

Technology Inventory, Participatory Research and Preparation of Demonstrations of Innovative CCAT in Water and Agriculture

A few activities under Outcome-2, began in Year-1, were carried over to Year-2 due to delayed implementation. The planned activities of both incomplete Year 1 and Year 2 activities included the following: a) preparing a national inventory on adaptation technologies in water and agriculture (based on desk based review and consultation with experts and stakeholders); b) identification of adaptation technologies by organizing stakeholders consultation at the district and Upazila (sub-district) levels; c) stakeholders consultations for screening and evaluation of adaptation technologies; d) development of a framework and methodology for participatory assessment of the appropriateness and effectiveness of CCAT with key criteria: climate resilience, gender responsive and women friendliness, affordability, user-friendliness and availability in the market; and e) action research for identification and demonstration of the best practices in adaptation and adaptation technologies in water and agriculture.

National Inventory of Adaptation Technologies for Gender and Social Equity

One of the key objectives of the SAKTEE project is to identify, evaluate and demonstrate innovative climate change adaptation knowledge and technologies (CCAT) in water and agricultural sectors for multi-level institutional adoption as well as to empower women and poverty-stricken disadvantaged groups in the project districts. The project is engaged with identifying and demonstrating CCAT and best practices that are proven and have potentials for benefiting vulnerable women and disadvantaged groups in the project areas.

Literature review and expert's consultations were conducted for preparing an inventory on CCAT. The consultations with sectoral experts and relevant government officials and engagement of stakeholders at regional and local levels also provided information on appropriate technologies. In this backdrop, the project intended to prepare a technology inventory report based on relevant published and unpublished reports and documents, scientific papers as well as in consultations with sectoral experts. The key objectives of preparing a national inventory on adaptation technologies were:

- to learn about the current adaptation technologies in agriculture and water sectors in project locations;
- to identify CCAT and confer how these technologies can benefit vulnerable women, poor and disadvantaged people at the local level; and
- to know about the challenges and potential opportunities on using innovative adaptation technologies for women and disadvantaged sub-populations.

To understand the technology needs and identify the gaps, in adaptation technologies for water and agriculture sectors, the research team applied the following techniques and steps: a) secondary data collection from web site, relevant reports & journals and analysis to develop an inventory on technologies in selected two districts; b) consultations with climate change experts, agricultural scientists, researchers and development professionals; c) organized consultations via workshops at the district level and Upazila levels; and conducted Key Informant Interviews (KII) with the Sub Assistant Agriculture Officer (SAAO) and NGO representatives.

A Draft Report of inventory on adaptation technologies in agriculture and water was prepared in Year-1. To improve the contents of the report, a series of stakeholder consultations with the sectoral actors were organized at the District and Upazial levels in Year-2. In consideration of COVID-19 pandemic situation, these consultations were organized through online (virtual) to avoid face-to-face interactions as required by government lockdowns. The Department of Women Affairs supported to organizing the consultations programme and the sessions.

In the context of Bangladesh, agriculture and water sectors are the two most adversely affected sectors by climate change impacts; these in turn are affecting livelihoods of the population significantly. It is postulated that the adoption of socially transformative adaptation technologies can create key opportunities for pursuing the goals of accelerating climate action, reducing gender and social inequity and empowering women and disadvantaged, impoverished people. The adaptation technologies have been identified in the contexts of climate stresses and social conditions of the coastal and wetland districts. The Inventory Report has embodied the most suitable adaptation technologies in water and small-scale agricultural sectors in the two selected climate hotspots. The Report has also identified a number of CCAT that are women-friendly, socially appropriate and pro-poor in the local contexts. The report is included as Appendix-2.



Water Harvesting in the Coastal Villages

The Inventory Report reveals that the current technology matrix differs across the regions, sectors and communities. The successful application of the CCAT largely depends on social conditions (level of poverty, awareness, skill & capacity of using the required technologies and motivation of the poor and women), availability and affordability of the poor and women. The government, NGOs, private sector & market systems and the actors, supporting the poor, women and socially disadvantaged communities for use of appropriate technologies in agriculture, water, sanitation, health and livelihoods (which are climate resilient, low cost-considering the affordability of the poor and available in the locality and women friendly) are critical for transformative changes. It is emphasized that the CCAT must reduce climate risk,

build resilience in the social, human systems and ecosystems as well as lessen burden of the poor women in the long run and thus contribute to gender equality. The key challenges of pro-poor and gender responsive technology generation, dissemination and transfer are: Identification and development of climate resilient and women friendly technologies; Innovation by blending of local knowledge and IK with external technological knowledge; Capacity building and enabling environment; and Collaboration, engagement of actors and supports to the vulnerable communities.

