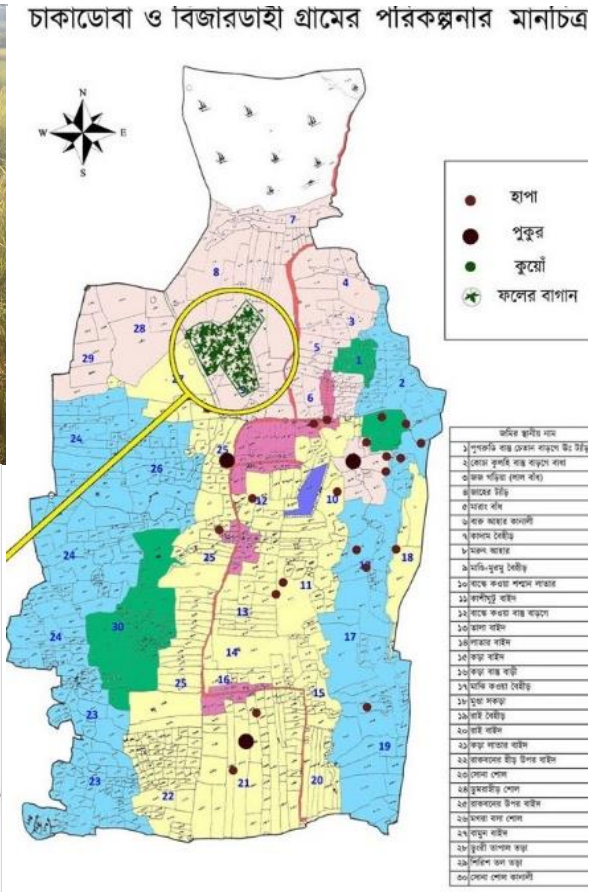
Survey data from both *Hakimsinan* and *Chakadoba*, indicated that while a cross-section of women had knowledge at some level, there was little action to bring change in practice within her household or her neighbours. This challenge required collectivization of women into groups simultaneously which played a major role in expressing and establishing women's voices, in decision making process, in crop choices and in behavioural practices.

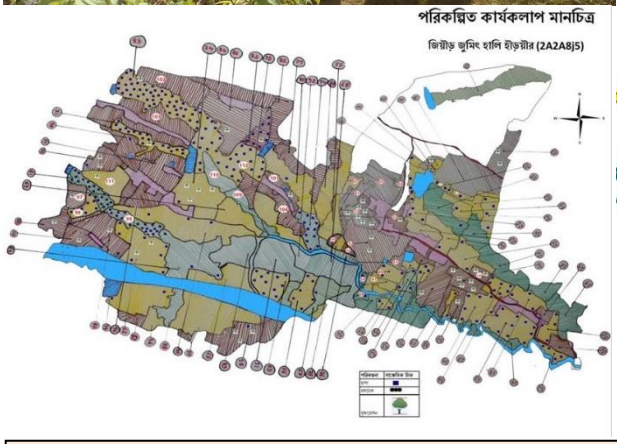
Keeping in mind recognised NSA pathways, PRADAN prepared plans with the SHGs of project sites for this year on the following dimensions:

a. Physical asset creation in the villages to increase access and availability of water:

Preparation of land and water based NRM activity plans with SHG members and in collaboration with the MGNREGS department in rejuvenation of dying rivers under project USHARMUKTI (salvation from barrenness). Under USHARMUKTI we have been able to prepare 71 Detailed Project Report (DPRs) covering 359 villages and 62,000 Ha areas. The planning process starts by the community with preparing of the watershed resource map delineating the ridge lines, drainage points, different land categories with different color codes with water flow direction and the prepared watershed resource map is used for plaining activities in each piece of lands. By implementing those activities in the DPR, assets of 15,000 families will be created worth 67 million AUD. Most of these DPRs have given priority to the asset creation of small and marginalized farmers. Still now assets worth of 1.17 million AUD has been created by utilizing MGNREGS funds in Ranibandh & Hirbandh block.

Collaborating with West Bengal Accelerated Development of Minor Irrigation Project (WBADMIP) to create assets like horticulture plantations (mango, cashew, dragon fruits, drumsticks), Arjuna plantations for tasar rearing, creating irrigation infrastructure, etc. To date we have been able to create assets worth 1,05,500 AUD in these two villages (project sites). In the Ranibandh & Hirbandh blocks, assets worth 6,69,2,71 AUD has been created by utilising WBADMIP fund.





Exposure to watersheds and preparations of resource maps

Mango, Cashew & Arjun Plantation along with 30-40 model treatment

Field visits of WBADMIP officials jointly with the community

b. Introduction of pulse production and awareness-raising to diversity diets

Introduction of pulses like pigeon pea (Cajanus cajan), green gram (Vigna radiate), black gram (Vigna mungo) in Kharif (monsoon) season in upland area. Here PRADAN is collaborating with Bidhan Chandra Krishi Viswavidyalaya (BCKV) – the state's Agricultural University. Last year we instigated an information campaign on pulses informed by research undertaken previously which showed the food plate of these communities, especially women, mostly lacked protein. Through discussions with the community it was discovered that people in earlier times had grown nutritious crops like pigeon pea, black gram etc. in this area. The community was not aware of the nutrition value of these crops but had been cultivating for fulfilling their food requirement. (Historically, the introduction of high yielding paddy varieties along with rice that households acquired from the Public Distribution System were sufficient to fulfil the rice requirements for most of families thus the culture of cultivating pulses gradually diminished).

Given this situation, during discussions with the community we began communicating the message that for good health and nutrition, families needed to consume balanced and diversified diets rich in nutrients and that to limit one's diet to only rice would not ensure good health. Mapping of community consumption habits was also undertaken with the community to trigger discussions and reflections around the theme.

Our messaging throughout this campaign included:

To avoid a deficiency in protein, each family (five members-3 adults) needed to cook 150 grams (Indian Council of Medical Research recommends daily 40 gm for an adult) of pulse daily for consumption. So monthly there will be a requirement of 4.5 to 5 kg pulses for consumption which is 60 kgs per year. To make these 60 kgs available each family needed to cultivate pulses at least in 0.1 Ha land. This information was shared with the women in their SHG institutions and along with these awareness meetings, mobile van miking and training programs were also organized.

In addition, we collaborated with B.C.K.V. to train our colleagues on pulses. This collaboration has ensured quality seeds from the university. Training on pulse seed preservation was also completed. To date we have been able to cover 1,130 farmers growing pulses in 132 acres of land and 23 exposure visits have been organized in the villages with good pulse cultivation covering 241 SHG members focusing on role of pulses in improvement of nutrient intake in their daily diet.

Training by professors from Agriculture University (BCKV), exposure on pulses

c. Options to enhance income using an (inclusive) value chain perspective

In a village agriculture system there are several steps, technologies, skill sets, and several actors involved who have different roles. In this system one element might be beneficial for one group while not beneficial for another, one might have economic benefits while the other has social, etc. To understand these dimensions better, we decided to discuss the issues separately with women and men and then hold joint (women and men) meetings to understand the differences, similarities, ways forward etc. Our philosophy revolved around the process of participating in value chain work so that the process itself becomes an enriching and learning opportunity for all concerned (community and us). We also decided to not begin any value chain discussion with any specific crop.

We completed FGDs on value chains where NSA was an important component. These exercises were conducted separately with men, women and one joint event involving both men and women from Chakadoba and Hakimsenan (Total six events and each event for two days). The discussions generated lot of excitement and learning for all of us. The community in both sites have prioritised crops for cultivation and also explored market for realising better prices. In the current year, brinjal and cucumber have emerged as major crops in

the area – people from the community have been selected by the SHG collectives to play the role of agriculture entrepreneur. Trained by PRADAN and playing a pivotal role both in supplying agricultural inputs to the farmer's door step and linking the product to market (collective marketing process is attracting traders in the interior villages). At the end of this agriculture season, these experiences and outputs will need to be analysed for promoting an Agriculture Production Cluster.

d. Planning for a second crop for pulse and oilseeds (e.g, lentil, mustard, niger) has begun, utilizing existing moisture after main crops like early paddy, vegetable and pulses in monsoon.

e. Orientation of PRADAN staff and partners on NSA pathways and building perspectives around it. Two senior staff from PRADAN received an Australia Awards Fellowships program (DFAT) for the activity "Building women's economic empowerment using value chain and nutrition-sensitive agriculture pathways (India)" during April-May, 2018. During this period, they were assisted by CSIRO scientists to further develop the NSA plan.

   During May 2018 another two PRADAN staff joined the previous two Australian Fellowship awardees to work with CSIRO, Brisbane. These colleagues also received training on qualitative research methodologies. On 6th and 7th August 2018, we conducted a Nutrition Sensitive Agriculture Training Workshop facilitated by CSIRO scientists in Kolkata. This training was funded by the Australia Award conducted not only for PRADAN colleagues but also representatives from other CSOs and WBADMIP. The objectives were:

   - To enhance knowledge on the types, causes and consequences of malnutrition
   - To improve uunderstanding of various multidisciplinary approaches to reducing malnutrition
   - To consolidate understanding of the pathways linking agriculture and nutrition outcomes
   - To increase knowledge and confidence in the methods and tools used for evaluating these pathways

f. Perspective building of women SHGs on nutrition and the importance of diet diversity: While speaking with the women of this area it was understood that they mostly take carbohydrate-based diet (rice). So perspective building events were organized where the women were sensitized about the importance of balanced food on their plate.

g. Field level agriculture training to SHG members and their family members with handholding support: During their agricultural planning the women have shifted their crop preferences. For the very first time they have intensively planned for pulse cultivation. So these farmers required hand holding and demonstration at the field level

Insights Gained

Over time, PRADAN has been able to develop a sophisticated understanding of NSA pathways in Bankura. Figure 7 below shows multiple linkages of different factors which have been mapped for improving nutrition outcomes in Bankura. In developing the framework, PRADAN simultaneously worked with stakeholders so that they engaged with the community using an ECE approach and also with women collectives to facilitate

empowerment for taking charge of development in their area. Being concerned about local ecology, the collectives are now better able to manage the soil, water, labour, seeds/ plants, fertiliser, draft power/ livestock through nutrition sensitive agricultural prototypes, reducing drudgery through mechanization, adopting energy saving farming devices, and participating in inclusive value chain and integrated management of natural resources. This effort has assured agriculture production directly links with income, ensures availability and access to water, and helps to minimise the exploitation of natural resources. Awareness of diversified diets, nutrition education, role-sharing and increased investment helps to improve health, hygiene, sanitation, and household availability of nutritious food. Our framework also recognises the role of women's consciousness of their own intra- household food allocation along with the role of social mobilisation and collective action leading to a better life. Sustainable development outcome which further empowered the women collectives & its relation improves with stakeholders.

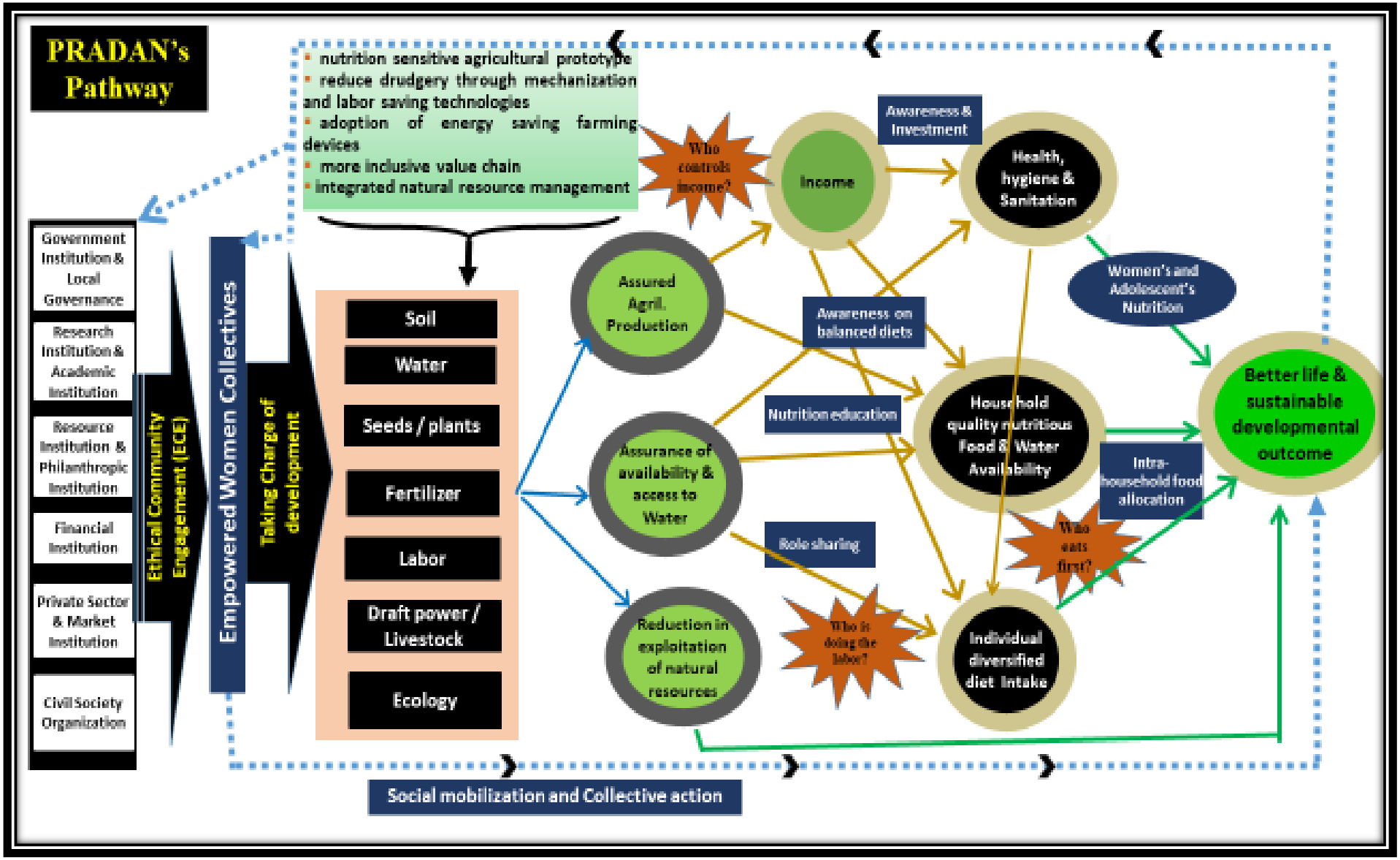


Figure 7 PRADAN's pathway for improving nutrition outcomes in Bankura – mapping multiple linkages among different sectors and actors.

