

***Project Title: Uptake of climate change adaptation research results in South Asia***

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*Subtitle: Evaluation of adaptation trials in the Ganges-Brahmaputra-Meghna delta and its upscaling to climate financing (Bangladesh)*

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## 1. Abstract

*Include a short abstract for the project (no more than 300 words) to introduce the project, the rationale, methodology and initial outcomes.*

Climate Resilience and National Resilience programs focus on formulating the Bangladesh National Adaptation Plan (NAP) for long-term adaptation investments and enhancing the national capacity to integrate climate change adaptation (CCA) in planning, budgeting, and financial tracking process. However, these programs and projects need a system-level quantitative tool to assess the requirement for adaptations at different scales and consequently decide on adaptation financing for these programs and projects. The current project is built on the earlier findings of the DECCMA project to address the above issues, with the target to add the necessary refinement through incorporating the equity, accessibility, adequacy, and gender dimensions to be useful at different scales of adaptation for climate change. The Dynamic Adaptation Model (DAM) is a product that has been developed gradually. It can be applied at different scales that can support the different communities and sectorial agencies/departments to guide local and national planning to adaptations while prioritizing in selecting appropriate options in different programs and projects to ensure the efficient use of available resources. DAM is developed based on strong mathematical formulation supported by field evidence. The model is calibrated and validated using field data to quantify the present-day adaptation need and now is being tested for some of the proposed adaptations in the NAP processes to assess its usefulness at the national level. Moreover, it is the home-grown model; therefore, the required customized version for different communities and agencies is possible through updates in the future with its extension for new areal coverage in collaboration with the developers and the alignment of the recent national initiatives. These are the ongoing processes essential to make it worthwhile for the mainstream national adaptation plan that needs further work.

## 2. Project Objectives

*As relevant, state the basic rationale for the project and the research problem or problems that were addressed should be stated. Often, the researchers' understanding of the problems will have evolved since the project was approved. The report should describe this evolution and the reasons behind it.*

*Re-state the general and specific objectives of the project, with a discussion of whether or not the objectives were met. If the objectives were not met, outline the reasons why and the subsequent impact on the project. Objectives may have also evolved, and the reasons and learning involved should be described. The degree of fulfillment of any new objectives should also be assessed.*

*The objectives wise progress of this project are as follows*

<i>Objectives</i>	<i>Progress</i>
To test the adaptation gap identified through recent studies conducted in deltas to reduce the risk generated from hazards in climate change and	We used socio-economic indicators to identify adaptation gaps and evaluate the adaptation options. Achieved 100%



<i>Objectives</i>	<i>Progress</i>
monitor and evaluate the implemented adaptations using some selected socio-economic indicators.	
To examine the accessibility, adequacy, and equity of potential adaptation options to fine-tune the theoretical analysis and upscale those evaluated options to support the national-level adaptation demand for climate financing.	Extensive field visits were done to examine the accessibility, adequacy, and equity of potential adaptation options. We made improvements of our Dynamic Adaptation Model (DAM) with the field-based knowledge. Achieved 100%.
To complete the adaptation finance proposal for Bangladesh that has already commenced/informed by DECCMA research findings, which requires further partnership with relevant government departments for completion and submission by the end of the project.	This project prepares the background to incorporate the research findings in the adaptation finance proposal. We established several important connections at different sectors workshops/meetings and developed knowledge sharing platforms through this project. However, integrating research findings at policy levels require time, at least 2-3 years evidence. This is an ongoing process. Though we did not attain this objective fully, this project created an enabling environment and would be realized through mainstreaming DAM in the near future.

**3. Outcomes and Results**

*The outcome sought under the CLARE program is:*

*“Actors in planning, programme implementation, policy and research use a range of evidence-based options to enhance and support communities’ livelihoods in the face of climate challenges in ways that benefit the most vulnerable women and men.”*

- *In general, how did this project contribute to that outcome?*

Climate change is the reality that is creating new challenges to the lives and livelihoods of the local communities, especially in the coastal zone of the Ganges-Brahmaputra-Meghna Delta. Four dominant hazards, i.e., flood, salinity, cyclones, and land erosion, are the major events that are being increased in terms of both frequency and magnitude for which the local communities are in

the course of adaptations dynamically. The Government of Bangladesh launched several initiatives to handle such future risks in the face of climate change through different programs and projects. The Bangladesh Climate Change Strategy and Action Plan (BCCSAP) is a knowledge strategy built upon the National Adaptation Programme of Action (2005). It sets out many programmes to be taken by Bangladesh over the short, medium, and long term within several strategic areas – food security, social protection, and health; comprehensive disaster management; infrastructure; research and knowledge management; mitigation and low carbon development; and capacity building and institutional strengthening.

Climate Resilience and National Resilience programs are the most explored events with the vision to formulate the Bangladesh NAP for long-term adaptation investments & enhance the national capacity for integration of CCA in planning, budgeting & financial tracking process. However, these programs and projects need a system-level quantitative model to assess the requirement for adaptations and consequently decide on adaptation financing for these programs and projects. The Dynamic Adaptation Model (DAM) is the available model to this end which has been developed gradually over the last one decade with the contribution of several internationally and nationally collaborative projects and can be applied at different scales of adaptation. It can support the different sectorial agencies/departments to guide national planning to adaptations while prioritizing in selecting the programs and projects through the efficient use of available resources.

As DAM is calibrated and validated with field data (captured in this project) and includes accessibility, adequacy, equity, and gender issues at the macro-micro level, it is readily available to be implemented by the vulnerable communities, NGOs and agencies involved in such adaptation schemes. Moreover, it is the home-grown model (Akter et al., 2021), and its dynamic version is built on that platform. Therefore, the required customized version for different agencies is possible through updates in the future with its extension for new areal coverage in collaboration with the developers (BUET and its partner institutions) and the alignment of the recent national initiatives.

- *Recount a “story of change” from your project towards this outcome: a narrative that illustrates a change that can be attributed, in full or in part, to the project, supported by evidence from which we can demonstrate a plausible contribution. A story should mention the situation before the project, the intervention conducted through the project, and the change that occurred.*

The uptake project contributed toward the concluding stage of the long journey that we started in 2010. Our research group consisting of around 100 active members in Bangladesh, the UK, and India in the ESPA Deltas project ([NE-J002755-1](#), supported by the ESPA programme in the UK) was initiated to answer some fundamental questions on how to make the balance between the conservation of ecosystem and the development projects in the coastal zone of Bangladesh such as ports, land reclamation, power-energy, climate change adaptations, and many other initiatives. It was one of the most significant projects considering the scale of the research projects in BUET. It was implemented over a period of 8 years. The entire team was led by Prof Robert Nicholls,