Further, a combination of hardware, software and org-ware is needed for development and successful application of new and effective adaptation technologies. The stand-alone technology such as an infrastructure or equipment is not sufficient for effective adaptation. The key focuses and challenges of the long term and gender responsive adaptation technology development & transfer are:

- Identification and development of climate resilient technologies
- Innovation by blending of local knowledge and IK with external technical knowledge
- Providing appropriate information about CCAT, EWS and services to women & poor
- Capacity building of the poor, women and enabling environment; and
- Collaboration & engagement of actors for greater supports to the poor women & most vulnerable communities.

Stakeholders Consultations on CCAT

The stakeholder mapping was pursued in Year-1. The key stakeholders on adaptation, women empowerment and gender equality are placed at different levels: national, regional and local levels. They include government actors and stakeholders, NGOs and Civil Society Organizations (CSOs); women led organizations; LGIs, media as well as research and training institutions. The adaptation technologies, identified through reviews and expert consultations, were shared with the actors and stakeholders at the regional (district level) and local level (sub-district level). These were accomplished through organizing stakeholder's consultations on CCAT for validation and inclusion of their suggestion to make the technology matrix that are more locally appropriate, climate resilient, women-friendly and pro-poor in the social and institutional contexts (please see the report in Appendix-3).

Participatory Action Research with Technology Users and Primary Stakeholders

In Year-2, conducting action research with users and primary stakeholders has been an important activity. The SAKTEE project team developed a framework and methodology for participatory assessment of the CCAT to evaluate the appropriateness and effectiveness of the existing adaptation technologies. The assessment applied a number of criteria, which included: climate resiliency, gender responsiveness and women friendliness, affordability, user-friendliness and availability of the technologies in the market.

The Project conducted participatory action research in the two selected districts, namely Satkhira and Sunamganj, with the feminist research approaches by involving the poor women, girls and vulnerable groups to assess their vulnerability in the local contexts and experiential knowledge. It also aimed to identify the needs and priorities of adaptation technologies in their

eyes. Local and village level stakeholder's consultations were conducted under the action research to evaluate appropriateness and effectiveness of adaptation technologies in agriculture and water. The process has prioritized a set of women friendly and locally appropriate CCAT in the two ecosystems. The local consultations have also explored - how the prioritized technologies can benefit the vulnerable women, poor households and disadvantaged people at the local level. The specific objectives of the action research were to:

- **Create a list of the gender-specific (women focused) adaptation technology in water and agriculture sector**
- **Examine how can the technologies benefit vulnerable women, poor and disadvantaged people at the local level**
- **Examine the appropriateness and effectiveness of the technologies to address climate change impacts and vulnerability of women and poor people**
- **To identify the challenges and opportunities of scaling up adaptation technologies by women, poor and disadvantaged groups; and**
- **Enhance the linkage of the communities with relevant government departments, NGOs and stakeholders for further support.**



The following key issues and questions were discussed in the action research: What types of technologies are currently being used in the agriculture and water sectors in the locality? Who are the main users of the identified technology? Who develop and disseminate Climate Change Adaptation Technologies? At what level of these technologies are effective in the local contexts (climate-resilient, available, cost affordable and women & users friendly)? How can these technologies benefit vulnerable women, poor and disadvantaged people at the local level? What are the challenges and limitations (e.g. knowledge, attitude, values, market, institutional etc.) of up-taking the adaptation technologies by women and disadvantaged sub-populations?