Observed Changes

The Australian Awards Fellowship and the training on qualitative research methodologies with CSIRO in Brisbane has enabled us to spend quality time with CSIRO scientists to delve deeper and generate a suitable NSA action plan for our area. In Brisbane our learning outcomes included the following:

- The basics of nutrition and diets: types of nutrients and their roles, combinations of nutrients, links between nutrients, foods, food groups and dietary patterns.
- Causes and consequences of malnutrition: types of malnutrition, the UNICEF framework on determinants of malnutrition, timing of malnutrition – why focus on the first 1000 days of life and consequences of malnutrition – current state of evidence
- Solutions for reducing malnutrition: evidence for nutrition-specific interventions, evidence for nutrition-sensitive interventions, how the different determinants of malnutrition contribute
- Pathways linking agriculture and nutrition

This experience, along with SIAGI workshops and discussions has assisted us to understand the links between health, hygiene, nutrition, water and gender. We have been able to both validate and challenge our assumptions on the ground. The Brisbane training on qualitative research methodology has proved useful in the context of our work which is focussed on triggering transformation in the attitudes and sense of agency of poor women. We have also tried to inculcatee the spirit of ECE within government departments.

The changes we have observed in the Government since introducing an ECE approach are listed in Table 4.

Table 3. Observed changes in the Government since introducing an ECE approach

Before SIAGI	Now
Earlier women and the marginalized were not at all involved in the planning process.	A significant space for women and the marginalized has been created to spearhead watershed planning and implementation Government guidelines issued to include the women representatives from SHG Institution and Landless Job-card holders in the Project Monitoring Committee (PMC) of MGNREGS
Training was imparted mostly to men	Large numbers of training events were organized by the Government for the SHG members on Integrated Natural Resource Management
Elders were not at all involved	For the very first time the Watershed Development Planning process is ensuring inclusion of all (elders and children)

Implementation occurred through contractors. No faith on the community especially women that they can effectively implement Govt. program.	Immense trust on the WUAs --- now the funds are transferred directly to WUAs bank accounts for implementation.
Government officials seldom interacted with the women	Frequent visit by the Government officials helped in replacing the initial environment of fear & apprehension by lots of hope, dream & mutual confidence.
No confidence in the SHG institutions	Experienced members from the SHG institutions were invited to extend their support to other Gram Panchayats
There was no demonstration that community-NGOs- Govt. can collaborate to effectively implement developmental programmes	This collaboration has also become an exposure ground for the neighbouring districts

The changes we have observed in the community are summarized in Table 5.

Table 4. Observed changes in the community since introducing an ECE approach.

Before SIAGI	Now
Community is not organised well, conflicting interests within the community is high.	Able to resolve conflicting interests in light of shared perspective of developmental agenda.
The SHG based institution and their leaders mostly focussed on their members' welfare.	SHG-based institutions now consider the welfare of their community, extending locus of concern beyond individual SHG members. Groups want to ensure that the most vulnerable members do not remain excluded from participating in the SHGs as a result special drive was given during this period towards inclusion of women from poor and marginalized families in the SHG collectives and 296 new SHGs were formed with these families.
The rural community thinks they are only recipient of favours from government, so whatever service they get they should be obliged.	The adivasi women of this area used to call themselves as `Hor' and outsiders as `Diku'. They were not at all ready to interact with the outsiders. In the last few months they have shown very intense interaction between the community and other stakeholders like the Government and Panchayat. Now the women are more confident to negotiate with these stakeholders and openly share their concerns.

	The community realizes the value of collaboration with other stakeholders and is able to see their contribution and appreciate their accomplishments.
A perspective that the Gram Panchayat not responsive to our needs- It is politically driven	Gram Panchayat is "OUR INSTITUTION" irrespective of political leaning and we will work together for a suitable developmental agenda
Poor focus on rejuvenating nature	Enhanced vision to live in harmony with nature and increase its carrying capacity
Interaction with the market was done only by men	For the very first time during the value chain FGDs the women's group wanted to have a better understanding of the market so that the farmers get the adequate return for his/her hard work. They sought the support of men to build their confidence to deal with the market. Both men and women along with the PRADAN professionals have visited the markets to have a better understanding of its operation.
Nutrition, health and hygiene was not a priority	Discussions related to nutrition and health now happens in both formal and informal forums. Communities are now discussing maintaining hygiene in the cattle sheds by concretizing the floor. From Hakimsinan & Chakadoba almost 90 HHs have submitted application to government and out of that 45 cattle sheds have already sanctioned. Both the villages now have 23 households with tap water connections. The community has also approached the government for safe drinking water in the schools and the application has been actually materialised in the school of Chakadoba.
No concern for ill effects of pesticides on their bodies	During the FGDs with the villagers the community could better understand the importance of wearing gloves and masks during application of chemical inputs. An orientation program on this has been done and the community has also started practicing it.
Traditionally, the women mostly engaged in weeding and it is a very painful task to perform – it causes back pain due to constant bending and the sharp edges of paddy leaves create several wounds on the body.	Villagers are now using Cono weeder machines which is cost effective and also reduces women's drudgery for weeding the paddy field.
In the last few years pulse and oilseeds were rarely cultivated.	Villagers have started looking at pulse and oilseed cultivation as a nutrient supplier for the community.
The women generally worked to clean the cattle sheds every day and as the floor is not concrete, it became very difficult for the women	The representatives participated in the discussion decided to take this discussion to the community and motivate them to concrete the cattle sheds including

sometimes causing skin diseases on their hands and feet.	installation of a proper drainage system – if some of them can start, the trend will be set for the rest community.
As it has been felt that the women in the village are still in the back seat – because of mainly the social discriminatory norms.	A training program on the societal discrimination for the leaders of women collectives have been organised which has triggered thoughts & reflections among them. To change the situation, they have decided to have a one round of gender orientation of all households. Accordingly, the community has selected few trainers (men and women) from the community who will train men and women from all HHs of the village. Before that there will be TOT by PRADAN professionals and then they will do it in the village This year the women celebrated their women's day to make their presence felt in the society. They made rallies, designed different plays, participated and discussed about themselves and their institution. Thus it boosted up their confidence within.

The changes observed in us (PRADAN) are presented in table 6.

Table 5. The changes we have observed in our own organisation (PRADAN) since SIAGI began.

Before SIAGI	Now
Rigid and biased with project deliverables; activity as priority	People in focus; More open and sensitive towards community needs
When community raises some need, even if we do not have all-encompassing knowledge, it is possible to execute an activity even we do not understand it fully. Learning by doing is OK.	According to the community's need, even if we do not have the knowledge, we now bring the community along with us. We now put effort into cross learning/visits, to explore and do some reading (self), and develop an understanding of an activity to plan its execution.
Impatient to have quick results, lack of persistence.	Relatively more patient and persistent.
The belief that "I am the only actor responsible in bringing about change in society" and that "there are a limited number of caring sensitive people touched by the problems of others.	Now, "I believe there are many people who are inspired to bring about change in society."
Other stakeholders like PRI representatives/ local government officials are not responsive. Do not feel like engaging with them to influence.	We will engage with other stakeholders to make them open and supportive, aligned with a new vision. Good

	linkages established between them and community, influencing local governance.
We engage with other NGOs just to help them.	We engage with other NGOs to learn and contribute towards a joint journey with the spirit of collaboration. We are playing a pivotal role in organizing our Developmental Cluster Forum comprising of ten Civil society organizations.
No consent was sought before taking notes or recording discussions with community members.	During training we now take consent from community before taking notes or recording. We practise it in every training.
During training programs arrangement of soap for washing hands was non-existent.	We also keep hand soap during training programs.
Mothers with young children were generally discouraged to participate in trainings as it was seen as potentially causing disturbance.	Preplanning for child care facilities, if the participants have children with them.

Perspectives on Scaling NSA and ECE

ECE requires patience to be executed well, allowing time for the community to reflect and decide, and should be a process-focussed endeavour. Adopting ECE practices within NSA poses a greater challenge. Agricultural development interventions typically assume a base level of resources where farmers are able to take risk. In resource poor communities (eg poor tribal villages) income generation might not be the immediate pathway to improved nutrition. Women spend money on children's education and immediate health needs. Until households reach a base level of income, money will not be spent on nutritious food. So, income could still be the focus initially along with social supports to motivate and improve access to nutritious food. Women's empowerment is a key mediating factor for behavioural change. WASH will also be a key part of this pathway but we would need to link to other partners to achieve this. Without WASH the NSA intervention is likely to be less successful.

We have so far convinced the Government to take on board the principles of ECE. To date the SIAGI team have held two workshops with the WBADMIP team sharing learning and insights from community engagement. To encourage an organization like WBADMIP to appreciate and agree to organize this kind of workshop on Ethical Community Engagement and Scaling up strategies itself can be seen as an achievement.

While still early days, a focus on ethical research practice in NSA has created a space for partners to connect more deeply and empathetically to achieve shared goals. The process has helped to ensure that research activities engage more meaningfully with participating communities, while building on partners' strengths.

With the experience we have gained, we can put forth the following considerations for scaling ECE in the context of trialling NSA approaches:

- Given knowledge of best (field) practice in NSA is still emerging, developing capacity remains a key focus for field staff, trialling NSA approaches remains a challenging and slow process.

- Approaching the scaling task with a minimum 'do no harm' (to nutrition outcomes) philosophy remains a valid goal for scaling development initiatives.

- Effort is best spent integrating existing knowledge sets, having clear research objectives and seeking to collect only targeted and specifically relevant data which directly links to one or two key research questions. A structured and efficient research process reflects commitment to ECE practices.

- ECE can be a time- and resource-intensive endeavour where trade-offs and compromise can present often. A minimum basic set of standards may guide field staff in their decision-making and planning.

Our scaling up plan:

- Strengthening the SHG institutions
- Capacity building events for both for men and women
- Developing a perspective of WASH: focusing on safe drinking water, hygiene and stopping open defecation through construction of IHHLs along with water
- Developing community level change vectors to handhold and sensitize the villagers
- Training of PRADAN professionals and these change vectors on Behavioural Change Communication skills involving experts
- Banking on the huge commitment from Govt. for more water bodies to grow vegetables for enhancing the income and for domestic use
- Nutrition sensitive crop planning (Pulses + vegetables + oilseeds). Food grains are already grown and are available
- Collaboration with Govt. for infrastructure support
- Setting up a robust system for regular monitoring learning and evaluation in the SHG institutions
- Conducting guided exposure trips
- There will be workshop with other stakeholders like Gram Panchayat, Block, CSO, Govt. Organization, SHG institutions, media to disseminate the learning and policy advocacy

Broader Lessons Learnt (PRADAN's perspective)

PRADAN considers the process of cross-learning to have occurred on multiple levels. This section details the lessons captured by PRADAN as they relate to PRADAN's interaction and relationships with multiple research partners (including communities).

Lessons learnt from working with our NGO partner – CDHI:

- To enhance the ability of farmers to understand and deal with the market. This year we have a plan to start this with farmers (both men and women).
- We are quite impressed with the greenhouse idea designed to grow spinach during the rainy season, therefore capturing profits of off-season pricing. We will try a low cost model (may be low cost poly house) this year.

Lessons from working with our NGO partner – Shushilan:

- Adaptive learning: building processes of regularly meeting and eliciting reflection: We have planned to create an autonomous process where the community regularly reviews its work and makes a plan.
- Pro-active monitoring also is something our community could practice to enhance the quality of work.
- The creation of a constitution has ensured the inclusion of marginal farmers and women. We need to help the community to create their constitution so that priority is given to the poor and marginalized.

Lessons from working with communities:

In the process of intensive engagement with the community we asked our communities to share their perspectives on the 'dos and don'ts' of ECE (i.e. ECE *practices*). Their view points are including as part of the document entitled, *Principles and Practices of Ethical Community Engagement: Resources to Support Engaging for Impact.* This exercise has served both as guidance and as reassurance for engaging ethically.

Broader lessons learnt relating to research processes, resilience and PRADAN's current achievements are summarised in Table 7.

Table 6. Broader lessons for PRADAN overall.

Continue	Improve	Start	Stop
• Persistent engagement with WBADMIP & Usharmukti • Proper strategy to expedite implementation process • Learn from others including the community	• Data collection and analysis • Pulse productivity • Linkages with Agril. University and Agricultural department • Writing and presentation skills • Quantitative data analysis using statistical tools	• Orienting donors on the principles of ECE • Orienting youth • Orienting both men and women on gender equity • Regular review and planning by the community • Quarterly review in PRADAN • Work on orienting community on nutrition, health and hygiene • Work on stopping open defecation and availability of safe drinking water	• Making over ambitious plans • Giving up after just one year's failure • Insisting to do such things which the community is not comfortable with.

Pivotal Lessons (SIAGI's perspective)

Given PRADAN's institutional focus on empowering women by developing individual and group self-agency and self-efficacy, and given PRADAN's existing relationships with community members in the building of self-help groups (SHG), several fundamental principles of ECE were already in practice prior to the commencement of activities in these two villages. This has not meant that the task of ECE has been easy or without trade-offs.

The following lessons have been gleaned from SIAGI's experiences in applying ECE approaches through the lens of establishing an evidence-based NSA action plan:

- *Keeping true to internationally recognised NSA methods and tools has been challenging in an economically, culturally and environmentally constrained context*

  In the course of our attempt to identify a suitable approach to NSA, we have found that currently available international frameworks and tools are not clearly aligned to ECE principles. Current guidelines assume an existing resource base, functioning groups, and relatively high farmer risk-taking capacity. In addition, currently available data collection tools to determine the food and nutrition landscape and to evaluate change are onerous and burdensome for both farmers and practitioners.

  Significant environmental, economic and socio-cultural constraints have exacerbated the challenge. For example, water scarcity, low land holding, lack of safe drinking water and limited irrigation facilities combine to constrain agricultural intensification options. For farmers who are first generation cultivators and who are regularly experiencing drought and climate change and who are reliant on immediate returns, the difficult decision to pursue cash cropping or NSA is very real.

- *'Learning by doing' has been a necessary aspect of capacity building*

  The SIAGI team has invested heavily in building the capacity of team members to access a range of research techniques including the use of qualitative methodologies. This has enabled staff to conduct in-depth probing on issues of direct relevance to research questions and has revealed different information than what might have been obtained using quantitative methodologies. This process has required a more structured research approach but also one which demands more relationship-building and conversation prior to the collection of information. Improving our understanding of the interrelated issues of poverty, food and nutrition security, health and gender equality for informing a roadmap will further build our capacity.

- *Resisting the urge to know and do everything*

  Adhering to applying ECE principles while uncovering new knowledge has been a fine balance. It has reminded the SIAGI team that research undertaken should be focussed on providing community benefit rather than for satisfying intellectual curiosity. A frequent practice for researchers has been to elucidate as much information from one visit as possible in order to take advantage of time efficiency. This practice is often not a fair or respectful exchange and does little to empower or build trust.