who created equal opportunities for all the members working from different nationalities. This approach created the platform to make the best utilization of resources and expertise in Bangladesh, eventually developing the ownership of the people involved in this team. Our research group had the opportunity to be in close touch with the important division (General Economic Division, GED) of the Planning Commission of Bangladesh, where the Bangladesh Delta Plan 2100 is formulated. The member of GED at that time, Prof Shamsul Alam (now state minister of planning), played an important role (with his team: Mr. Mafidul Islam, Dr. Taibur Rahman, Mr. Enamul Haque, and others) in providing our access to the planning commission (organizing several national-level workshops at NEC venue) with the understanding that the result of the ESPA Deltas project will be helpful in the BDP 2100 planning process. Two members of our team acted as the focal point of the Bangladesh Delta Plan from the ESPA deltas project to realize the above vision. Through these interactions, a [workshop on Science-Policy Interaction in Adaptive Delta Planning: Sharing key features of Bangladesh Delta Plan 2100 and ESPA Deltas Project was organised during 30-31 October 2016 at the Council Bhaban, Bangladesh University of Engineering and Technology \(BUET\)](#). In conclusion, Delta Plan has proposed to test the Delta Dynamic Integrated Emulator Model (DDIEM) in this project. This model can also be applied in some important projects proposed in the delta plan for the protection of sea-level rise, solution of water logging problems, and construction of new polders in the south-central region of the delta. Upon mutual agreement with the ESPA program, the activities continued until 2018. They produced a national level outcome with the showcasing of the results, and the book launching ceremony was held in the planning commission on January 16, 2020, [https://iwfm.buet.ac.bd/site/home\\_slide/integrated-assessment-for-the-bangladesh-delta-plan-2100-analysis-of-selected-interventions/](https://iwfm.buet.ac.bd/site/home_slide/integrated-assessment-for-the-bangladesh-delta-plan-2100-analysis-of-selected-interventions/)). In the meantime, the results of the ESPA delta project was compiled in a book where some of the members from the GED contributed as author of a chapter on the co-learning from ESPA Deltas project and the Bangladesh Delta Plan ([https://www.espa.ac.uk/projects/ne-j002755-1](https://www.espa.ac.uk/projects/ne-j002755-1;); <https://www.springerprofessional.de/ecosystem-services-for-well-being-in-deltas/15800914>).

It is important to mention that the available data in the National Water Resources Data Base hosted at Water Resources Planning Organization (WARPO) was utilized in this project. WARPO became the strategic partner of this project with an MoU. The MoU stated that the model and data collected and generated through the project would be deposited to WARPO when the project will be completed as a separate data set of ESPA Deltas project.

While our team was in the implementation processes of the ESPA Deltas project, another new collaborative project, the DECCMA ([IDRC 107642](#)), part of the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA), with financial support from the UK Government's DfID and the International Development Research Centre (IDRC) was initiated in 2014 that was built on the ESPA Deltas work. The project was completed in 2018 and was implemented by four countries: Bangladesh, the UK, Ghana, and India. Around 250 people worked

together on climate change adaptations with a central focus to deliver policy support on sustainable gender-sensitive adaptation in deltaic areas. This project utilized the full benefits of the connections already established through the ESPA Deltas project by engaging more stakeholders in adaptation programs and projects. The DECCMA project had provisions to recruit a number of graduate research Fellows (MSc and Ph.D.) and one officer, Tarique Omar, from GED directly placed for his Ph.D. research at IWF, BUET to explore the topic of Interactions of Science-policy-implementation on climate change adaptations. The motivation for recruiting the Ph.D. Fellows from the Government Officer in the research project were to prepare them for the next generation of policymakers and to establish science-policy interactions in a formal way.

While implementing these projects, we had another project led by the same group and funded by JICA-JST (2014-2019: SATREPS 051000000023) that dealt with Disaster Prevention/Mitigation Measures against Floods and Storm Surges in Bangladesh. The counterpart lead agency was Kyoto University, Japan, our long-term research partner since 1987-88. We then had the opportunity to combine all the available data, models, and a single research article on the sediment flux in the GBM delta was developed and published in Science of Total Environment (link: DOI:[10.1016/j.scitotenv.2018.06.147](https://doi.org/10.1016/j.scitotenv.2018.06.147)) authored by the researchers from Bangladesh-UK-Japan.

Meanwhile, after concentrated activities in Bangladesh, India, Ghana, and UK, in the final dissemination workshop of the DECCMA in 2018, we received a few more suggestions from a wide range of stakeholders that the developed adaptation model needs to have field validation and try to address community needs at the relatively root level before it can be applied in reality. We further implemented the required activities through a project funded by CDKN (administered by ICLEI, South Asia), Evaluation of adaptation trials in GBM delta and its up scaling to Climate Financing from July 2019 to December 2020 that enabled us to identify a few new issues such as the scale effects, people's perception, barrier to adaptation, accessibility/adequacy/equity, and relationships between different adaptations at the system level. As the network of CDKN is quite extensive, the adaptation model we shared on different platforms received wider exposure with a few more new comments.

The project Uptake of climate change adaptation research results in South Asia: Evaluation of Adaptation Trials in GBM Delta and its up scaling to Climate Financing got the final opportunity to make the long dream operational considering all the gathered issues. The central focus was to examine the **accessibility, adequacy, and equity** of potential adaptation options to fine-tune the theoretical analysis and upscale those evaluated options to support the national-level adaptation demand for climate financing.

In the meantime, we handed over all the ESPA Deltas and DECCMA data, and models to WARPO in 2019, and realizing the potential of the developed biophysical models in the above two projects, WARPO funded two consecutive projects on the issue of sediment management in the coastal zone of Bangladesh through which we further developed Bangladesh Delta model (BDM) using which the system-level response of any physical interventions can be assessed well before a project is implemented. The third phase of the project is in the process to be adopted to fine-tune the Bangladesh Delta Model to evaluate the flood risk for the entire country. BDM is a national tool

developed for WARPO to be implemented in different projects of the Bangladesh Water Development Board. It is worth mentioning that BDM is made in Bangladesh by Bangladeshi researchers, but all the results and information of ESPA-Deltas, DECCMA, and SATREPS are utilized.

This is not the end of the story. Tarique Omar, our Ph.D. fellow in DECCMA, went back to the Government and was in close touch with us to solve any emerging issues. For example, he reached out to us for one of the critical national issues on Flooding while the National Resilience Program is developing the Flood Preparedness Program (FPP). We developed the Dynamic Flood Risk Model (DFRM), which is calibrated and validated, piloted (by CARE Bangladesh), and in the process of utilizing it at the national level. It is important to mention further that DFRM is based on the data set of WARPO and the model generated under the SATREPS project.

In conclusion, around a decade ago, we approached the policy-planners-implementers with our research findings so that the evidenced base results could be utilized to solve several water-related problems in Bangladesh, and in return, in recent times, the policy makers and implementers are back to us with some key scientific questions to answer. This is the story of change. It takes time, patience, motivation-dedication, and an overall team spirit. The process functions both ways- 'Science-policy-implementation' and 'Policy-Implementation-Science'. Following these, government-level funding are realized through this type of process besides a number of faculties and students involved in the process are being engaged in a different national activity upon invitation from the Government.

- *Complete the Annex identifying specific outputs generated under the project (knowledge products, engagement, and capacity strengthening)*

As a continuation of the earlier projects, this Project created a multi-disciplinary platform to work together. Faculties and students at different universities within the University Network along with members of different NGOs, worked together towards the product, Dynamic Adaptation Model (DAM). Approximately 20 online knowledge-sharing meetings and training sessions were conducted through which the local issues on adaptation were understood. Training programmes were arranged for the team members to train them on fieldwork through a few socio-technical sessions and hands-on exercises. Since mid-December 2020, meetings have been conducted to develop questionnaires for four different hazards focusing on different livelihoods and gender dimensions. A preparatory meeting was conducted in January 2021, where members of the university Network and NGOs shared their opinion and experience on the draft questionnaire. They also provided several guidelines for conducting the field survey successfully.