The action research has produced a set of locally and socially appropriate technologies in water and agriculture in both coastal wetland ecosystems. The options of adaptation technologies in small agriculture from the coastal villages of Kaliganj, Satkhira are shown in table-2. The vulnerable communities, women and socially disadvantaged groups have identified the promising adaptation options and technologies in agriculture in both ecosystems. The women friendly CCAT in small agriculture sector in Satkhira include: homestead gardens using scaffold, dyke cultivation, raised beds crop cultivation, crab farming and integrated fish farming. The vulnerable women and the local actors, women stakeholders have also identified the opportunities and challenges of the adaptation technologies. Please see the summary report on Participatory Action Research in the Satkhira district in appendix-4.

Table-2: Local Adaptation Technology in Agriculture with the Opportunities and Challenges (Kaliganj, Satkhira)

Name of the agriculture technology	Opportunities	Challenges
Homestead Vegetable cultivation by using Scaffold (<i>machan</i>)	<ul style="list-style-type: none"> ▪ Women friendly ▪ Easy accessible for poor and women ▪ User friendly ▪ Socially appropriate ▪ Community people will provide appropriate demonstration plot for piloting ▪ Low cost and affordable by poor and women ▪ Locally available scaffold materials and vegetables seed ▪ Appropriate for homestead or dyke of the shrimp farming land, pond side, road side etc. 	<ul style="list-style-type: none"> ▪ Ensuring adequate water for round the year ▪ Heat stress and salinity intrusion ▪ Natural disasters like Cyclones, tidal surges, heat wave ▪ Protecting from cattle
Homestead Vegetable Cultivation by using Drum	<ul style="list-style-type: none"> ▪ Women friendly ▪ Easy accessible for poor and women ▪ User friendly ▪ Socially appropriate ▪ Community people will provide appropriate demonstration plot for piloting ▪ Low cost and affordable by poor and women ▪ Locally available scaffold materials and vegetables seed ▪ Appropriate for homestead or dyke of the shrimp farming land, pond side, road side etc. 	<ul style="list-style-type: none"> ▪ Ensuring adequate water for round the year ▪ Heat stress and salinity intrusion ▪ Natural disasters like Cyclones, tidal surges, heat wave ▪ Protecting from cattle
Crops Cultivation	<ul style="list-style-type: none"> ▪ User friendly ▪ Socially appropriate 	<ul style="list-style-type: none"> ▪ Heat stress and salinity intrusion ▪ Natural disasters like Cyclones, tidal surges, heat wave ▪ Protecting from cattle
Dyke Cultivation	<ul style="list-style-type: none"> ▪ Women friendly ▪ Easy accessible for poor and women ▪ User friendly ▪ Socially appropriate ▪ Community people will provide appropriate demonstration plot for piloting ▪ Low cost and affordable by poor and women ▪ Locally available dyke cultivation materials and 	<ul style="list-style-type: none"> ▪ Ensuring adequate water for round the year ▪ Heat stress and salinity intrusion ▪ Natural disasters like Cyclones, tidal surges, heat wave ▪ Protecting from cattle

Name of the agriculture technology	Opportunities	Challenges
	vegetables seed	
Poultry Farming	<ul style="list-style-type: none"> ▪ Women friendly ▪ Easy accessible for poor and women ▪ User friendly ▪ Socially appropriate ▪ Low cost and affordable by poor and women ▪ Locally available poultry farming materials 	<ul style="list-style-type: none"> ▪ Heat stress and salinity intrusion ▪ Natural disasters like Cyclones, tidal surges, heat wave ▪ Ensuring adequate drinking water for round the year ▪ Chick is not available in this locality. Have to collect from district, divisional town ▪ Proper treatment facilities of chick dieses
Crab Farming	<ul style="list-style-type: none"> ▪ Climate resilient ▪ Women friendly ▪ Easy accessible for poor and women ▪ User friendly ▪ Socially appropriate ▪ Low cost and affordable by poor and women ▪ Locally available poultry farming materials 	<ul style="list-style-type: none"> ▪ Heat stress and salinity intrusion ▪ Natural disasters like Cyclones, tidal surges, heat wave
Fish cultivation and collection	<ul style="list-style-type: none"> ▪ Socially appropriate ▪ Poor and women can cultivate fish in small ponds round the year 	<ul style="list-style-type: none"> ▪ Disease control ▪ Heat stress and salinity intrusion ▪ Natural disasters like Cyclones, tidal surges, heat wave
Shrimp cultivation	<ul style="list-style-type: none"> ▪ Socially appropriate ▪ Small organic shrimp farm are suitable for the poor and women farmers 	<ul style="list-style-type: none"> ▪ Costly ▪ Heat stress and virus attack ▪ Natural disasters like Cyclones, tidal surges, heat wave ▪

The drinking water and WASH related adaptation options and technologies have been identified by the villagers in Kaligang and Shyamnar Upazilas in Stakhira district in the coastal region. The widely used technologies are: RWH, PSF, piped water supply and deep tube-well (please see the table3).