- *Responding to unanticipated partnering (and scaling) opportunities*

  While a structured NSA action plan has been an essential foundation from which to start thinking about how to approach NSA, remaining open to unexpected partnering opportunities has meant that

the original plan is adapted to accommodate change. The timing of engagement with technical and research partners who are able, for example, to provide infrastructure capacity or share expert knowledge in pulse cultivation has been fortuitous. Keeping true to both NSA pathways and ECE principles in the course of partnership will require careful attention and planning.

- *Proactively creating collaborations, partnerships and opportunities*

  Given the magnitude and inherent complexities of the task ahead, this is not a vision that can be achieved alone. Working with partners to create different, more mutually valuable relationships will be a key ingredient for our success. Comprehensive mapping of stakeholders who operate in the broader social-ecological system continues to be a key task. Identifying and engaging partners who are able to provide support by sharing essential skills or experiences, knowledge and other resources can potentially assist in achieving long-term goals.

- *WUAs are enabling communities to manage money but at a cost*

  A major achievement so far has been enabling the community to manage money through water user associations (WUAs). Early lessons are now emerging. These groups require significant capacity building to function well while the process of registering community members has revealed high transaction costs. Monitoring these and other trade-offs will be an important exercise as ECE process are scaled.

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Report 7: Case Study 3 – Ethical Community Engagement for Community based Water Management and Agricultural Intensification in Bangladesh

Promoting Socially Inclusive and Sustainable Agricultural Intensification in West Bengal and Bangladesh (SIAGI)

CASE STUDY REPORT

Ethical Community Engagement for Community Based Water Management and Agricultural Intensification in Bangladesh

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Australian Government

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Contents

Acronyms

ACI : Advanced Chemical Industries Ltd

BARI : Bangladesh Agriculture Research Institute

BAU : Bangladesh Agriculture University

BBS : Bangladesh Bureau of Statistics

BDT : Bangladeshi Taka

BEM : Bio-Economic Modelling

BRRI : Bangladesh Rice Research Institute

CBO : Community Based Organization

CDHI : Centre for Development of Human Initiatives

CIMMYT: International Maize and Wheat Improvement Centre

CSI4CZ :Cropping system intensification in the salt-affected coastal zones of Bangladesh and West Bengal

DAE : Department of Agriculture Extension

DC : District Commissioner

EC : Executive Committee

ECE : Ethical Community Engagement

FGD : Focus Group Discussion

GC : General Committee

GOB : Government of Bangladesh

HH : Household

HVCs : High Value Crops

IIT : Indian Institute of Technology

KGF : Krishi Gobeshona Foundation

KII : Key Informant Interview

LGI : Local Government Institute

ML : Million Litters

NGO : Non-Government Organization

NOC : Non-objection Certificate

PRA : Participatory Rural Appraisal

SIAGI : Socially Inclusive Sustainable Agriculture Intensification

UAO : Upazila Agriculture Officer

UNO : Upazila Nirbahi Officer

UP : Union Parishad

VC : Value Chain

WSMC : Water and Silt Management Committee

WUG : Water Users Group

Executive Summary

This report presents the outcomes and lesson learnt from the last three and half years of SIAGI project activities in two study villages (Sekendarkhali and Khatail) in the southwest coastal region of Bangladesh. The study villages are highly vulnerable to the environment, natural calamities and threats from human activities such as salinity intrusion, silted canals and dysfunctional sluicegates. Besides these, the vulnerable farming communities are much more exposed to unintended consequences of agricultural intensification due to lack of social cohesion. The objectives and responsibilities of Shushilan in this study was to engage the landless, marginal, smallholders and women-managed households through an Ethical Community Engagement(ECE) approach and institutional approach (through the formation of community-based organisations) so that these socially disadvantaged groups have a stronger position to capture the benefits of agriculture intensification. Moreover, Shushilan assisted the SIAGI family (the collaborative SIAGI team) through collecting and sharing data, notes, narratives, blogs, case-study and reports of the study sites to meet the project objectives. This report documents the outcomes from objectives 1, 2 and 3 of the project: (1) to determine household typologies and characterise livelihoods based on access to resources, institutional arrangements, constraints and opportunities, and land tenure to meet the objectives of the SIAGI project; (2) to understand the visions, aspirations, livelihood potentials and choices of farmers; and (3) to determine the current reality of the social inclusivity.

This report presents the history and context of the study sites, household typologies and characteristics, the approach and process used for engaging the community and other stakeholders, and forming the Water and Silt Management Committee (WSMC) and Water Users Groups (WUGs). The report also discusses the significant changes in the community, their knowledge, attitudes and practices. Key changes observed include increased confidence and trust among the community and WSMC, increased technical know-how about Rabi crops and high value crops (HVCs), the community sharing costs for the canal re-excavation, farmers undertaking crop planning, increased crop intensification with a notable amount of vegetables growing and some farmers starting triple crops, the year round vegetables and fruits growing along the canal's dyke, equal access and collective decision making for crops choice and irrigation, increased market access, increased income and investment of income for their livelihood assets, conflict management by the WSMC, and voice given to the marginalised and women farmers. The report also details some of the observed changes in other stakeholders including government officials and research partners.

The report highlights the important lessons learnt from the project and considers how these practices can be scaled up and out. The lessons learnt include: (a) harnessing the power of community is key to improving and transforming their livelihoods; (b) the recognition of the farmers' skills, knowledge and expertise is critical for changing their fate; (c) relationship and trust building is essential for the community and multi-stakeholders to make bigger changes in the community; (d) ECE is important for creating community ownership of the project; (e) leadership and facilitation is importance for creating an enabling environment for community empowerment; and (f) sustainable change takes time and effort. The complex and diverse nature of issues in these community mean there is no single or simple solution to improving livelihoods, but an ECE process can empower the community to mobilise resources to meet their needs and aspirations. The project was faced with some challenges, including the conflict between freshwater and brackish water users, unplanned grazing, power and political influence in the WSMC, and attempts by a few to undermine the project activities and the WSMC by spreading false rumours in the community. The community has come together and started to step up and resolve some of these challenges on their own. Scaling out of ECE has already commenced with farmers from two neighbouring villages starting to trial new crops with the support of Shushilan and other stakeholders. Scaling up has also begun with several capacity building sessions conducted on ECE for other researchers, project staff and NGOs; ECE is now also part of the redesigned course on 'Practice in Community Engagement' at BAU. Other promising opportunities exist for taking the project learnings to other communities and to the policy level.

1 History and Context

The study villages Sekendarkhali (located in Amtali sub-district) and Khatail (Dacope sub-district) are agrarian communities, positioned in polder 43/1 and polder31, respectively, on the southwest coast of Bangladesh. Historically, before polder construction, people's lives and livelihoods in these communities struggled due to open lands with the main river system, which were regularly inundated by tidal surges and saline water. Fishing and day labour were the main livelihoods all year-round, where boats were the only transport and means of communication between the villages and mainland. The community used indigenous practices, building temporary earthen embankments in the dry season to protect the land from salinity and then removing them in the wet season to enable sedimentation for agriculture, particularly for the transplanted Amon rice. However, the yields were very low. In the 1960s, after the polderization programme, both communities' lifestyle and food security were positively changed when low-lying areas were transformed into permanent agricultural lands providing opportunities for multiple cropping intensity. However, since 1980s, leasing-based (locally called *Harry*) *Bagda* (shrimp) farming started in the community, using brackish water that slowly affected the soil fertility, biodiversity, crop lands and environment. Over time, this contributed to increased unemployment and food insecurity of the poor households. After devastating cyclone Sidr in 2007 and storm-surge Aila in 2009, both villages have shifted to permanent agriculture farming by stopping the leased-based *Bagda* farming, resulting in gradually improved soil fertility, crop yields, and environment.

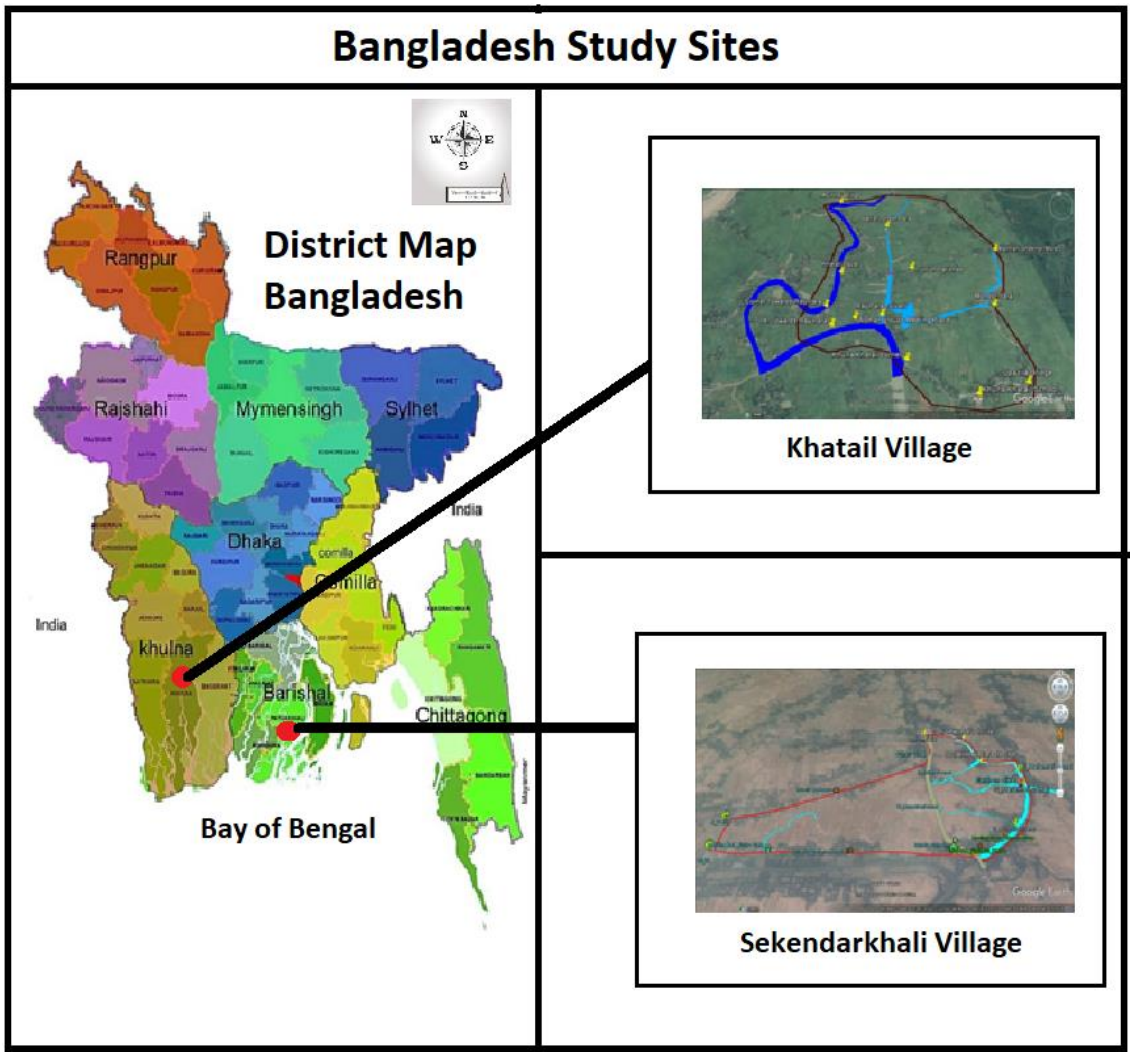

Figure 1: Map of Study Area

The widely used classification of rural households is based on farm holdings, often conducted by the Bangladesh Bureau of Statistics (BBS). Most of the village level typology studies were carried out in the 1980s, which may not be completely applicable now due to the significant changes that have taken place in the agriculture sector. Therefore, this report re-designs household (HH) typologies in combination with the BBS approach and field observations (Rahman and Das, 2016). There are two broad classifications of the households: i) farm category, and ii) non-farm category. The farm category is mostly similar to the BBS standard, while the non-farm category is classified based on field observation. The households are sub-divided into six categories as described in Table 1.

Table 1. Characteristics of households and their interest in engagement

HH typology	Brief Description	Level of interest to engage	Reasons for engagement	Present income level (annual)
Large	• >7.50 acres of agricultural land • Major income from agriculture but service and business as a secondary profession • Often lease out their land • 12 months food sufficiency	Very low	Opportunity and increase income	Avg: BDT 175,000 Min:BDT100,000 Max: BDT 350,000
Medium	• 2.50 – 7.49 acres of agricultural land • Major income from agriculture; for a few of them, non-farming activities such as service/business • Practice agriculture farming and give rent and lease of land • 12 months food sufficiency	Low	Water management and leasing land to the targeted HH (Livestock management-*Khatail*)	Avg: BDT122,000 Min: BDT 60,000 Max: BDT 400,000
Small	• 0.5 – 2.49 acres of agricultural land • Major income from farming • Practice agriculture farming on own land, and lease/share other land • Very few of them involve with non-farming activities (e.g. carpentry, stone masonry, petty trading, business, driving, services) • 6-8 months food sufficiency	High	Increase food security and nutrition of HH - Diversified crops in *Rabi*/*Aman* - Employment	Avg:BDT 88,000 Min: BDT24,000 Max: BDT 350,000
Landless	• No agricultural land • major income depends on farming (share of cropping, day labour) and non-farming activities(e.g. wage labour, driving, petty trading, services) • Practice agricultural farming by leasing/sharing land • 6-7 months food sufficiency	High	- Increase food security and nutrition of HH - Diversified crops /horticulture round the year Employment -Opportunity and	Avg:BDT62,000 Min: BDT 12,000 Max: BDT 200,000

HH typology	Brief Description	Level of interest to engage	Reasons for engagement	Present income level (annual)
Marginal	• 0.05– 0.49 acres of agricultural land • Practice agriculture farming or experience on agriculture by leasing/sharing other land • Major income depends on farming or non-farming activities (such as wage labour, driving, petty business, etc) • Wage labour during the lean period • 6-8 months food sufficiency	High	increase income	Avg:BDT63,000 Min: BDT 24,000 Max: BDT 200,000
Women managed HH	• Have specific land of the household (marginal/landless/small) or lease/share land • Women practice agriculture in absence male members (e.g. seasonal migration) • Most income from farming, and some from wage labour • 6-8 months food sufficiency	High		Avg: BDT62,500 Min: BDT 30,000 Max: BDT 200,000

2 Engagement Process

Based on SIAGI's ECE framework and trajectories presented in October 2016 at Kolkata meeting, the community engagement report prepared by Rajeshwar Mishra in 2016, literature reviewed from websites and experiences on PRA (Participatory Reflection and Action) tools in development sectors, we were encouraged to customize the ECE process and apply it at the project sites. The intention was to create the community's ownership of the outcomes achieved through SIAGI and obtain a deep understanding of the community's dynamics. In addition to the learning workshop in Jalpaiguri in May 2017, the field observations about knowledge, attitude and practice of the field partitioners and the community's findings further encouraged us to develop an ECE process framework to test in the Bangladesh field sites. More importantly, it was observed that although field practitioners literally or verbally iterated the ECE principles, they were not always clear about the ECE process itself and how the process works, from where it is started and how the process will continue. Considering this limitation, the Shushilan team conducted several discussion meetings in Dhaka, Khulna and Amtali of Barguna in 2017 to internalize the ECE process and its tools and develop a systematic way to test and continue it at the SIAGI project sites. As Figure 2 shows, the community is at the core of ECE, and the engagement processes (such as collaboration, information campaigns, discussion, consultation and capacity building) follow ethical standards (described in Section 2.1), including transparency and accountability.