Moreover, during the survey, members continuously shared their experiences to collect useful data, which helped strengthen their capacity. Around 50 members (faculties, students, and NGO employees) in this project were trained on basic understandings of the model, its use, the importance of climate change adaptation, the sectoral theme of the adaptation process, and selecting suitable adaptation for a future scenario. Besides, this knowledge sharing process with

the University networks and NGOs (faculties, students, and employees) can further provide the training to the local communities on the importance of climate change adaptation and can support future field data collection (a [list of the trained members are given in Annex 1](#)). Through this platform for future collaborative research that will continue beyond the lifetime of this project (Legacy). Trained communities ([listed in Annex 2](#)), developed during the implementation of the project, will act as future climate leaders at the local level that will continue beyond the project timeline.

As a part of the dissemination of DAM, a meeting was arranged with the Center for Environmental and Geographical Information Services CEGIS, a Government Trust, on 5<sup>th</sup> February 2022, where members involved at the policy level and researchers outside the core research group joined the meeting ([list of the CEGIS members are given in Annex 3](#)). It is important to note that CEGIS is developing the National Adaptation Plan, and they are keen to utilize DAM in the NAP processes. The goal of the meeting was to share to assess the potential of DAM to support NAP. Such interactions will be continued in the future beyond the project timeline. As the researchers in Bangladesh develop DAM, we are committed to supporting NAP through utilizing the DAM and beyond in the future. However, it is a continuous process, and further formal research is necessary for mainstreaming.

- *What were the most important results or consequences<sup>1</sup> arising from the project outputs and activities?*
  - *Why do these results matter?*
  - *How did the project advance knowledge and practice on climate adaptation?*

Adaptation has become the center of attention in climate change research regarding policy implications. Quantification of adaptation that will minimize future risk to cope with climatic hazards for a community helps plan a better future for that particular community. Many communities have a history of adapting to climatic hazard events, including those induced by climate change, through measures that include insurance or loan, infrastructure/engineering works, and disaster risk management. The priority is to enhance climate change resilience by building adaptive capacity through adaptations and taking specific technical (/formal) and non-technical (/informal) adaptation measures in climate-sensitive sectors. Quantification of adaptation is particularly important for developing countries and their poverty reduction efforts with limited resources due to low income and poor access to infrastructure, services, and education.

A system approach is followed to achieve this objective and quantify adaptation that will minimize risk in a specific climate-prone area and support the national-level adaptation demand for climate financing. The system is embedded within the natural and human systems. Quantification of

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<sup>1</sup> Project outcomes include changes in behaviours, attitudes, practices, capacities, policies, relationships, technologies, etc. that contribute to climate resilience. They may result from the research process or the application of research findings. Consider the consequences (outcomes) that result from tangible achievements (outputs).

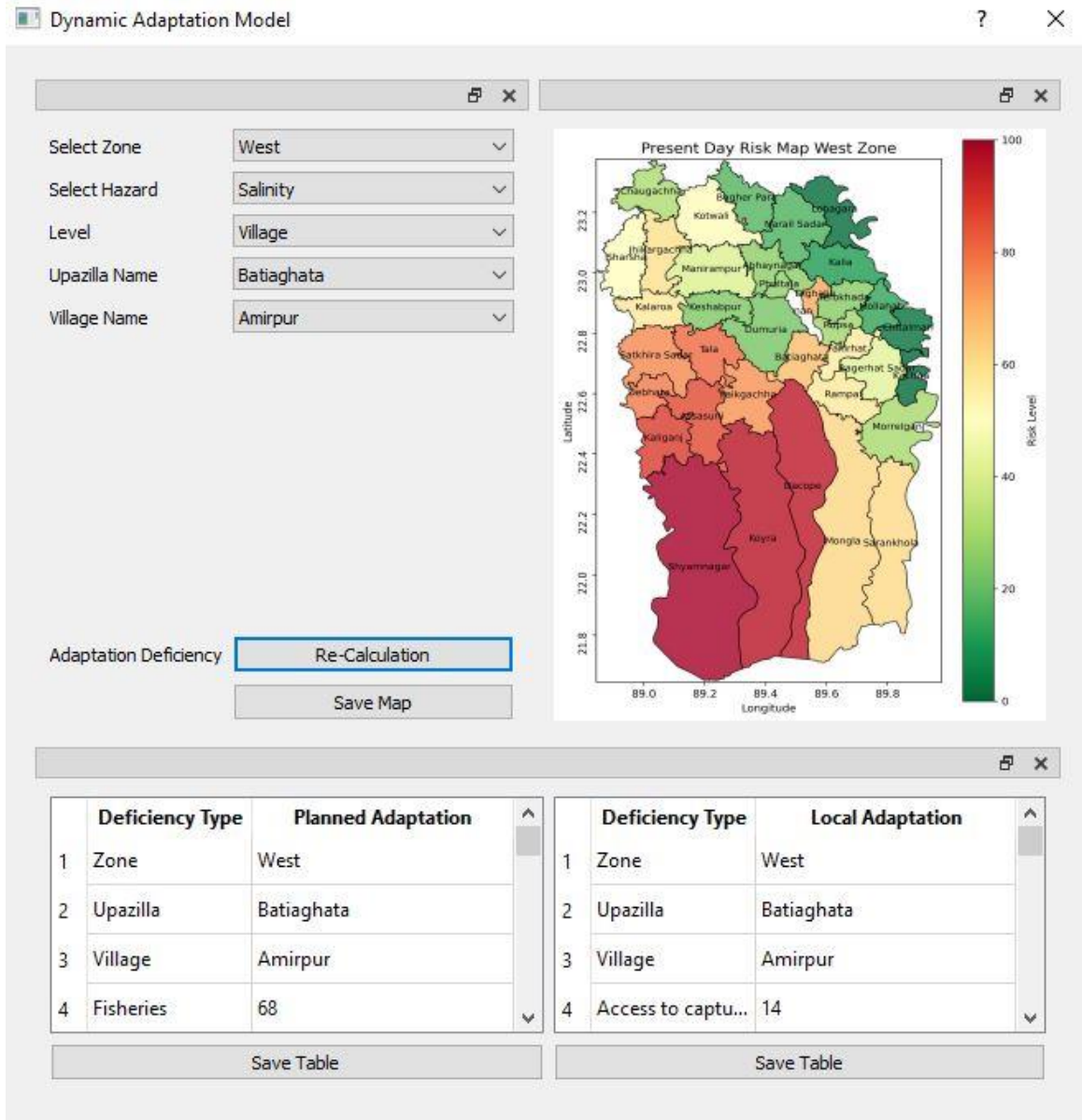
Adaptation needs can identify the priority of adaptation investment for risk-based planning. Investment in a particular adaptation should also consider overall impacts on other existing and planned adaptations, influencing risk minimization. For the quantification of adaptation needs, the calibrated and validated Dynamic Adaptation Model (DAM) is readily available. The two most important results from the project outputs and activities are found at the local and national levels.