Table-3: Local Adaptation Technology Matrix in Water with the Opportunities and Challenges

Name of water technologies	Opportunities	Challenges
Community -based Rain Water Harvesting (RWH)	<ul style="list-style-type: none"> ▪ Very popular and widely used in household level ▪ Women friendly ▪ Easy accessible for poor and women ▪ Climate resilient ▪ User friendly ▪ Socially appropriate ▪ Community people will provide appropriate land for installation of Community-based Rain Water Harvesting (RWH) ▪ Strong structure and can survive during 	<ul style="list-style-type: none"> ▪ Totally depends on rainfall ▪ Costly ▪ Feasible only for tin, asbestos sheet and plastic roof ▪ If rainfall becomes less, then not function. ▪ Distribution management of rain water ▪ Community engagement for further maintenance ▪ Should follow an appropriate guideline to ensure proper distribution of stored rain water to the community people

Name of water technologies	Opportunities	Challenges
	natural disaster i.e. Cyclone, tidal surges <ul style="list-style-type: none"> ▪ Salinity could not affect the structure ▪ Basically large size plastic tank 	<ul style="list-style-type: none"> ▪ Maximum six months usable in a year ▪ Large size plastic tank is not available in this locality. Have to collect from district or divisional town.
Desalinization technology	<ul style="list-style-type: none"> ▪ Women friendly ▪ Climate resilient ▪ Socially appropriate ▪ Adequate to meet the needs 	<ul style="list-style-type: none"> ▪ Costly and the community cannot afford ▪ Depends on electricity supply ▪ Not available in this locality. Have to collect from district, divisional town or from abroad. ▪ Poor people can't afford ▪ Highly mechanical and technical
Pond Sand Filter (PSF)	<ul style="list-style-type: none"> ▪ Women friendly ▪ Socially appropriate ▪ Adequate to meet the needs ▪ Easy accessible for poor and women ▪ User friendly 	<ul style="list-style-type: none"> ▪ Totally depends on rainfall ▪ If rainfall becomes less, then not function. ▪ Frequent maintenance required
Pipeline	<ul style="list-style-type: none"> ▪ Women friendly ▪ Socially appropriate ▪ Adequate to meet the needs ▪ Easy accessible for poor and women ▪ Climate resilient ▪ User friendly 	<ul style="list-style-type: none"> ▪ Costly ▪ Depends on electricity supply ▪ Not available in this locality. Have to collect from district, divisional town. ▪ Poor people can't afford ▪ Community engagement for further maintenance
Deep Tube Well (DTW)	<ul style="list-style-type: none"> ▪ Easy accessible for poor and women ▪ Climate resilient ▪ User friendly ▪ Women friendly ▪ Socially appropriate ▪ Adequate to meet the needs 	<ul style="list-style-type: none"> ▪ Depends on electricity supply ▪ Costly ▪ Only for household use, not for drinking or agriculture ▪ Not available in this locality. Have to collect from district, divisional town.

The Project has identified the best practices and local evidence on adaptation technologies through inventory, stakeholder consultations and action research with community and primary stakeholders. The project team has also **prepared a demonstration schemes on CCAT in water and agriculture** at the selected villages in two districts, but field level implementation could not be achieved due to Covid-19 pandemic in the country. Both the coastal region and wetland (*Haor* basin) are badly affected by COVID. The government has imposed restriction on movements in the regions again in the face of second wave of COVID in Bangladesh from late March 2021. The proposed **CCAT and adaptation technology fairs** could not be organized because of the growing COVID infections and current country-wide lockdown. These are to be implemented in the final year.