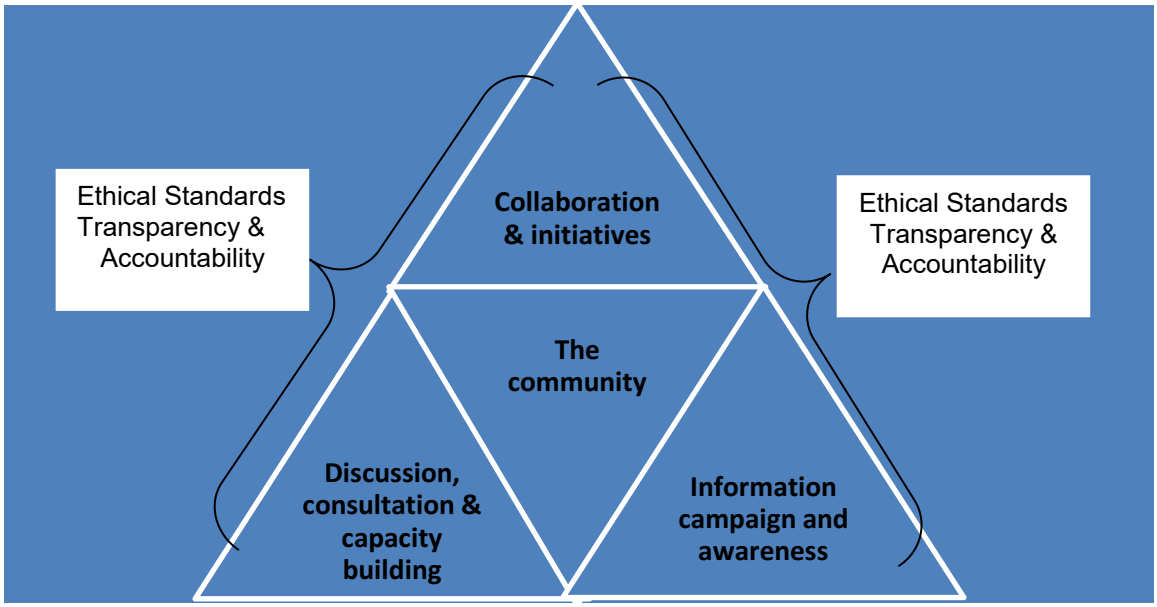

Figure 2 - Ethical Community Engagement Process framework for SIAGI fields in Bangladesh (prepared by Shushilan in 2017)

2.1 Ethical standard

As per the ECE report, in January 2017 the study team followed a set of principles and disciplines on ethics with concern for the community's values, aspiration, culture, and norms that played a pivotal role in engaging the community in an inclusive manner. The principles and moral obligations (***'the community first', 'do no harm', 'respect and love', 'transparency & accountability'***) were determined and adopted by the researchers as the code of conduct for deeply understanding human dynamics, assuming the reality and evolving initiatives of decision-making with the concern of the community values and aspiration. Ethical conduct was maintained during facilitation to create an enabling environment at the community level, to encourage participation, and to identify the problems and the solutions through inclusive planning, decision-making and collective action, thereby improving outcomes of the project.

In both study villages, conservative Muslim women were encouraged to participate in *Water User Groups (WUGs),* canal re-excavation, water management and crop cultivation beyond the homestead area. Vulnerable landless farmers and conservative women were encouraged to sit together at the same level with the land-lords and influential community leaders during meetings. Female facilitators who maintain religious customs helped the project team to deeply understand the problems and aspirations of the women farmers through formal and informal interaction.

Community Insights

"I am involved in the current opposition political party. Thus, sometimes, I feared to discuss freely and mixed with outsiders. Your (field researcher) regular interaction, empathy and movement in the village build my trust that you are not harmful to me. Thus, I come in whenever you call." A male group member of Khatail village (Meeting note 11.11.2017)

"I come in the meeting because I love the behaviour of 'Dada' and 'Apa' (participants called the field researchers as brother and sister). They are too polite to disagree to participate in the meeting. I come here to hear their voice and talking. Besides, they say good words that help us to dream to live." A woman participant of Sekandarkhali village (FGD note 07.12.2017)

It was also important to be transparent with the communities through information sharing, consultation, discussion, capacity building and collaboration of the stakeholders and initiatives. In fact, community members themselves helped build a platform where everyone is equally responsible for their actions and has equal rights and power to enjoy the benefits and justice. At Sekendarkhali village regarding collective in-kind and financial contribution to the canal re-excavation, dyke preparation and fish farming in the canal helped to reduce the conflicts and assisted to get support (administrative, technical and materials) from the government departments (*Upazila Nirbahi Office*, Department of Agriculture, Department of Fisheries), Local Government Institutes (*Union Parishad*) and Private Sector (*Lal Teer Seed Ltd.).*

2.2 Values and aspiration and understanding the community

Community aspiration is a statement that reflects the shared hopes that many individuals have for the future of their community. It is a future that is based on common values and narratives of the community. ECE recognises that every person (including marginalized, women, landless and ethnic minority) has equal potential and value to contribute to the project outcomes; no-one will be excluded from the development process and benefits. ECE as a facilitation approach involves the individuals and groups participating in a discussion, consultation and decision-making in a democratic way so that each person gets equal treatment to build their confidence, trust and capacity to achieve the desired outcomes. ECE started from an understanding of the community. The researchers used a spontaneous process to engage the community to understand them, their culture and norms, values, beliefs, behaviour, attitudes, household type, socio-economic status and livelihood status, as well as their problems and challenges. They used approaches transect walks, social mapping, focus group discussions (FGDs), key informant interviews (KIIs), informal discussion, working with the farmers and villagers, and regular communication (see images 1 and 2).Moreover, the researchers moved around at different times in the village, such as early in the morning, at noon, in the evening to better understand the people and their customs and rituals.

Image 1 Social mapping at *Sekendarkhali* village, left and FGD at Khatail village, right

Image 1 Transect walks at *Sekendarkhali* village

As per notes and field reports from the transect walk in December 2016, Shushilan crossed the entry barrier of ECE by conducting a meeting at the UP (Union Parishad/council) complex where they shared the study views, objectives and clear differences between research project and development project for implementation. In that meeting, Shushilan encouraged two key farmers and one youth to walk some distance along the village road and share their views. The easiest and the most important part of the transect walk was the walk itself and the discussions that arose during it, with the local people as experts, although documenting it afterward was comparatively difficult. The walk helped to clearly decide specific observation points along the transect walk at which everyone stopped to record all parameters. During the walk, whenever researchers found a man or woman on the roadside or nearby homestead, they tried to greet them by saying "*Salam*" for Muslim and *"Namaskar*" for Hindu community. Moreover, saying "how are you" then asking questions and keeping quiet during the response was important. The researchers paid attention to respondents' answers and showed respect for their culture and beliefs. Whenever ten or twelve people were encouraged to gather during a transect walk, a suitable place was identified to talk with them for 30 minutes. Generally, it was very near to the village road and under a tree or at a homestead. Preferably the groups sat in U-shape on green grass or on a mat collected from a neighbouring farmer's house.

2.3 Information campaign and awareness

Through organizing formal interactions (large gathering, group meeting, consultation meeting) and informal meetings (counselling, coaching and troubleshooting) with individuals and family members there was awareness raising and information sharing on specific messages(i.e. objectives of the project, why researchers were present, activities of the project, benefits of the project, who would be involved, roles and responsibilities) and issues (about project, identified problems and challenges, and potential solutions/ activities). The ECE process ensured the stakeholders (the community and government departments, representatives) were involved throughout the project life cycle in inclusive and flexible ways, building trust. This was done through large gatherings at the community level, door to door visits and formal and informal interactions with government stakeholders that kept them informed of whatever was being done in interest of the community.

Information was shared with the targeted group members about promising practices, crops, seeds and technologies that were successfully demonstrated by *CSI4CZ, DAE,* and the private sector. Sometimes, SIAGI partners and stakeholders shared the learning and experiences of the exchange visits in a neighbouring village to understand the production technologies of new vegetables and fruits (such as watermelon). In exchange visits, discussion meetings were organised, views were exchanged among the participants and pictures and videos using the laptop at the field level were presented. ECE also encouraged government officials to support the targeted community (farmers) whenever necessary.

2.4 Discussion, consultation and capacity building

It is important to find an appropriate balance between the formal and informal engagement of the community. The formal process is necessary, but ECE also valued informal vehicles of engagement, such as talking to people at community events, local markets, their working place and elsewhere around the community. These informal interactions encouraged a greater flow of information and helped build rapport with the community people, which is central to establishing a relationship of trust. If an individual shared something that was important but potentially harmful or risky to him if disclosed to others, we kept the information confidential in line with the 'do no harm' principle.

Community Insights

"*We never go outside of our house without covering our face and wearing veil*" (In Bangla: *Amra Khokono Burka Chara Mukh Na Dhekhe Bahir Hoi Na*). A woman of Shekhpara of Khatail village, FGD Note, 21.12.2016 (Purushke Mukh Dekhano Bepordha) A woman of Sekandarkhali village, FGD Note 11.12. 2016

"*We have to go about one kilometer to collect drinking water during dry season*". One woman of Khatail village, FGD note 21.12.2016

"*Our agriculture lands remain fallow in Rabi season due to lack of freshwater, knowledge about modern crops cultivation and supports*" (In Bangla: *Dhuloter Somoy Amader Krishi Jomite Kono Fosho lHoyna, karontokon Jomite Nona Pani Thakhe, Adhunik Krishi Sampor khe Amader Gayan Kom Abong Sohojogitar Obhabab Ache*). Sekandarkhali village, FGD note 12.12.2016

The ECE process encouraged the community to talk and discuss their problems, probable solutions and strategies in both homogenous and heterogeneous group meetings with WUGs. In-depth discussion and consultation were conducted with the community on specific issues (what are their aspirations; what are the problems around water management, *Rabi* cropping, sluice gates, and water bodies; why are these problems; what should they do, why and how) in a friendly environment. ECE also created an enabling environment of discussion through facilitation where researchers worked as a catalyst to understand the interests of the participants and their reasons for coming to the groups so that these participants can realize the project objectives, their rights, and have their time in meetings valued. Patience (talk less and listen more) is important for conducting and facilitating the discussions and consultation sessions. New plans and strategies came through discussions, and stakeholders were able to raise questions for clarification. Most importantly, these discussions with the key informants followed a structured but flexible format, which helped clarify issues, allowing better execution of community-based plans. Table 2 shows the Khatail community's plan to meet the crops challenges with their roles and responsibilities. The image 3 shows the large meeting with the community at Pankhali Union Parishad.

Image 2 Large gathering with the farmers, local leaders and government officials at *Khatail village* of *Pankhali Union Parishad*

Table 2. Khatail community plan to solve issues

Identified problems	Potential Solutions	Who will implement it	In which time	Required support
1. Salinity problem hindering crop production during *Rabi* season	-Stopping brackish water by building a temporary dyke -Taking initiatives to grow *Rabi* crops	-farmers and villagers, UP, Agriculture department, Upazila Administration, NGO, and Research Institute	November-December	Agriculture department, Upazila Administration NGO and Research Institute
2. Stopping open livestock rearing during *Rabi* season	-Create awareness about scientific rearing of livestock -Taking initiative by UP and local administration -Guarding system by UP and community	-villagers, farmers, groups and UP	During *Rabi* season (November to April)	Local administration, agriculture department, NGO
3. All farmers do not get equal access to water The canal being unused through siltation Earthen dyke may be cut by some people	-Formation of water & silt management committee -Building scientific drainage system and management of it -Guarding so that no one dares to cut earthen dyke	-villagers, farmers, groups and UP	Running *Rabi* season (November to April)	Local administration, agriculture department, and NGO, Research Institute

2.4 Collaboration and initiatives

Through formal and informal interactions, the field researchers assisted the community in understanding the situation, problems, their aspirations and beliefs, and then in planning and drawing strategy paths to find solutions. ECE created an enabling environment to collectively create community solutions and adapt them as required. This was evident in:

i) canal re-excavation activities of Sekendarkhali *village*,
ii) community movement in *Khatail village* for freshwater storage and stopping unplanned livestock rearing,
iii) developing effective linkages with government agriculture department, local government institutes and private sector (*Lal Teer Seed Ltd, ACI, Agromart Group*) and
iv) engagement with research institutes (*BARI, BRRI*) and their students for successful *Rabi*, *Amon* and *Aus* cropping in climate and environmentally challenged areas.

The researchers also informed, listened carefully with patience, consulted with the community about their concerns, and provided feedback and comment on their ideas, planning, and initiatives to keep them on the right track to achieve the objectives.

3 Formation of Groups

3.1 Description of WUGs/WSMC

The formation of the Water and Silt Management Committee (WSMC) was catalysed by Shushilan under the SIAGI project for the purposes of water resource management, just distribution of water for irrigation and bringing positive changes in terms of social cohesion, autonomy and resilience building. The community inclusively formed two WSMCs in Sekendarkhali village (in the first year) and Khatail village (in the second year) to establish a new framing of water users to work collectively and collaboratively at the grassroots level, ensuring social inclusion of women and marginal households with the aim of minimising elite capture of the previous committees. Shushilan facilitated the empowerment process of the committee through ongoing capacity building in ECE so that they could actively engage in WSMC's activities and democratically make a collective decision on water management, irrigation, and agriculture productivity. Roles and responsibilities of the committee include as follows:

- Abide by the roles of the constitution
- encourages the community to engage in the WSMC
- take initiatives on the management of the water and water resources, improvement of the agriculture, livelihood and environment
- make functional of the committee by developing their capacity through participating in the training, coaching, orientation, troubleshooting and learning by doing organized by the government department and NGOs
- advocate and raise the voice on behalf of women, marginal and tenant farmers on all water management issues and ensure irregularities are dealt with in a just and equitable manner
- take initiative for collective investment for betterment of their livelihood and agriculture
- monitor and supervise the canal water, water quality, distribution of irrigation
- work on administrative and financial issues of the committee
- be transparent and accountable to the community for their activities

3.2 Formation process

Engagement of the community is a continuous process in order to sustain the SIAGI's outcomes. Shushilan followed the ECE process to form the WSMC. Formation of the WSMC started at the beginning of the project during the context study and information campaign in Sekendarkhali village and Khatail village to increase the communities' understanding of SIAGI's objectives and activities. Local communities under the catchment area within village boundary were empowered through the ECE process to form the WSMC to represent the local communities as the driving force of water resource management. The aim was for all community members to have decision-making power at all stages of water resources management in their catchment area and to be able to engage with local government officials, local administration and local government institutes.