- At the local level, the model was developed using community perceptions to identify the adaptation needs of a community and understand the relationship among the adaptations for calculating adaptation deficiency. To ensure this model results, the whole survey was gone through a knowledge-sharing process where a meaningful interaction on knowledge sharing and gathering occurred between trained persons and local communities for model development. Here, through the community perceptions, many changes, links, gaps and refinements were possibly identified in the model from the field.
- The dynamic Adaptation Model was proposed to join National Adaptation Plan. The initial plan and results of the Dynamic Adaptation Model were shared with different policymakers and government stakeholders in several workshops. Policymakers and different line agencies at the national level shared their opinions on their needs and expectations from the Dynamic adaptation model. By considering their expectations, Dynamic Adaptation Model (DAM) is now in further refinement.
- Furthermore, the Dynamic adaptation model creates an opportunity for involved students for further research and sharing. The whole scenario of the field was not possibly captured into the model due to time, funds and other limitations. However, opportunities for further knowledge advancements were open through this project, such as migration, biodegradation and environmental changes related to adaptation etc. were identified while conducting survey. 6 full time students from BUET and 15 part-time students from other universities were involved in this project in different sections including knowledge advancement. Among them 2 have completed their MSc thesis, 1 PhD and 2 MSc thesis are currently under supervision.

The Dynamic Adaptation Model (DAM) is a python based standalone desktop software. This model can minimize the risk of user-selected hazards for a selected zone. The optimization/minimization is performed using a python standard library named Scipy. Users can save the result as CSV file format as well as can save the map as jpg. The user interface (UI) is designed using the open-source QT-base python package PyQt. Other open-source packages like NumPy (Numerical analysis), Pandas (for data analysis), and GeoPandas (for GIS analysis and Mapping) were used to develop this software (**Figure 1**).



**Figure 1:** Interface of Dynamic Adaptation Model (DAM) software.



- *Compare intended and actual results - please comment on key results that were intended but not realized, and any unintended results that were realized.*

The CDKN (administered by ICLEI, South Asia) project, titled ‘Evaluation of adaptation trials in GBM delta and its upscaling to Climate Financing’, was implemented by our research group from July 2019 to December 2020. A few new issues are identified in the CDKN project, such as the scale effects, people's perceptions, barriers to adaptation, gender, accessibility/adequacy/equity, and relationships between different adaptations at the system level. Besides, more comments like sector-based adaptation need findings; investment priority comes while disseminating the adaptation model (Akter, et. al. 2021; Rahman et al., 2021) to the stakeholders of various sectors.



Three public policy briefs on the adaptation model, gender and community perceptions were developed to elaborate on the issues more precisely (See Annex). To incorporate the mentioned findings in the adaptation model, we identified the three following objectives under this project.

- To test the adaptation gap identified through recent studies conducted in deltas to reduce the risk generated from hazards in climate change and monitor and evaluate the implemented adaptations using some selected socio-economic indicators.
- To examine the accessibility, adequacy, and equity of potential adaptation options to fine-tune the theoretical analysis and upscale those evaluated options to support the national-level adaptation demand for climate financing.
- To complete the adaptation finance proposal for Bangladesh that has already commenced/informed by DECCMA research findings, which requires further partnership with relevant government departments for completion and submission by the end of the project.

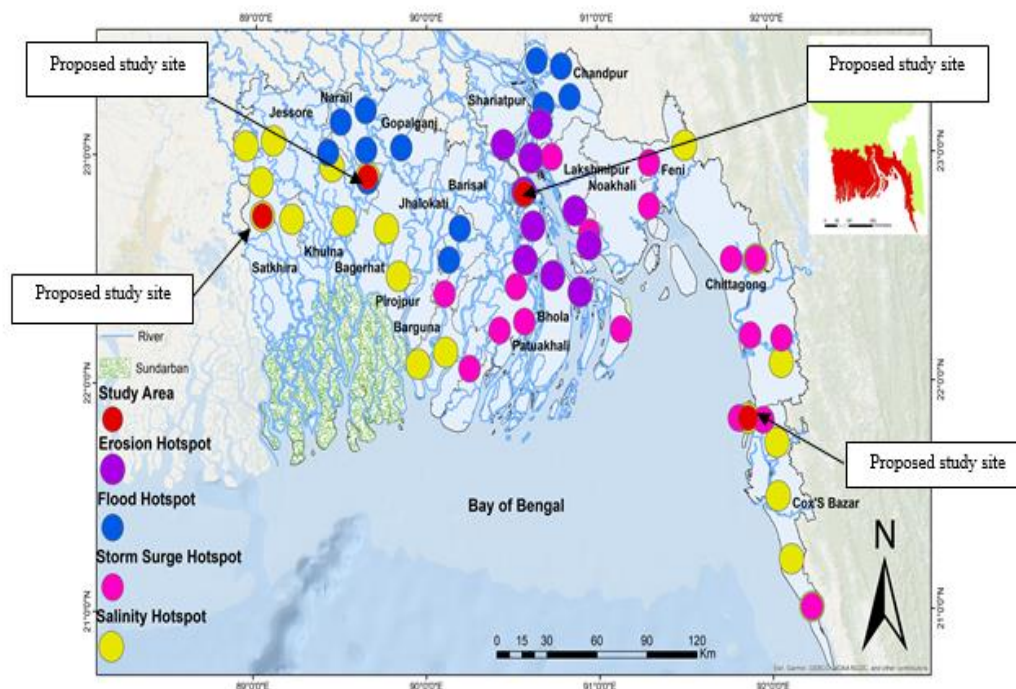
Apart from these, it is decided to conduct the field survey in 12 villages with respective hazards (Storm surge, Salinity Intrusion, Flood, and Land Erosion). Due to the constraints of time and resources, only six villages were surveyed to achieve the objectives. However, almost all findings found from the field surveys are included in the recent model. If we could survey 12 villages, the model would provide results with more confidence. [Results from field surveys based on objectives are described in Annex 4](#). However, based on the limited survey results, we have simulated the related information for all the villages in the coastal districts. Eventually, DAM will be ready to implement at the village level, which we did not intend at the beginning.

## **4. Implementation**

### **4.1 Project Management**

This study determines the deficiency in adaptive capacity against each of the hazard parameters. The risk hotspots related to different hazards (erosion: purple circle, fluvio-tidal flooding: blue circle, storm surge: bright purple circle, salinity: yellow circle) in the coastal are already being recognized through the DECCMA project. Four representative sites for field trials are selected (red circles and arrows) based on these four different hazard parameters, as shown in **Figure 2**. The dynamic behavior of hotspot mapping developed in the DECCMA would allow the policymakers to identify the adaptation needs dynamically. The local scientists developed the adaptation model in collaboration with the international scientists of the DECCMA project. Any future changes in this adaptation model will be taken care of by the core faculty members/students in Bangladesh who are involved in this project.

The major goal of this project is to contribute to the national level climate financing using the refined model (Dynamic Adaptation Model) to estimate future adaptation demands and consequently realize the adaptation financing that was initiated in the DECCMA project. Two interim reports have already been submitted to describe the project’s dynamics. As mentioned in the first interim report, two community-level training programs (focusing on Farmers and Fishermen administered by Barisal University, Patuakhali University of Science and Technology, and BASA/Ashroy Foundation) were planned in the Barisal/Patuakhali region. Amid the pandemic situation, the research team also explored potential project implementation methods (say online) during February-July 2020.

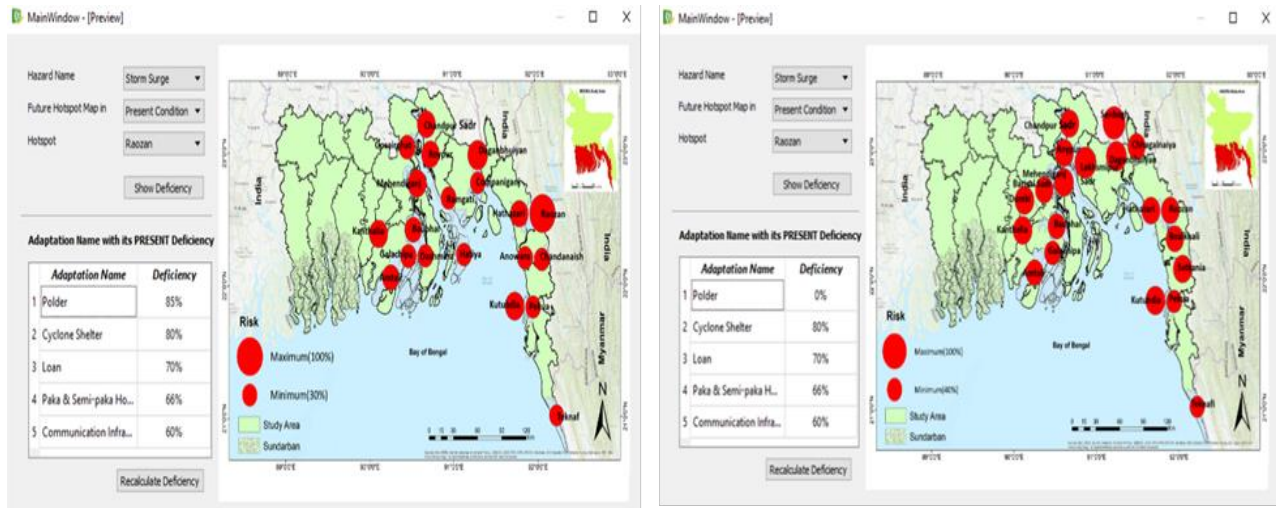


**Figure 2:** Distribution of hazards specific risk as recognized in DECCMA study and selection of study sites

The team analyzed the experiences and data of fieldwork and workshops from a CDKN-funded similar research project and incorporated them in designing the implementing approaches of this project. These means were adapted through keywords such as community-based adaptation, nature-based solution, gender and equity, and **scale effect of macro-micro level adaptations**.

The partner organizations received training in August 2020 ([Annex 5: Joint Training Workshop of CDKN and this project](#)) to gather local people's information. To achieve our first two objectives (i.e., identifying adaptation gaps and the accessibility, adequacy, and equity of potential adaptation options), a set of adaptation parameters among macro and micro-level units is selected through the NAPA, the BCCSAP and some recent studies shown in [Table 1](#) of [Annex 6](#). The research team

worked on survey questionnaires to understand the scale effect of objective two among the macro and micro-level administrative units (i.e., Upazila, union, and village levels). The preparatory meeting (January 12, 2021) was held with partner universities to prepare the team for the field survey. The duration of six field surveys, team members' names, and affiliations are detailed in Table 1 of Annex 7.



**Figure 3:** Conceptual diagram linking DECCMA-CARIAA Extension towards responding to needs and demands.

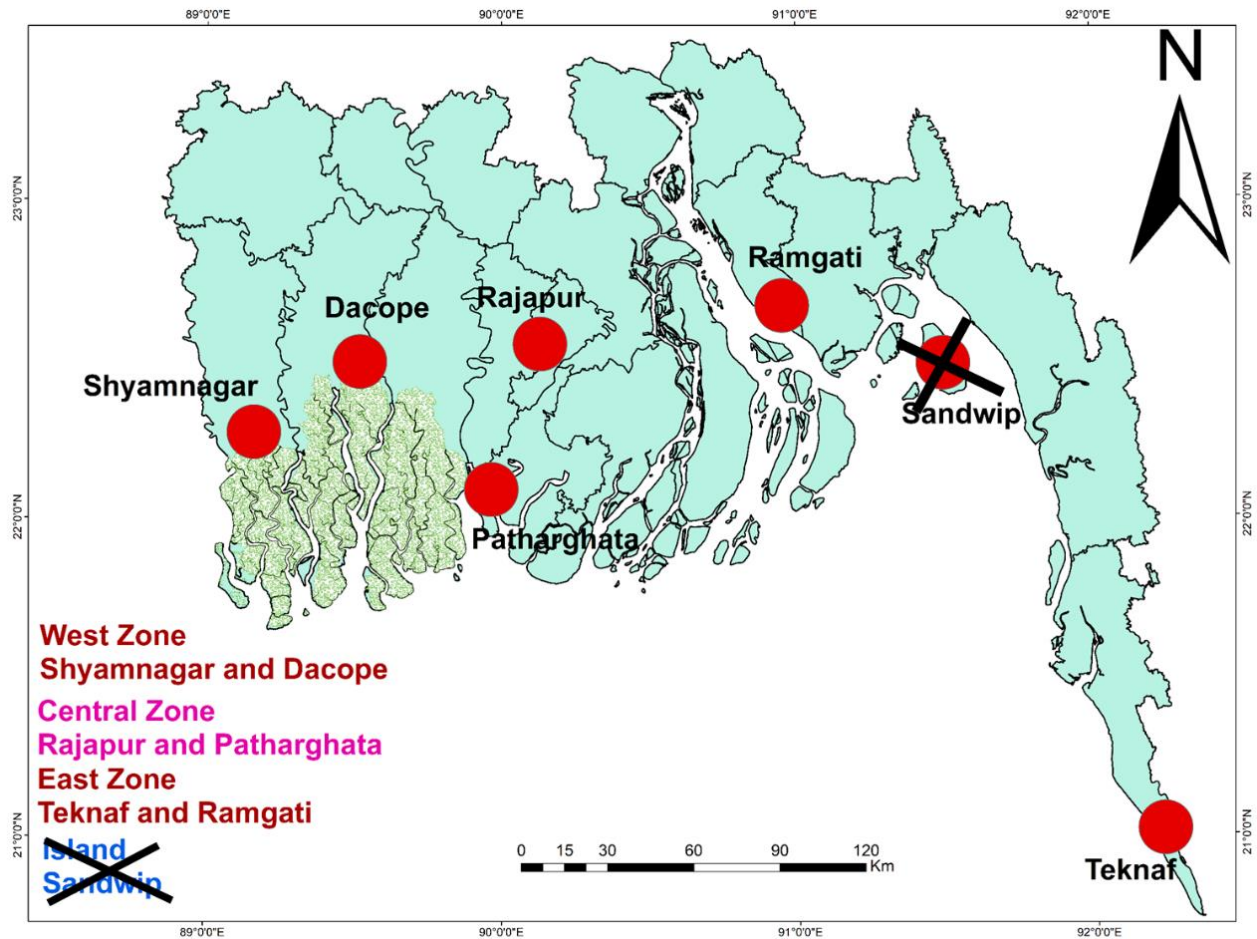
The in-person survey was conducted using the required safety guideline provided by Bangladesh Government and IDRC. We apply these field data to develop and validate the Dynamic Adaptation Model. The model will be available to apply in NAP, BDP 2100, MoEFCC, and BCCSAP and related programs and projects as open source. The relevant organizations/projects linked with the research team will ensure its broader applicability and necessary future updating. The final target is to make the availability of the DAM to the different levels of stakeholders.