In July 2016, Shushilan collected a Mouza map [1](see image 4) and conducted an information campaign (through transect walk, FGDs, social mapping, formal and informal interactions) to contact the communities, explaining the SIAGI objectives and activities, identifying potential water bodies (canals), sluice gates, catchment area of the community (village) and the problems that they are facing regarding irrigation, water-bodies, and agriculture intensification. Shushilan conducted a census in the villages followed by an information campaign to list the households and identify household typologies. Moreover,

[1]*A Mouza map comprises the boundaries of all land parcels and contains methodically arranged information including the ownership, land use and area details. Currently, the maps are available mainly on hard copy without-dated information.*

they reviewed the documents of Bangladesh Water Development Board (BWDB) particularly The National Water Policy 1999, Participatory Water Management Guideline 2001 and Participatory Water Management Rules 2014, and existing documents and guidelines of Shushilan on Community Based Organization (CBOs) to prepare a draft constitution for the WSMC. They consulted the communities and potential stakeholders (local representatives of CSI4CZ project, Union Parishad chairman, UP members, government officials, and NGO's representatives) and then developed a draft WSMC constitution outlining the process of community participation and representation. They also conducted awareness activities about the roles and responsibilities of the WSMC, its formationand composition, gender, and selection of leaders. The consensus was built by organizing a large gathering so that ECE could create demand among the community and the majority of the community could join the WSMC formation process. Followed by a large gathering, Shushilan invited the community to form a General Committee (GC) of WSMC by becoming a member. If any household missed the large gathering, the community members enthusiastically visited missing households, shared the meeting learning and finalized the members of the WSMC. Finally, GC members organized another large gathering with the involvement of local government officials and Local Government Institute (LGI) representatives to form the Executive Committee (EC) followed by a democratic process of election.

Image 4 Mouza map study at Sekendarkhali village, left and Meeting with the community and representatives of LGIs, right

3.3 Engagement of the community

WSMC is an inclusive committee that represents all classes of people in the community. Shushilan advocated and intervened to engage landless, marginal or tenant and woman farmers in the EC (Executive Committee).As per the WSMC constitution, Shushilan advocated for 30% women's representation in the EC committee including senior positions. A temporary committee (chaired by one member secretary and another four members) was formed to conduct the election/voting process for the EC committee (WSMC constitution, 2017). Membership of the GC is inclusive and open to all villagers– including men and women belonging to the families of farmers and non-farmers, and any other members of the community within the watershed of the village area who are influenced directly or indirectly by the canal's water.

To become GC members, they must be the household head or any member of the household above 18 years old and reside in the influenced area of catchment area (Sekendarkhali village and Khatail village), and agree with the terms and conditions of the WSMC, pay BDT. 10/- as admission fee, sign the member's register, agree to pay savings as per rate and agree to deposit savings regularly. Persons under the age of 18 years can obtain membership if their legal guardian agrees and takes full responsibility for them.

WSMC has two tiers of governance. One is the General Committee and the other is the Executive Committee.

General Committee (GC): The general committee is the highest decision-making tier of the WSMC and the guardian of the constitution. The general committee must comprise of one adult member from the households of the community/village who is interested in being involved. The members of this committee will be known as the "General Members" of the WSMC. Activities of the GC include: selection of members of the Executive Committee; approval of yearly budget and report; participation in water resource management for the betterment of the agriculture, lives and livelihoods; demand based participation of the community with in-kind, cash and physical contribution to the operation and maintenance activities of the canals and water resources; and the holding of at least one meeting per year that fulfils the quorum requirement (i.e. presence of 1/3 members of the GC). Most importantly, the GC is the authority for any rectification, change, development and refinement of the constitution through consensus of the majority of the General Members (minimum 60%). The GC in Sekendarkhali has 81 members whereas the GC in Khatail village has 245 members.

Executive Committee: The members of the EC have been elected by direct election in a general meeting. In both villages, the EC has 11 members, who include:

- President-1 man/woman
- Vice President -2 men/women (1 must be a woman)
- General Secretary- 1 man/woman
- Joint Secretary- 2 men/women (1 must be a woman)
- Treasurer- 1 man/woman
- Assistant Treasurer 1 man/woman
- Executive Members- 3 men/women (1 must be a woman)

A minimum of 60% of the Executive Committee members must be landless, marginal farmers and women managed households and 30% of the committee's members must be women. Within 7 days from the date of the announcement of the election results, the EC held its first meeting. The EC has been elected for a two-year period commencing from the date of the first meeting after its constitution, and it will stand dissolved upon the expiry of its term. The EC has effective control of the WSMC. It is the competent authority to operate and manage the water resources. It identified the issues; located the canal site; designed, planned and monitored the activities of the canal excavation; and is responsible for operation and maintenance of the canal. It also ensures proper utilization and distribution of water while managing conflict of interests of different groups. Under this constitution, the president of the EC is the 'formal head' of the committee whereas the general secretary mobilizes the committee through consultation and advice of the president. Members of the EC meet quarterly, and on a needs basis.

4 Interventions

4.1 Collective action and partnership for canal re-excavation

ECE encourages the community to identify their problems and challenges. Based on this, the community itself develops probable solutions and an action plan. The problems identified by the community includelack of freshwater reservoir, lack of unity and misconception among villagers, and uncertainty of crop farming during *Rabi*and *Kharif-1* season. Through ECE, the community discusses how the problems impact their lives and livelihoods. To meet the challenges, the Sekendarkhali community, with the support of researchers, also formed the WSMC, prepared its constitution, built trust and harmony among each other and finally took collective decision and action to re-excavate the '*Hafamari Canal*'.

The WSMC received support from LGIs, government officials and the wider village community for re-excavation activities of the canal through advocacy and negotiation. They also created a fund of USD 8,750 for re-excavation activities and obtained a Non-Objection Certificate (NOC) from the local administration to collectively utilize the natural resources (canal's water and fishes). The community, the ACIAR sister projects (SIAGI and CSI4CZ) and the LGIs contributed 48%, 44% and 8% of the funds for re-excavation, respectively. The partnership and signed agreement between the *Union Parishad* (lowest level LGI of Bangladesh), Shushilan and the WSMC, allowed the WSMC on behalf of the community to undertake the re-excavation activities on May 2018. The length of the canal is 1227m, 9.15 m width and 1.37 m depth, storing 15 ML of freshwater. As per the productivity of Boro Rice Production in Bangladesh (Hossain, 2013), this freshwater can effectively serve about 800-900 hectares of agriculture lands under *Rabi* crops cultivation[2].

Views of stakeholders

"All canals are silted, re-excavation of the canal is necessary. People are also not aware of diversified crops. They do not take the initiative to improve their life. People have become lazy by getting free help/assistance from NGOs/Government and donor. We need to stop." Meeting note with UNO-Dacopa Upazila 15.11.2016

"If farmers feel interested in Rabi crops by storing freshwater in the canal, we will support them technically and some seeds distribution. I will also attend the farmers' meeting. My junior colleagues (sub-assistant officers) will also attend in the farmers' meeting, workshop whenever you call. I am giving advice to them."Upazila Agriculture Officer, Dacope Upazila, 14.11.2016

Shushilan technically supported the WSMC through the ECE process from beginning to completion of the canal re-excavation including planning, decision-making, canal's demarcation, earth measurement, earth calculation, budgeting, implementation and negotiation with LGIs and local government officials. Applying the ECE process with the WSMC and the community has resulted in increased ownership, bargaining power and transformative leadership among the WSMC members. Moreover, WSMC successfully negotiated with LGIs particularly *Union Parishad* Chairman to construct two culverts along with 'Hafamari canal' in order to sustain the freshwater channel (see image 5 and 6).

[2]For more information please see the SIAGI blog on Community's Power in Water Management, https://siagi.org/2018/03/15/communitys-power-in-water-management/


Image 5 Hafamari canal after re-excavation in July 2018, left and newly constructed culvert to channel freshwater in 2019, right


Image 6 Hafamari canal after re-excavation in July 2018, left and newly constructed culvert to channel freshwater in 2019, right

4.2 Access to farmers in canal's freshwater irrigation in *Rabi* and *Aus* season

Since the canal re-excavation, plenty of freshwater in the canal has encouraged the farmers of Sekendarkhali village to participate in growing diversified irrigated crops (see image 8) in *Rabi* season. The canals and their water are public property and everyone has the right to access the water; however the WSMC manages the '*Hafamari canal'* and its water so that all farmers get equal access to irrigation. Although many farmers in Sekendarkhali village were interested in *Boro* rice farming, the joint decision on crop planning by the WSMC limited *Boro* rice farming and assisted the marginal and tenant farmers to obtain equal access to diversified *Rabi* crops (sunflower, groundnut, chilli, okra, potato, eggplant and leafy vegetables).

On the other hand, in Khatail, the WSMC mobilized and coordinated the neighbouring community (villagers), political leaders, LGIs and local administration to effectively close the sluice gates in *Rabi* season so that all community members can get access freshwater to grow *Rabi* crops. The WSMC also successfully advocated the local administration and achieved non-objection to store freshwater in the last *Rabi* season. They prepared five dykes on their own initiative to store freshwater in the canal. They also effectively managed and resolved the conflict over livestock entering the planted fields with the help of government officials and LGIs. The WSMC of Khatail village collectively made the decision to grow *Boro* rice on 100 acres of lands in a specific area of the village in order to minimize management costs, and effectively manage pests, rats and livestock. Its members said that *Boro* rice cultivation in a large area with the support from CSI4CZ, DAE and the private companies (BRAC, Lal Teer, ACI, Agro, Syngenta etc) will encourage other farmers to use their fallow lands to grow crops in *Rabi* season.

Image 3 Crops farming at canal dyke and Aus rice at the field in *Sekendarkhali* village in 2018, left and Sunflower farming using canal water in Sekendarkhali village in 2018, right.

4.3 Collective fish farming at canal water by the WSMC

After the re-excavation of the canal, the WSMC in Sekendarkhali village mobilized the community and collected 100 BDT from each GC member household for collective fish farming. The WSMC had been oriented on fish farming by the Department of Fisheries to understand fish fingerlings, and fish feeding, management, and treatment. The WSMC collectively cultured 1000 fingerlings (species Rui, Silvercup, grass cup and tilapia) in the canal. Moreover, some members monitored the canal's fish on rotation basis, both day and night. The cost of investment in fish culture was BDT 30,000. The WSMC expects they can sell the fish for about BDT 100,000.

4.4 Participatory crop planning for *Rabi* season

With the technical support of the researchers, both communities have developed diversified crop plans (vegetables and rice), that have been implemented by using canal water. Crops in the homestead area were mostly irrigated with water from ponds, some supplemented by canal water. Crop planning is used as a decision-making tool and is developed by the individual farmer to guide and keep them on track. Generally, in Bangladesh, farmers do not use any written documents with input and output calculations to monitor their field progress and performances.

In January 2017, farmers were encouraged to undertake crop planning, to ensure maximum returns from every crop and every field (see Table 3). 35 farmers (20 in Khatail and 15 in Sekendarkhali) engaged in crop planning for the first time. They kept track in the field as per their plan and identified the individual field limitations and challenges. In the cropping plan, farmers selected varieties of crops for specific fields as per specific aspirations and yield goals. They also designed their input needs (fertilizers, pesticide, tillage, labours, irrigation, cost etc), and outputs goals (expected production, yields, expected to sell price). They identified challenges to pre-empt and overcome.

By 2019, the number of farmers using crop planning had remarkably increased (75 farmers in Khatail and 30 farmers in Sekendarkhali). Based on crop planning, farmers also received support from CSI4CZ, DAE, SIAGI and private companies to increase crop intensification and yields. In Khatail, most of the farmers selected *Boro* rice as a first choice in the field and other *Rabi* vegetables like okra, potato, leafy vegetables, bottle gourd, sweet pumpkin, and tomato in the homestead area (see Image 7). Farmers in Sekendarkhali village selected ground nut, mug dal, sunflower, chilli, okra and *Boro* rice. After the development of primary crop planning by the farmers, further discussion and consultation was conducted with researchers about any changes in their plan.

Table 3. The format used in crop planning using a participatory process

Farmers name	Amount of land	Selected crops	Inputs					Outputs	Anticipated challenges	Required help
			Fertilizer	Pesticides	Tillage	Irrigation	labour	Expected production (per bigha)		
xxx	xxx	xxx	xx	xx	xx	xx	xx	xx	-----	DAE, SIAGI, CSI4CZ, private companies
Timing (tillage to market)			xx	xx	xx	xx	xx	xx	-	-
Costing			xx	xx	xx	xx	xx	-	-	-


Image 7 Crops planning by women farmers in Khatail, left and Based on crop planning woman farmers produced vegetables at homestead area in Khatail, right

4.5 Crop Choice Model or Bio-economic model

The bio-economic crop choice model was developed in collaboration with IIT, CDHI, Shushilan and BAU. The Shushilan team gathered the bio-economic modelling data such as costs, yield, prices, area under cultivation, labour and machine requirement, fertilizer and pesticide requirement etc. and gender-wise preferences of crops from different angles such as risk, labour requirement, profit, cash flow, market access, price fluctuation etc. These data were collected by using PRA tools (such as focus group discussions) from both men and women groups of the study villages. Secondary data was also used to support different scenarios of the farmers and their reality. Researchers encouraged the farmers of both villages to apply their learning and gain further knowledge by participating in a crop choice modelling exercise, which underpins the bio-economic model. At the beginning, the bio-economic model seemed a bit complex, but later on it was observed to be an effective discussion tool. Activities of bio-economic modelling include as follows:

- Primary and secondary data collection and input the data into an excel sheet
- Received orientation of the bio-economic modeling analysis
- Installation of the software
- Validation of the software through running
- Application of the model in front of a group of farmers (male and female)
- Demonstration of the bio-economic modeling at the study sites

- ❖ Feedback and communities reflections

Community Insights

Our thinking and the computer's result are almost same. The computer's result has given us more confident to choose the suitable Rabi crops. It may also help us to understand which crops are more risky and which crops are more profitable for us.

Field note, Sekendarkhali village, January 2019

4.6 Dyke cultivation

In 2017, the farmers were trained in high-value crops cultivation through ECE and engaging with BARI (Bangladesh Agricultural Research Institute), DAE (Department of Agriculture Extension) and the private companies. After the canal re-excavation in Sekendarkhali village in 2018, there was renewed interest in growing dyke crops. Thus in 2018, the WSMC was counselled on how to use the dyke for growing fruits and vegetables.

As per the plan, during *Aman* season (*Kharif-2*), farmers used the canal's dyke for different types of crops including Malabar spinach, yard-long beans, beans, local beans, water spinach, cucumber, bitter gourd,

Image 8 fruits and vegetable cultivation by the side of the canal dyke

eggplants, okra and bottle gourd. Farmers also used the canal's dyke to grow tomato, coriander, red amaranth, spinach, beans, radish etc. Some of the farmers successfully grew banana and papaya for the consumption of home and selling in the market (see image 8).

A total of 34 farmers in *Aman* season and 24 farmers in *Rabi* season (marginal, landless and small farmers) engaged in dyke cropping in Sekendarkhali in 2018. They earned on an average BTK 7,941 (AU$132) after their consumption. Eight farmers (5 men and 3 women) earned regularly (daily BTK 200-300(AU$3-5)) from dyke cropping along the canals by selling vegetables in the local market. This regular earning meant that some farmers no longer had to leave the village to work as wage labourers. Some of them also hired additional labour to take care of their vegetable garden[3].

4.7 Collaboration and partnership for supporting farmer capacity building

Shushilan successfully collaborated with CSI4CZ (a sister ACIAR project), CIMMYT (International Maize and Wheat Improvement Center) and private companies in Sekendarkhali village to support inputs (training and seeds) to the marginal and landless farmers of SIAGI. The Sekendarkhali WSMC organized an orientation on

[3]For more information please see the case study "*Rabi* cropping gives the farmers' choice to stay in the village" (https://siagi.org/2019/01/28/*Rabi*-cropping-gives-the-farmers-choice-to-stay-in-the-village/).

high-value crops on 14thJanuary 2019 where 27 farmers from SIAGI-formed groups (including men and poor women farmers) participated. Local technical persons from CSI4CZ, CIMMYT, a private company (Lal Teer Seeds Ltd), DAE and an agriculture officer from Shushilan provided information relating to *Rabi* crops, quality seed, field preparation, pesticide and water management and nutrition value of high-value crops. Following the orientation, CIMMYT, CSI4CZ and Lal Teer distributed quality seeds to poor farmers (see image 10). Seeds included okra, peanut, chilli, mung dal and black gram. Note that following the multiple training sessions for farmers, Lal Teerprovided100-gram vegetable seeds among 75 farmers in2018*Kharif-2* season and provided peanuts to 60 farmers and okra to25 women farmers in *Rabi* season in 2019 (see image 9). DAE also gave 85 Kgs of Mungbean seeds to 55 farmers.

With the coordination of Shushilan, the CSI4CZ project also helped the SIAGI farmers with their new technologies and instrument support. Ten male farmers and five female farmers received training and demonstration support in Sekendarkhali village in 2018. "NUMAN" project (another ACIAR sister project) provided rice seeds to 23 farmers at Sekendarkhali in 2018 in *Kharif-2* season and provided pulse seeds to 15 farmers in *Rabi* season in 2019. Presently NUMAN is working on *Aus* Rice. In addition, last *Rabi* season CIMMYT worked with the farmers and BRRI provided inputs and training for five farmers for sunflower, maize and *Boro* rice. The field technical persons from CSI4CZ, CIMMYT and Lal Teer also assisted and monitored the farmers during field preparation, sowing seeds and management of the lands, while Shushilan coordinated the process.

Image 4 Farmers orientation and seed distribution by Lal Teer Seed Ltd and MRT Agro private Company in February 2019, left and Okra and watermelon field in Khatail, right

Like Sekendarkhali, farmers of Khatail village also received some support from DAE, BARI and the Agromart Group. In 2018, forty farmers (general members of WUGs/WSMC) in Khatail village grew *Boro* rice on about 100 acres of lands after receiving support in the form of seeds, fertilizer inputs, and training. The average production of the *Boro* rice was per hectare was 3.69 ton. Lal Teer and Agromart Group supported 30 farmers with sunflower and vegetable farming but farmers' fields were damaged by livestock and salinity.

4.8 Access for women in irrigated agriculture and leasing lands

Water availability in the canal increased access for women to growing irrigated crops (chilli, tomato, groundnut, okra and potato) in both Sekendarkhali and Khatail villages. Generally in Bangladesh, land is owned by men, and women get limited access to lease land. However, freshwater availability and women's involvement in the institutionalization process of the WSMC has helped women to lease land for irrigated field crops in their own name. In 2018, three women farmers in Sekendarkhali leased around 10 decimals of land for cultivating *Rabi*crops (chilli, groundnut and sweet potato) using irrigated water from Hafamari canal. Women in the village also used irrigated water togrow a variety of vegetables in their homestead (see image 11) for both consumption and selling at the local market. Similarly in Khatail, six women with the support of their family members have benefited by growing irrigated crops using canal water. Women in Sekendarkhali village also

Image 9 Vegetables at homestead area of *Sekendarkhali* village planted by woman farmers in 2019

4.9 Comparative returns from dry season crops

In both villages, the ECE approach and process helped to motivate farmers and build their skillsfor agriculture intensification and livelihood improvement. Considering the crop planning, access to freshwater irrigation and capacity building activities, the selected farmers cultivated about 19 types of *Rabi* crops in 2019. The following graph shows per hectare average earning (profit return) on the popular *Rabi* crops among the farmers in Sekendarkhali village in 2019.

Albeit the average yield of the *Rabi* crops in Sekendarkhali village in 2019 was low compared to the national average of Bangladesh due to climatic shocks (early rainfall during harvesting time), the farmers were quite happy by seeing their new crops for the first time. The farmers also said that they consumed about 30-40% of their crops' production. The highest consumption was Boro rice, chilli, sweet potato, peanut and pigeon pea respectively. As per the following graph (Fig. 2), peanut (Basonti and BARI-78), sweet potato (local white), mung bean (BARI-6/local variety) and sunflower (high sun 32/33) were the most profitable crops grown. The farmers achieved the lowest return from Boro rice. Input costs include tillage, seed, fertilizer, pesticide, irrigation and labour etc. The profit return of the peanut production was almost twenty times more than Boro rice, about eight times more than pigeon pea (BARI-1 and local variety) and about four times more than chilli. Farmers iterated that they preferred to grow peanut and sweet potato because input cost and risks of these two crops are comparatively low than other crops.

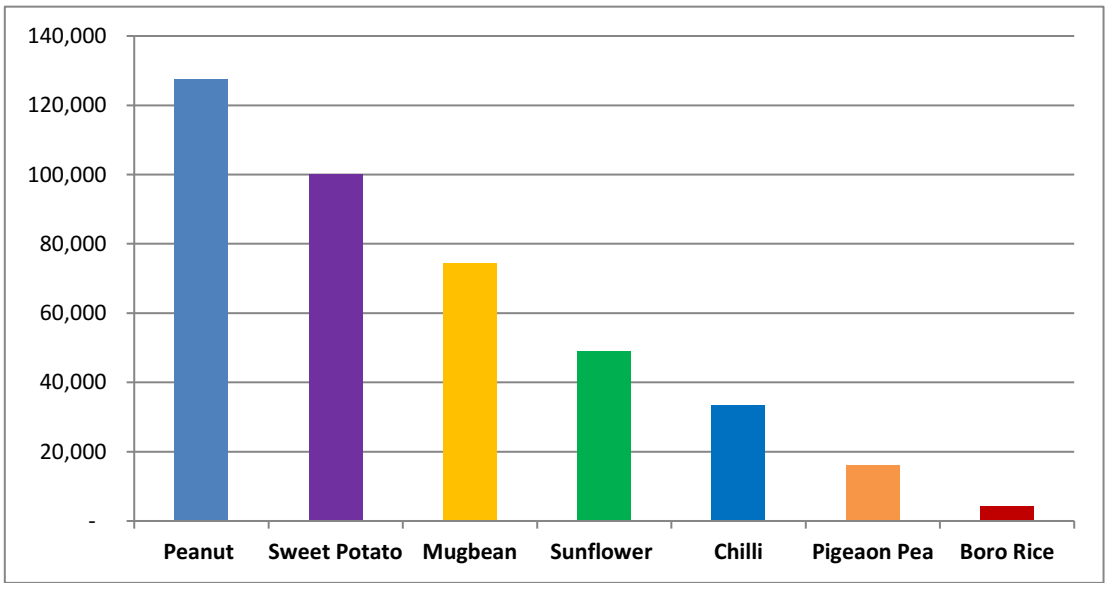

Figure 3 Average per hectare profit return (BDT) on Rabi crops, Sekenderkhali, 2019 (Source: farmers' crop planning and tracking activity data, survey data and field notes by Shushilan in 2019)

It is also observed that the farmers spent their earning for various purposes. The highest expenditure was for the payment of loan, settlement of daughter's marriage, buying livestock (goat/cow/hen/duck) and repairing house respectively. Other expenditures included buying clothes, medical expenses, children's education, buying irrigation pump, communication and entertainment purposes.

4.10 Value chain assessment

Although Bangladesh has witnessed a revolution of vegetable production over the last decade, the study villages were far behind in producing and consuming vegetables. The Shushilan team received training on value chain assessment in Jalpaiguri, India in August 2016 and participated workshop organized by BAU and CSIRO in Mymensingh in August 2017. The team conducted a value chain assessment and market scanning in both study sites to understand the market opportunities and gaps considering the learning of these two workshops.

VALUE CHAIN ACTORS

The value chain for vegetables is comprised of:

- Farmers (small, marginal and women managed households) are the producers of the vegetables. The farmers of the study villages did not contribute vegetables due to lack of knowledge, technical know-how, and challenges of salinity intrusion. But the farmers of the neighbouring villages contributed 10-20% of the vegetables in the local market.
- Middlemen/intermediaries (men and women) are generally poor villagers who collect vegetables from the villages and sell to the neighbouring villages, local market and local wholesalers. They make as estimated profit margin of 15-20%.
- Regional/district level wholesalers (*Artdar*) collect vegetables from local wholesalers, intermediaries and farmers. They make as estimated profit margin of 3-5%.
- Local wholesalers collect vegetables from intermediaries, farmers, sometimes district/regional wholesalers. They make an estimated profit margin of 10-20%.
- Retailers (see image 10) collect vegetables from intermediaries, district wholesalers, local wholesalers, farmers. They make an estimated profit margin of 15-20%.

SITUATIONAL ASSESSMENT

Input supply

- The farmers faced challenges of salinity intrusion and lack of availability of freshwater for producing vegetables during *Rabi*-season.
- Farmers have limited knowledge, technology transfer and input support on vegetable production.
- Farmers lack of knowledge in identifying appropriate inputs such as seeds and fertilizer.
- There seems to be inaccurate and/or inadequate information about quality seed, fertilizers, and pesticides.

Production

- There seems to be inaccurate and/or inadequate knowledge of the farmers for land preparation time and harvesting time.
- Climate change and natural disaster such as erratic rainfall, seasonal change, fog, salinity intrusion, cyclone and storm surge etc negatively impacts on vegetables production.

Logistics

- The established markets from the study villages were not so far; they are accessible by bus, auto-rickshaw, motorcycle and bicycles.
- The quality of infrastructure, including roads is comparatively good.

Markets

- The markets seem to have a high demand for high value crops, particularly for vegetables.
- A very high proportion (70-80%) of vegetables in the *Chalna* market of *Dacope Upazila* come from outside Upazila and district. On the other hand, 50-60% of vegetables in the *Amtoli* market and *Kolapara* market come from outside districts.
- It is also observed some of the vegetables come from 300-400 km far away.
- Farmers lack knowledge about the market and high value crops.
- There seems to be inaccurate and/or inadequate market information among the farmers, middlemen, retailers and local wholesalers.
- There is a steady demand for vegetables in the local market and among the neighbours, but the price of the vegetables fluctuate.
- The price of vegetable fluctuates if there is a low supply of vegetables and there are fewer retailers and intermediaries.
- There is no control of the government in the market price of the vegetables. The wholesalers of the local market and wholesalers of the regional market/district market control the market price.
- Intermediaries (syndicates) can distort market price.
- Middlemen, retailers and wholesalers manage the vegetable flow in the market (from producer to consumers).
- Middlemen collect vegetables (10-20% of the market) from villages and sell to the consumers, retailers, and wholesalers.
- A good number of middlemen who collect vegetables from villages were women and some were poor aged women.

Image 10 Vegetable vendors

Consumption

- Farmers (family members of the farmers/small, marginal and women managed households) consume small amounts of vegetables in general.
- Before the SIAGI project, most of the farmers bought vegetables from the local market to consume.
- There is very unequal profit margin across the value chain.

Value chain interventions

Considering the above situation and understanding of the value chain, the Shushilan team in consultation with the WSMC took the decision to conduct activities around vegetable production to take advantage of the gaps in supply in the local market. These activities include:

- awareness raising about the importance of the vegetables among the farmers (interactive discussion to disseminate knowledge on the importance of the balance diet and nutrition through using flipchart; interactive discussion on market information)
- capacity building of the targeted farmers on vegetable production through linkage developed to the DAE and private sectors
- participatory crop planning for vegetable production and using PRA games and bio-economic modeling for choosing appropriate crops
- ensuring freshwater for *Rabi* cropping through the collective way
- supporting the farmers as a catalyst for the production of the vegetables
- market linkage of the farmers

Community insights

"Only simple tips on peaceful movement by Shushilan greatly helped to motivate our leaders and local administration. Otherwise, we poor farmers must be harassed by the vested interests and the law enforcing agencies and local leaders and mass people would not help us for such kind of movement." Lolita and Rajjak Shekh, WSMC members of Khatail village

Freshwater availability in both villages had created great encouragement among the farmers for *Rabi* cropping particularly vegetable production. Considering the above activities, about 70% of the farmers in the Sekendarkhali village and 50% of farmers in Khatail village engaged in vegetable production either in the field, canal's dyke or homestead area. Some of the targeted farmers in the Sekendarkhali village have generated more income by selling *Rabi* vegetables in the local market.

4.11 Collective peaceful demonstration for freshwater in the canals

Although for many years the leasing system was stopped in *DacopeUpazila*, the local government with the help of a few vested interest groups had leased almost all canals of Dacope in April 2019 for shrimp farming. This included the canal in Khatail. Agricultural activities and research plots (both *SIAGI* and *CSI4CZ*) are at risk from brackish water entering into canals for shrimp farming. This brackish water is a significant threat to the community; it can damage crops, and lead to health-related problems (stomach, liver, and skin) in women and children, as well as livestock and poultry, with ducks and hens dying.