Moreover, online dissemination needs to be ensured for its sustainability in the future. Policymakers/Users can easily access this model as an adaptation tool to compute the deficiency of an adaptation parameter for risk minimization of a specific zone shown in Figure 3 (left figure) where risk is visible. Later, adaptation deficiency in the study area is filled in one hotspot shown in Figure 3 (right figure). Then, the model gives a revised adaptation scenario, which will be helpful for decision-making processes.

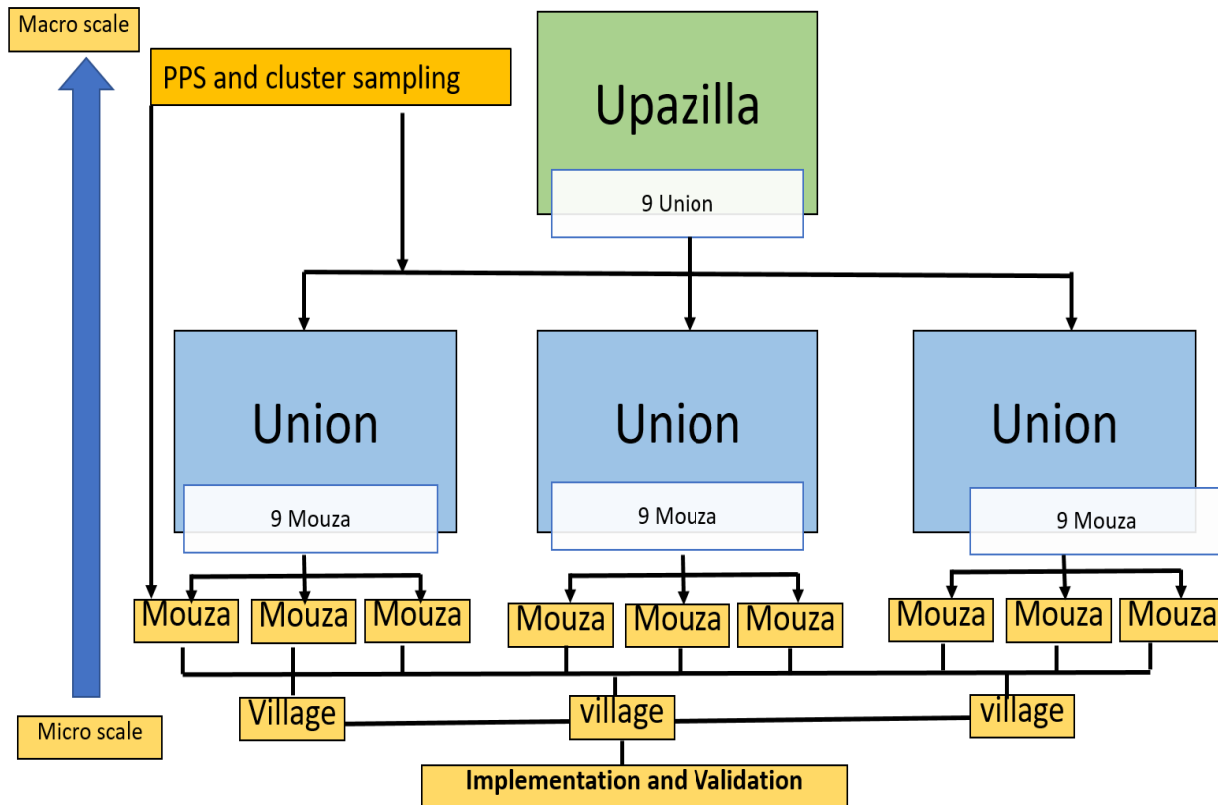
Field survey questionnaires are prepared based on four hazards, i.e., Storm Surge, Salinity, Flood, and Erosion. Fieldworks in six areas (Shyamnagar, Dacope, Rajapur, Patharghata, and Ramgati, Teknaf) (Figure 4) were completed by the project team (including local UNM, NGOs, Line agencies, local community etc.). More than 1500 households were surveyed in the six selected study areas. Generally, the breadwinner or household head of a household participated in the questionnaire survey where 60% of participants were male, and 40% were female. The study area

is selected based on a high-risk score and at the end of the project, there is a high prevalence of more than one hazard event.

All six field Surveys in Shyamnagar, Dacope, Rajapur, Patharghata and Ramgati, and Teknaf were completed within September 15, 2021, shown in [Figure 4](#) (field survey information and detailed study site map is provided in [Annex 8](#)).



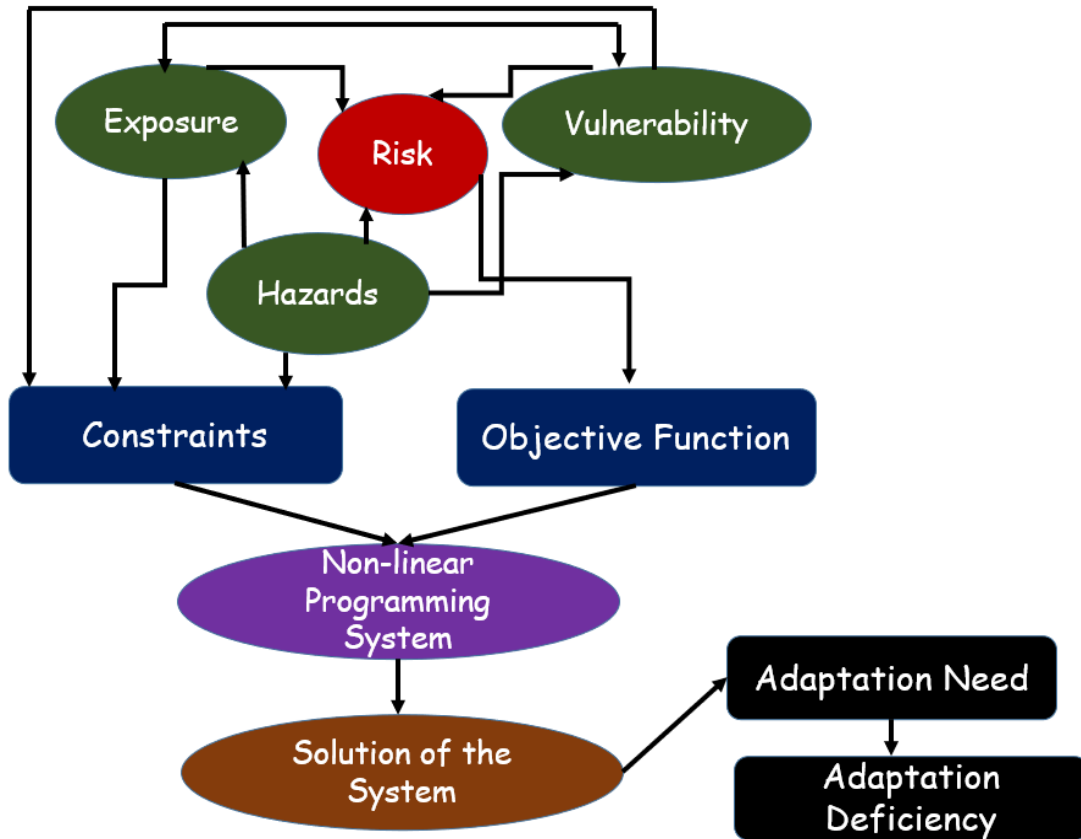
**Figure 4:** Study Area for Field Survey



**Figure 5:** Scale effect to Macro level to micro-level

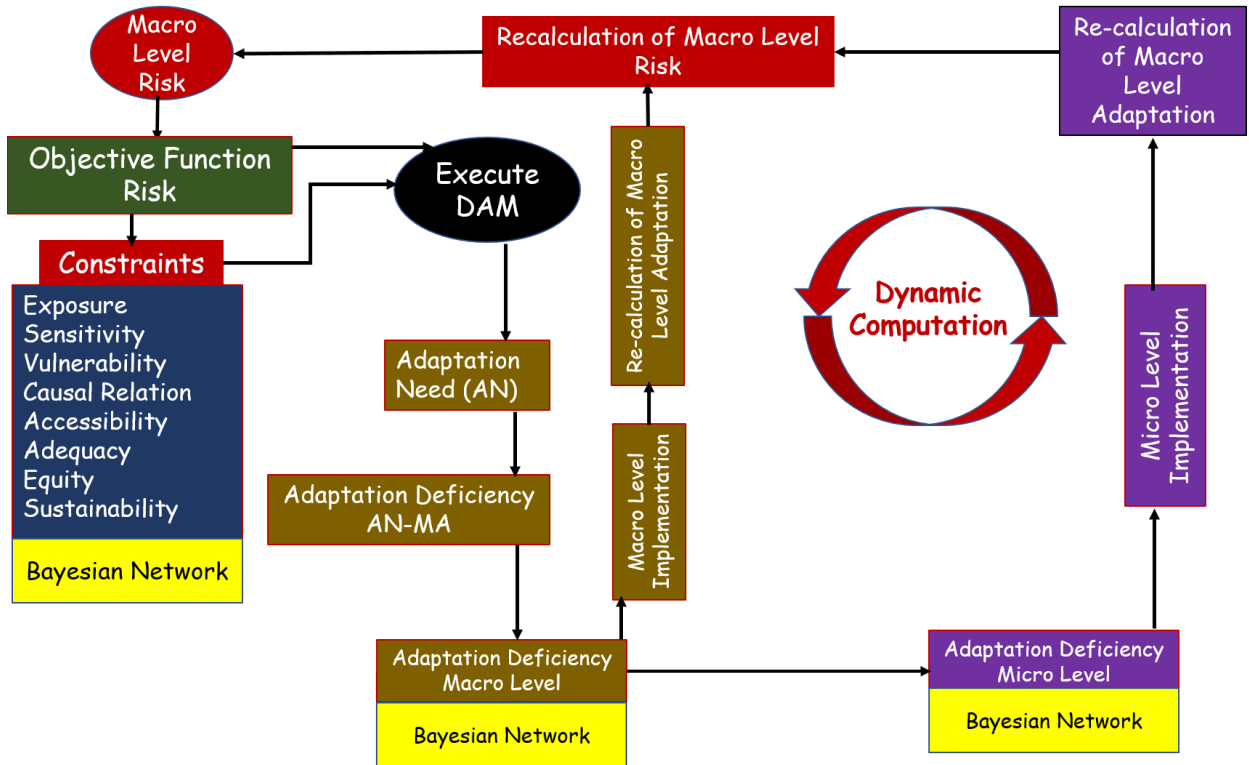
We incorporated a systems approach incorporating both the human system (exposure and vulnerability) and natural system (hazard) in the Dynamic Adaptation Model based on the feedback received during the training workshop with stakeholders. Indicators are selected in such a way that represents a location's geography, demography of a community, and natural variability of the system in an inter-related and inter-dependent manner. Risk is a measure of interaction between these two systems where any climatic hazards can impact both systems. The risk of these systems is minimized by applying non-linear programming. To minimize the risk (objective function), the system is bounded by several constraints (constraint equations). For example, different combinations of hazard, exposure, sensitivity, and adaptive capacities are bounded by different 'set rules' of the system which are expressed by different linear and non-linear constraint equations. The solution of this system estimates adaptation need, which is required to minimize the risk. The system diagram of the Adaptation Model is shown in [Figure 5](#).





**Figure 6:** System diagram of the Adaptation Model.

Besides, the adaptation measures' causal relations are incorporated into the model using Bayesian Network so that the Dynamic Adaptation Model behaves appropriately (Figure 6). Scale effect of **macro-micro level adaptations getting output from the CDKN project** is introduced in the recent version of the Dynamic Adaptation Model (Figure 7). The methodology of the model and survey questionnaires were designed with the help of regular virtual team meetings during COVID 19 pandemic. In addition, a series of virtual meetings with partner universities were held to construct a team for the field survey. When the prevalence of the COVID 19 became acceptable, field surveys in all six areas were completed.



**Figure 7:** Flow chart of Dynamic Adaptation Model

#### 4.2 Challenges in implementation

One of the important targets of the present research is to develop awareness of the community level stakeholders about the impact of climate change, train and demonstrate climate-adaptive livelihood practices in the coastal zone of Bangladesh. Probability proportional to size (PPS) and cluster sampling methods are used in the representative micro-level administrative units (e.g., Mouzas) to fulfill the objectives and activities mentioned above. The methodology changes are now considered a transformation from the macro scale to the micro-scale and a causal relation among the micro and macro level adaptations. This process is vital for implementation and model validation. The survey questionnaires based on four hazards (Storm Surge, Salinity, Flood, and Erosion) are also designed within this scale range. Several field surveys were conducted between February to September 2021. During the survey, COVID 19 was identified as the primary constraint that the team faced. After completing the survey in five villages, the team has to stop the field survey work due to the second wave of COVID 19. Surveys of five districts were conducted continuously, but due to lockdown in the COVID 19 situation, the survey at Teknaf was postponed. Although attempts have been made to continue, it was delayed by uncertainty. When the situation became favourable enough, our team started the last survey in Teknaf in September. During that time, local people, stakeholders, and NGO representatives took time to be more liberal to cooperate. To overcome this challenge, social distance, proper safety, and security were maintained. Besides, communication with local people using the local language sometimes creates misunderstanding, which was overcome with the help of local representatives. Sometimes people

answered or gave their opinions in a biased way, which was accommodated by cross-checking others' perceptions. Maintaining a large team in the field sometimes become challenging for the team leader. This issue was overcome by discussing with the team, understanding their needs, and sharing their experiences.