It is observed that 95% of the community in the *Dacope* is in favour of crop farming using freshwater. Considering this, the Khatail WSMC collectively made the decision to conduct a campaign and prepare a petition letter to UNO (*Upazilla Nirbahi Officer*) and DC (*District Commissioner*) to stop brackish water and make the sluicegates functional.

Shushilan supported discussions and counselled the Khatail WSMC about peaceful campaigning, discipline and ethics (do no harm, respect and love). The WSMC mobilized a petition by coordinating farmers (men and women), community leaders (18 Village Development Committees in Pankhali and *Tildanga Union* under *NoboJatra* Project managed by Shushilan), local political leaders, school teachers, faith-based leaders, elected representatives at Upazila level and representatives of *Union Parishads*. The WSMC submitted a letter with 2,940 signatures from the community to UNO on 30th May 2019. UNO gave the commitment to the WSMC that he will take action and will talk to his superiors, but he failed to take any steps.

More than 1000 community members (representatives from all classes of people) along with a good number of women gathered and demonstrated peacefully with banners, play cards and slogans campaigning for freshwater in the canals and good management of the sluice gates, for the environment and agriculture (see image 11). As a result of the human chain and mass petition to UNO, local administration declared that no salt water would be allowed in the canal and instructed the sluice gate committee to manage the gate properly.

Image 11 Human chain in Dacope led by the Khatail WSMC and attended by elected representatives and local leaders, for stopping brackish water in 16th June 2019. Picture in below in the left side one WSMC leader giving lecture among attendance during demonstration

5 Observed Changes

Over the last three and half years the SIAGI project has promoted agricultural intensification in both study villages through the ECE process and the institutionalization process of Water and Silt Management Committee (WSMC). During this journey, the SIAGI project has collected a significant amount of data and observed changes at the targeted household and stakeholder level through close interaction with the community, field visits and the use of participatory appraisal tools. There have been many changes observed in the community, stakeholders, NGO and research partners, as described below.

Table 5 Observed changes in the farmers (small, marginal and women-managed households) and community level

Title of changes	Before SIAGI	Present status
Community driven initiatives	Lack of collective mobilisation	• The communities themselves identified the importance of freshwater reservoirs. • In Sekendarkhali, the community planned and executed the re-excavation of the 'Hafamari canal'. • In Khatail, the community successfully demonstrated and organized a mass-petition to the Local Government.
Cost-sharing	Did not share cost in the canal re-excavation activity	• The community of Sekendarkhali shared 48% of the cost for canal re-excavation.
Changing cropping pattern	Aman-fallow-fallow	• Farmers started triple crops (*Aus*, *Aman* and *Boro*). • In 2019, in Sekendarkhali, a notable amount of vegetable cultivation observed in the field(13 acres area), canal's dyke and homestead area. • Similarly, in Khatail, Boro and vegetable production. • Now, in both villages farmers grow additional crops besides Aman rice. • The year round fruits and vegetables cultivation in the canal's dyke
Crop planning	Did not use crop planning	• People are working with crop planning.
Capacity building	Lack of knowledge and technical know-how on high value crops(HVCs)	• There has been increased technical know-how on crop planning, and the production of HVCs and High Yielding varieties.
Confidence and self-efficacy	Reluctant to grow *Rabi* crops. Failed to take an initiative in *Rabi* cropping due to mistrust.	• ECE helped the farming community to increase their willingness, trust and self-efficacy. • One success encouraged them to go for the next success. They have learned from the failure of crops due to planting time, environmental and climatic conditions. •
Transforming leadership	Lack of leadership among small, marginal and women-managed households	• A number of leaders emerged from the WSMC (particularly from landless, marginal and women-managed households) in both villages. • The WSMC of Khatail successfully led a peaceful demonstration against the local administration and leaseholders in Dacope Upazila to stop the

Title of changes	Before SIAGI	Present status
		re-introduction of brackish water. • The WSMC of Sekendarkhali, successfully mediated the conflicts over the use of canal water between *Boro* crop and vegetable growers.
Increased vegetable consumption	Household members were reluctant to eat vegetables. They did not know about their nutritional value.	• Farmers are producing more vegetables than before and consuming more.
Proxy representation	Family members did not give proxy in the group meeting	• Both Sekendarkhali and Khatail have also seen proxy representation in women groups and landless. • A proxy representation such as their husband/wife, elder son/daughter or wife of male member, attendance in the meeting increased farmers' motivation to engage with SIAGI activities.
Raised voice by marginal participants	Landlords would expect renters to follow their advice.	• Inclusiveness in the WSMC increased the voice of the marginalized farmers/members. • Equal access and the collective decision system in the WSMC have given those with less voice an opportunity to discuss their issues. • Some members of the WSMC in Sekendarkhali were not interested in contributing labour without payment since they were poor and landless. Thus, WSMC made the decision to pay these farmers to remove weeds from the canal.
Empowerment	Farmers did not negotiate for better conditions	• Farmers' negotiation capacity and voice has been increased. For instance, in Sekendarkhali, the WSMC successfully negotiated and advocated with LGIs, to construct two canals in two sides of re-excavated canals for regularizing the canal's freshwater.
Increased income	Farming income was low before SIAGI	• Farmers introduced new high value crops and increased their income. In 2019, during *Rabi* season, with some challenges, farmers of Sekendarkhali village received average return per hectare BDT 66,652 from HVCs.
Investment in livelihood assets	Marginal and women headed households had low capability to invest in livelihood assets due to insufficient income.	• Marginal and women headed households spent earnings from HVCs on repairing their houses, medical costs, clothes, loan repayments, children's education, agriculture inputs (machinery, fertilizer, water pump, seed), investing for livestock rearing (purchasing duck/hen/goats/cow), transportation, settlement of marriage for young girls and entertainment.
The power of social cohesion and unity	Lack of unity under the instructional form, lack of trust and attitude and lack of social inclusion.	• Practising the constitution of the WSMC significantly increased social inclusion. The WSMC demonstrated skills in canal management and re-excavation, conflict management, collaboration with stakeholders, etc.

Title of changes	Before SIAGI	Present status
		• They successfully negotiated with LGIs and the community leaders of the neighboring villages to manage the sluice gate effectively. • Almost all members of the WSMC are illiterate or semi-illiterate. In spite of their illiteracy, they are keeping their monthly meeting records, documents and data with or without the help of others, which was hard in the past. Nowadays, WSMC has a big image in the village.
Increased market opportunity	During *Rabi* season, the availability of the diversified vegetables in the local market (Sekendarkhali *Bazar*) was low due to zero production of *Rabi* crops. The buyers and private companies were absent.	• Market access is developing for Sekendarkhali village. Growing different crops and vegetables in different seasons is creating new market opportunities for sellers and buyers. • Many new buyers are coming to the community and giving interesting offers to farmers for product sales.
Increased linkages and collaboration	They did not visit LGI, agriculture office etc.	• They obtained a Non-Objection Certificate through negotiation with LGIs. Now they can directly communicate with Department of Agriculture Extension (DAE) personnel.

Table 6 Observed changed in other stakeholders

Title of changes	Before SIAGI	Present status
Collaboration and cost-sharing	Earlier the Local Government (*Union Parishad*) and the community did not collaborate in the project and did not share cost with the community and the donor's project	• *Union Parishad* shared about 8% of the cost in the canal re-excavation of the *Hafamari and Munshbari* canal of Sekendarkhali village.
Advocacy for the community	Earlier the Local Government (*Union Parishad*) did not advocate with the senior level Government Officials for the community	• Union Parishad successfully advocated and recommended to the senior level officials of *Amtoli Upazila* for support for canal re-excavation in Sekendarkhali, and helped the community receive a Non-Objection Certificate for the canal.
Changed government motivation	The government officials reluctant to work with Community Based Organizations (CBOs) like the WSMC	• The ECE approach has changed their attitude. Officials from the DAE and Local Government are very positive about the activities of farmers and water management practice.
Increased interaction and support	Government official hardly interacted with farmers' community including WSMC and women-managed households	• Government officials particularly DAE officials frequently visited the farmers' field, engaged the marginal farmers in the training, helping the community to increase their confidence. For regular water flow and freshwater availability in the *Hafamari* canal of the Sekendarkhali village, the *Union Parishad* of *Amtoli Sadar* constructed two culverts, helping the WSMC in conflict management.

Table 7 Observed changes in the sister project and private sectors

Title of changes	Before SIAGI	Present status
Coordination and input support	Researchers of BRRI, BARI and NUMAN project were reluctant to engage landless, marginal and women-managed farmers in the project demonstration.	• Due to coordination with CSI4CZ, farmers' access to inputs support (training, seeds, fertilizers, pesticides) increased in both study villages compared to previous years. • Poor farmers also received training on peanut, sunflower, green chilli, leafy vegetable, etc, from the CSI4CZ project.
Changing motivation and attitude	There was no demonstration to the SIAGI farmers group (WSMC members)	• CSI4CZ project engaged the landless, marginal and women-managed households for the demonstration of the HVCs and management of water in both *Khatail and* Sekendarkhali villages. In 2019, *Boro* production in the larger area of *Khatail* village was successful due to coordination, management of water by the WSMC. These activities and their success helped to considerably change the motivation and attitude of BARI and BRRI to work with the poor community in a collective way.
Skills training and input support	Earlier the community did not receive skills training and input support from the private sectors	• Farmers received training and seeds support on peanut, sunflower, green chilli, leafy vegetable, etc from Lal Teer Seed Ltd., ACI and Agro Marketing.
Improved trust and coordination	Private sectors were reluctant to work with NGOs and directly support the poor farmers due to lack of trust and coordination	• The private sectors (Lal Teer Seed Ltd., ACI, Northern Agro Ltd) to engage the poor farmers (both men and women) in HVC production. New companies are also showing interest to discuss with the farmers and engage in the study village.

Table 8 Observed changes in Shushilan since SIAGI began

Title of the changes	Before SIAGI	Present status
Beneficiary engagement	Although engagement of the beneficiary in the development project was participatory, in some cases ethics were ignored	• Experience of ECE has drawn a strong sense for the in-depth understanding of the community and effectiveness of the project implementation. • The adaptation of the principles such as 'Do no harm' 'respect' and 'love' bring the moral changes of the facilitators. • More tolerant and patient than past to hear the voice and the problems of the community
Transforming from donor-driven to community-driven	The development projects of Shushilan were donor-driven, with weak community ownership. In many cases, the delivery of the activities was also	• Taking a community-driven approach has increased the beneficiary's ownership. • Activities are more focused, transparent and bottom-up. • Engaging the community as partners.

	top-down.	
	Canal re-excavation, formation of groups, growing crops and market linkage are not a problem as a delivery activity for the NGOs.	• Changed our mindsets to assist the community to explore their potentiality and trust to improve their livelihoods through institution building of CBOs such as the WSMC
	We would expect quick result from the delivery of the activities	• Relatively more patient and persistent
Perception of the community as partners rather than just beneficiaries	"I know everything about the community". Sometimes we were rigid in how we engaged the community within the project framework. Problems of the community will be solved by the NGO through the delivery of the activities	• Recognising the skills, knowledge and expertise of the community, and their ability to mobilise resources • Conducted the formal and informal interaction as a part of the community, with the NGO personnel living with or nearby the community. This gave a strong sense of ownership. We are more open, transparent and free to exchange views and technical know-how.
Knowledge of value chain	We only consider the food and monetary value of agriculture products	• Now, we believe the diversified value of the crops that differ with person, time, place, culture and environment.
Qualitative information	Numbers were more important to understanding the impacts and benefits of the project activities	• We also give equal importance to the qualitative findings including the subject and object matter. Narratives and cases are one of the important tools to understand impacts.
Delivery of knowledge	The perception that the delivery of materials (e.g. cash, seed, fertilizer, pesticides)was required to achieve improvements in the community	• Knowledge transfer and coordination with other stakeholders has led to great improvement to the community, including agricultural intensification
Farmers attitude	Farmers suffered from dependency syndrome	• Farmers community are more confident to contribute in the project and to work as a partner • Some farmers (women and men) working as a change agent
Actors for development	I am the only actor to develop the farmers' fate	• United/joint efforts (the community, Government Department, NGOs, private sectors, researchers) to develop the farmers' livelihoods

Table 9 Observed changes in BAU particularly among team members

Title of the changes	Before SIAGI	Present status
Attitude towards working with NGOs	A bit reluctant to work with NGO	• Enhance confidence in the work of NGOs
Application of ECE	Interact with farmers with consent but reflection was missing	• Extensive learning on ECE, help better communication with the community • Increased trust in community initiatives

	Less confidence in the community's initiative or financial contribution	and cost-sharing arrangements
Focus on qualitative research	Qualitative approach undervalued Qualitative methods used but not properly reflected in reports	• Increased skill in using qualitative approaches through training and learning by doing • Reporting on qualitative findings
Knowledge of value chain	Conduct conventional value chain analysis	• Extensive or inclusive value chain analysis gaining popularity
Project learning institutionalisation	Takes long time for learnings to be institutionalised	• Project learning incorporated in re-designing the course within the project period

Challenges

Although there many positive changes observed in the community and associated stakeholders, the project was faced with several challenges, including those described below.

1. **False notions and propaganda at the community level:**

Some influential farmers in both villages also spread rumours that since other NGOs are giving materials and cash support to the beneficiaries, but not this NGO, who is not giving anything except knowledge support, they (NGO staff) surely are stealing the funds. For instance, "*one member in a meeting in* Sekendarkhali *village asked the facilitator, where is our snacks, how are your preparing bills*. *Surely, you are preparing bills but you are not giving us. I must complain about you in your office*." Although this is negative, in another sense, it is positive in terms of the empowerment of the community. They are speaking openly before the public.

2. **Everyone's responsibility is no one's responsibility**

The WSMC members did not give specific responsibilities to guard the fish of the canal in Sekendarkhali. Thus, no one guarded the canal at night, and it was found that fish were stolen by a few bad people of the neighbouring village. One day, one fish thief was caught but somehow escaped. Following this incidence, some WSMC members have been patrolling the canal on a roster basis.

3. **The competitive advantage of other livelihoods**:

Through ECE initiatives, agricultural intensification has occurred in both villages, increasing crop production and therefore food security in some targeted households. However, the real income of crop farming has remained low. Some farmers (both men and women) in *Khatail* and Sekendarkhali complained that *'you are motivating us for agriculture. This is good. But I can earn BDT 200-300 per day by selling vegetables. If I would was involved in construction work, including road, sea port, Payra power, in* Sekendarkhali *or the factory (newly established in Dacope), I would get BDT 500-700 per day. So, why will I work in agriculture?"*It seems agriculture or farming may not be a more profitable enterprise for many villagers.

4. **Increased tillage cost and labour cost in the area**

Only a few large farmers own agriculture machinery (such as power tillage, irrigation pump and pesticide spray machines) in both villages. As per the comments of farmers, since the demand for crop cultivation has increased in the villages, the agriculture machinery owners have increased the tillage cost by 30%. In Sekendarkhali village, per hectare tillage cost increased from BDT 11,000-12,500 in 2017 to about BDT 16,500 in 2019.

5. **Conflict increased in the village due to unplanned grazing**

Most of the area nearby Hafamari canal is covered with *Rabi* crops. So, all domestic animals graze in the field nearby *Munshibari* canal where *Rabi* crops are not widely grown. But some of those who cultivated *Rabi* crops are being affected by cattle grazing. In both villages, it was observed that a few farmers did not like the progress of poor people. Those farmers tried to destroy the crop fields by deliberately grazing livestock near the fields to allow cows to damage the crops.

6. Conflicts over freshwater vs brackish water

Although 95-97% of the community including landless and marginal farmers are in favour of freshwater in the canal for cropping and domestic use, a few influential people (2-3%) in Khatail and Sekendarkhali are in favour of brackish water for growing fish and shrimp. Although few in number, the influential farmers have strong political and institutional links with government officials. Some of them are also lease their lands to marginal and the landless farmers to grow crops. Despitethe poorer farmers successfully proving the importance of freshwater and demonstrating their ability to grow high value crops, they are still faced with the threat of brackish water intrusion(into the canal and the agriculture field)by those using the sluicegates to grow and catch fish and shrimp. Union Parishads (UPs) also illegally rent the sluicegates to some fishermen. Thus, a tension among the community in terms of brackish and freshwater continues to be observed.

Community and stakeholder's reflections

"Although this project of Shushilan *does not give cash, honorarium for training, meeting, material benefits, they give us love, give us information and knowledge. Thus we come to the meeting. I think this will also help to change our village scenario."* One group member of marginal farmer's group –AS-Khatail village

"We need not support of seed, fertilizer, and other inputs, give us technology how to produce high value crops in this barren land, assist us to store freshwater. Automatically after two or three years, we all farmers will be engaged in round the year cropping particularly Rabi." RS-one marginal farmer, Khatail village

"Last year I got lost, my crops (watermelon) were damaged due to early rain, but I am not disappointed. I know I will get success one time. This learning I got from this project." Marginal farmer, RS, Khatail village

*"*Shushilan *gives information and good suggestions. One good advice is more-costly than Tk. 1000." In Bangla: "Akti valo poramorsho 1000 takar theke dami"* A marginal farmer, Khatail village

"This year I cultivate watermelon about 50 decimals of land. Last year it was only 12 decimals and I was a loser in this enterprises. But I think, I am not a loser, I learned many things from that project. Last year, the project has given us brave and strength to go forward." One member of women managed the household and her husband, Khatail village

"This year, we ourselves prepared three dykes in the canal to store freshwater for Rabi season." Women members, Khatail village

"My family reluctant to eat vegetables, groundnut and breakfast. Now, my family regularly eat vegetables. These vegetables are grown by me." President-women managed group-Sekendarkhali

"My earning was zero. Now, I can earn BDT100-500 (Bangladeshi Taka) daily by selling my vegetables." One woman member of woman managed group, Khatail

"Other project (sister project) work with rich farmers who have lands besides the road. They also support them. But you (this project people) do not give us anything. This project gives us the courage and gives us console if we lose. Without material support (cash, seed, fertilizer) compare to the sister project, we are also doing well. I think, our result will be better than them (sister project)." Group members of women managed group, Sekendarkhali village

Government agencies' reflections

*"Canal re-excavation by confirming cash contribution from Union Parishad (Local government), cash/physical labour contribution by the community, project support and involving multiple stakeholders is really an innovative strategy. I like to say it is Public Private Partnership for canal re-excavation. Most importantly the community (villagers) are contributing 48% of the cost. This is very important. We are excitedly waiting for its results. If it a success we can replicate this system for re-excavating other canals."*Additional Deputy Commissioner-Barguna District

"I am so excited. If there is any conflict regarding canal re-excavation, I will stay there to minimize it. It is noble work. No one can stop it. I am giving a guarantee after completion of this canal re-excavation, I will take care of it. I am giving my word before high officials of Upazila administration and district, that I will construct one culvert within a short time to smoothly channelize freshwater in the re-excavated canal of Hafamari." UP chair-Amtali Sadar Union Parishad

"Since Community has come forward, the project has contributed, Upazila administration is along with it, I will properly monitor this scheme. I want to see no fields are remained fallow during Rabi season. I want to see crops in the field and smile in the face of the farmers." UP chair- Amtali Sadar Union Parishad

"Community people of Barguna district have been lethargic/ inactive for getting free relief from government and donors. They do not want to work. They want relief. For that reason, our canal is silted and the agriculture field remained fallow. Shushilan *also gives relief. They love* Shushilan*, because* Shushilan *gives a donation, free relief. But, this project is different, it is not giving cash, rather motivating, giving knowledge and information. This is important to change our mindset to make us active and productive."* UP chair-Amtali UP

"I apologize to the community for being a delay for giving NOC. I did not know what a good initiative it is. You (Community) came several times for NOC of the canal, but I was not agreed. Preliminarily, I was confused and doubt that really the community is contributing, are the community telling truth? I investigated the scheme of canal re-excavation several times by land office, agriculture office, and others. Everyone has given a positive report even when they visited the community and canal site. Upazila officials reported to me that this project is very important, all community members want to re-excavate this canal and want to contribute too. They said it is an innovative initiative. Finally, I have been convinced and given NOC. I also like to give thanks to Shushilan *for motivating and united them in such a way."* Upazila Nirbahi Officer, Amtali Upazila Administration, said during inauguration meeting of canal re-excavation in Sekendarkhali village

Service providers' reflections:

"You (SIAGI project people) are trying to development of the farmers without hardware support. This is very hard. The farmers are not habituated to involve in the project without cash/hardware support. If you could succeed, it will be a good example." Sub-assistant Agriculture Officer, Dacope Upazila

"Objectives of this project are good. You (project people) are trying to motivate them in agriculture in a different way. I will assist in this project as per my capability." Local representative, Lal Teer Seed ltd.

"ACI also interesting in this project. Please share the project learning with us time to time." Business Head, Advanced Chemical Industries Ltd. (ACI)

If farmers come to us with their products, we will give them all kinds of support (including cash)." Secretary Kolapara Market Committee

"If farmers produce sunflower seed, we like to support them, we will buy them all seeds." One cooperative oil crushing mill, Kolapara Market, Kolapara Upazila, Patuakhali district

6 Lessons Learnt

There are many lessons learnt from the project. These include:

Power of community

- People of this area now understand the power of unity. So, they are now trying to solve many problems at the home and community level using the power of groups/WSMC. Motivation through working on a group basis is transforming the power relationship and changing the aspirations of the people.
- The community has the internal power to change their mindset and fate. Recognition of the farmers' skills, knowledge and expertise are equally important for changing their fate. The farmers also have extensive experience in their area, agriculture field, soil condition, water and environmental situation, and market. Some of the farmers have their own mechanisms to adopt the new technology. They do not accept the new technology and sweet voices or motivation so quickly rather they think deeply and internalize what is necessary for them. They wait and observe the technology and the situation and slowly practice in a small portion of their land from their own efforts to achieve their aspired objectives. If they get good results they gradually increase their practice and exchange their views with others.
- Relationship and trust building is important for the community and multi-stakeholders (local government, UP representatives, private sectors, politically influential people) to make bigger changes in the community.
- Ethical community engagement, including formal and informal interaction, is important for creating ownership by the beneficiaries of project activities and to empower them.

Importance of leadership and facilitation in the community

- Communities need a catalyst and a change maker to assist them to transform their fate. It may need more time for obtaining a full picture of the impact of the project.
- Honest and dedicated leadership is important for organizing the community to change their fate and mobilise resources to improve their livelihoods.
- Setting up a constitution for community based groups (e.g. WSMC) that enforces the representation of marginal households and women sets the foundation for their voices to be heard.
- Shushilan has played a key role in capacity building around the governance structure of the WSMC, group formation, crop planning, technical support, nutrition, and conflict management. This is important for developing leadership within the community and ensuring that the community meets its aspirations.

The complex nature of issues

- Livelihood aspirations of a community cannot be met with a single initiative. The project has given more emphasis on farming activities instead of other livelihood components such as safe drinking water. To address such issues, it is important for the community to build the capacity to engage with decision. In this instance, the community needs to engage with the local government and the department of public health to ensure safe drinking water, particularly in the dry season.
- It is observed that sluice gates operation in both sites is completely political, which is hampering the farmers' interest and decreasing food security of the community. Union Parishad (UP) is supposed to be in charge of the sluice gates but UP members and influential people dominated the opening and closing of the gates. In that situation, establishment of Water Users group/Water Silt Management Committee with the help of an NGO may contribute to more equitable management of the sluice gates through collective decision-making and distribution of the water in a manner which maintains inclusivity, farmers' right and justice.

- ❖ Due to increased competitive advantage of earnings through selling labour in the non-farm sector, the landless and marginal farmers are often reluctant to engage in farming activities, which has huge uncertainty due to climatic event and market demand.

Sustainable change takes time and effort

- ❖ Effective ethical community engagement in research is harder than traditional research. Nevertheless, it is easier if one enjoys and loves interactions with the community.
- ❖ The WSMC is gaining experience through learning by doing with respect to community mobilization, water management, conflict management and reducing the elite capture. These learnings within the community can be applied to other community organizations.

Remaining opportunities for improvement

- ❖ There is demand from farmers to receive technical advice and assistance in agriculture. While some farmers in both villages have successfully adopted technical know-how of high-valued crops (chilli, potato, tomato, sunflower, groundnut, leafy vegetables) and increased their income with the help of the technical person from the CSI4CZ project and the Sub-Assistant Agriculture Officer of DAE, not all farmers had access to this opportunity. The interest and willingness of many other farmers to learn more about crop technology with the assistance of technical advisers has grown.
- ❖ Marketing is one of the key challenges since there are production and supply gaps in the local market. Farmers tend to sell the products into local market, as they only produced a low volume of vegetables. It is observed that when some farmers tried to sell their products to distant markets (e.g. watermelon and vegetables were sent to Khulna from Khatail village, and vegetables from Sekendarkhali to Patuakhali market), farmers lost their profit due to high transportation costs and small volume of products.

7 Final thoughts on scaling

Scaling now and the future, what can be expected in terms of the sustainability and spread of benefits?

Scaling through partnerships

- **Out-scaling to other communities:** the ECE framework and its process are being developed by SIAGI in both project sites. In 2019, Sekendarkhali's neighbouring village started growing crops (*Boro* rice, maize, sunflower, sweet potato, chili). About 40 farmers engaged in the promising practices with the assistance of Shushilan, BARI, BIRI and private company (Lal Teer Seed Ltd).
- **Upscaling collaboration and partnership:** Joint effort of BARI, BRRI, DAE and Shushilan extended support to the farmers of *Moshamari* village of Tildanda Union under Dacope Upazila. In *Moshamari* village, farmers successfully demonstrated Potato, maize, wheat, *Boro* rice, sunflower and leafy vegetables. Joint collaboration and partnership may be important to scaling the project learnings for sustaining and benefiting the farmers.
- **Partnership of project, LGI and WSMC for re-excavating the canal and strengthening the institution:** institutional learning of WSMC and partnership for re-excavating canal with cash, physical labour and in-kind contributions from the community and Union Parishad may be scaled up in other communities to improve ownership and sustainability of the water infrastructure and management. There is a possibility to build linkages between WSMC and Polli Sanchaya Bank (Rural Savings Bank) in the process of institutionalization of WSMC.

Scaling through capacity building

- **Extension of Knowledge on ECE and WUGs**: Shushilan organized two one-day orientation programs on ECE and the formation of Water Users Group in Khulna and Dhaka in April 2019 for 20 project

staff of “Implementation of Water Management Organizations (WMOs) and Integrated Pest and Crop Management” under Coastal Embankment Improvement Project-I (CEIP-1) of Bangladesh Water Development Board (BWDB). This project is being implemented in four coastal polders (polder 35/1 & 35/3 under Bagerhat district and 40/2 & 41/1 under Barguna district) where about 50 WUGs will be formed through community mobilization for managing water, crops and embankment. Most importantly, two projects are voluntarily providing technical support to the CEIP-1 project staff of Shushilan for scaling up the learning and promising practices of SIAGI project.

- **ECE workshops for post-graduate and colleague students:** The ECE learning has been disseminated to the post-graduate students and junior colleagues for their future research at BAU through a day-long workshop. The learning has also been disseminated to post-graduate students of another university (Department of Sociology, Rajshahi University) where the participants have highly acknowledged the approach.
- **Introducing ECE into academic programs:** Project learning helped the Department of Rural Sociology of BAU to rename and re-design the course “Practice in Community Engagement” in which principles and processes of ECE are the key modules of this course.
- **Introducing ECE to an NGO network:** Shushilan conducted a capacity building session on ECE for members of the Water Resources Management Forum in the coastal area of Bangladesh. Participants included an NGO network of the coastal area in Bangla called ‘Oitiya’. The NGOs in the network include Ashar Alo, Dalit, Leaders, Bhumishto, Shadesh, Progoti, Unnayan, Badhan, AOSED, Mukti Foundation and Shushilan.
- **Capacity building for other researchers and project staff:** Shushilan also built capacity of the Coastal Embankment Improvement Project (CEIP) project staff through organizing orientation meetings on ECE and demonstrated its practice at the field level, engaging the community for water & sluice gate management, social forestation and integrated crops and pest management in the coastal polders area of Bangladesh. Many of the NGOs and CEIP project staff have reported positive outcomes in the implementation of community-based activities. Moreover, Shushilan team oriented the fund-raising staff and Project Managers about how to include ECE approach in project design. Also, a discussion meeting was organized by the NUMAN project for a better understanding of the ECE. At present, NUMAN field staff received training on ECE and they are applying in the field.

Scaling to the policy level

- **Taking promising learnings to the policy level**: If the community can be mobilized through group formation, take onthe ownership of common resources and establish the linkages with local government, then they can go a long way in meeting their livelihood aspirations. However, policy should ensure equal participation of all classes of people. Promising practices include: community-based water resource management; buy-in of crop planning; Public Private and Community (PPC) partnership for canal re-excavation or management of common resources; collaboration and linkage development among the government, private sectors and the community for agriculture intensification; and engagement of women in high-value crops / market based crops. These practices have a great potential to be incorporated in the local and national policy of agriculture extension in Bangladesh.
- **Linkages with National Agricultural Policy-2018:** Recently (September 2019) there was a stakeholder meeting at BAU regarding finalization of the key strategy of National Agricultural Policy-2018 in which ECE was discussed by the project members for incorporation in the strategy towards the development of southern coastal agriculture. A follow-up meeting is expected with the team for further clarification of ECE so that it can be incorporated into the strategy.

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