We are currently developing and validating the Dynamic Adaptation Model using the results from the completed six field surveys. The rest of one survey location will not consider further amid uncertain conditions and conclude project activities within the project time limit.

Restraining or social distance order had affected access to local-level information. Regular online meetings were arranged to review the progress and discuss additional work plans. As all the academic and official institutions were closed due to the pandemic situation (From March 2020 to September 2021), the work progress slowed down due to the absence of face-to-face group consultation in an academic environment.

Findings from field surveys were incorporated in the Dynamic Adaptation Model and shared with the national and international levels. Despite having a low prevalence of COVID 19 from June 2020 to August 2021, interaction and communication with stakeholders or key members of various Government and Non-Government Organizations were not comparatively strong. Sometimes, the virtual communication method with local stakeholders, line agencies, and NGOs make the implementation more time-consuming. Despite the challenges, the research team is continuously working to fulfill the project demands through a series of online meetings conducted within the team.

### 4.3 Partnering

Our research team conducted extensive surveys to cover up the delay caused by the COVID pandemic. The survey team exhausted all the allocated research funds received from August 2020 to January. Initially, three Research Associates (RA) were engaged to start project activities at the preparatory stage. Part of the allocated resources was spent with a variance of 46.8% (underspent) during the six months of August 2020- January 2021. The resources for the investigators (PI and CO-I) involved in this project were spent as planned, with a 0% variance. Gradually partnership among the RAs of BUET, Students and faculties of other universities, and members of NGOs were developed. Four universities, including Barisal University, Bangladesh Agriculture University, Patuakhali Science and Technology University and Khulna University, and two NGOs named AVA and BASA were joined to strengthen the project activities. A total of eight faculties, 12 students from partner universities, and 4 NGO members are fully or partially involved with this project. The allocated budget was spent as planned. The budget for RAs was increased by increasing the number of RAs, i.e., from three to eight. Among them, five RAs worked under the supervision of BUET, whereas the partner universities monitored the other three. These three RAs from partner universities are preparing their MSc thesis by generating complementary knowledge to the project objectives. According to the time commitment in this project, the allocated budget for international consultants is revised as their visit to Bangladesh was not possible because of COVID 19 pandemic. The financial report shows that the research and other expenditures are



projected to be extended until December 2021 as a no-cost extension basis to ensure the best use of the project resources.

#### 4.4 Project state

Risk and adaptation measures are changed with hazard, location, and livelihood basis which is influenced by different socio-economic factors. To reduce the adaptation gap and test the implemented adaptations, questionnaire Surveys and Focus group discussions were conducted according to prepared semi-structured questions focusing on each of the four hazards. This process has already been completed successfully. Moreover, these survey methods and Key Informant Interviews (KII) are also used to gather data related to accessibility, adequacy and equity for fine-tuning of analysis. Above mentioned analysis and evaluation of adaptation measures are ongoing to reach the second objective of this research. Moreover, researchers are also working on the development of its software version. As now Government has opened all sectors, our team has tried to communicate with national officials for further partnership.

National Adaptation Plan (NAP) is planning to cover every necessity of the country's climate-vulnerable areas, focusing on immediate to long-term assistance. NAP is synergically aligned with Bangladesh Climate Change Strategy and Action Plan (BCCAP) and the recently published IPCC 6th report. NAP will allow Bangladesh to identify country-specific adaptation needs; develop and implement strategies to address the adaptation needs, and help her decide on actions to protect vulnerable communities. In order to address the adaptation needs and implement adaptation strategies in the vulnerable communities, DAM will play an important role. Consequently, the budget for the adaptation plan will optimize and risk will rapidly reduced in the vulnerable communities. However, for refinement of DAM, more field surveys will be needed and more demonstration among policymakers and government stakeholders will be required.

#### 4.5 Safeguarding

This project is based on field data and direct communication with respondents. That's why proper safeguarding protocols are maintained in this project. Due to the COVID 19 situation, safety measures are taken according to the instructions of the Bangladesh Government. Maintaining Social distance, using masks and sanitizers, and other precautions are considered in the project during data collection and communication with participants. Safety measures are considered during training. This project takes the necessary steps to prevent sexual exploitation, abuse, and harassment. Local representatives, Local NGOs, and line agencies are involved in the project. So proper verification has been done before going to the area and involving the respondents to avoid such circumstances. Strict monitoring was done to ensure the safety of the participants.

#### 4.6 Gender and social inclusion

Climate Change Gender Action Plans (ccGAPs) build on a country's national climate change policy, plan, or strategy into gender-specific issues by priority sectors such as mitigation, adaptation, and resilience-building efforts for women and men in every community. The methodology builds the capacities of women and women's organizations, together with

government representatives and other key stakeholders—championing the value of gender equality and women's innovative activities and solutions. Around half of the population in Bangladesh are women. Gender roles and relations mean that specific adaptation needs are different, and thus to ensure equitable adaptation, understanding these gendered needs and preferences is essential. The proposed project will further enhance the socially inclusive gender action plans and contribute to gender equality and enhanced sustainability in line with the Bangladesh Climate Change and Gender Action Plan and in pursuit of the Gender Action Plan of the UNFCCC and the Sustainable Development Goals. This project supports women's involvement in adaptation during climatic disasters. Women in coastal Bangladesh struggle to withstand natural disasters. Various types of women's barriers to taking part in climate actions are found through the training and demonstrations. As a questionnaire is prepared and conducted to know the gender barriers (mainly for women), barriers are documented in the project implementation. Economic, Political, social, cultural, and religious constraints surge their hardship. Most of them are involved with poultry, homestead vegetation, livestock rearing, nursery creation, and handloom activities under these difficulties. A rural woman serves as an umbrella in her family to balance all economic insufficiencies, motivating them to adopt traditional and indigenous knowledge and new technologies for better earnings. In studying and/or implementing activities, men and women are paying more attention to accessibility to make gender-sensitive recommendations on the best ways of adapting for each gender.

For the gender consideration in the project, a separate questionnaire is prepared and hence, conducted. The results found that all adaptations are not played as effective as others. For example, still most of the cyclone shelters are not gender-friendly. Especially the women and disabled people are especially not interested in moving into a shelter due to its social and cultural norms and inadequate facilities. Some adaptations are not possibly accessible for gender groups due to their decision-making ability. Such as, women weren't moving to growth centers for economic purposes due to permission issues from their husbands. Besides, male-dominant societal norms decrease their willingness to adopt an adaptation that is directly linked with monetary value such as livestock.

Through the survey, it was identified that, as gender groups are vulnerable to climate change, their interection to a family plays a very effective role both physiologically and economically. It is possible for them to make empowerment through adopting an adaptation if the constraints will remove. If they had full power to use money or make family decisions, most of the adaptations will be more effective than the current results. By sharing knowledge and raising awareness its possible to make a community more sustainable against climate change.

Furthermore, gender is considered for selecting each of the adaptation measures. To build the causal relation among the adaptation measures, gender is one of the criteria. With the help of community perception, accessibility, adequacy, gender, and barriers while taking an adaptation option, equity of an adaptation is determined. During the field survey for gender, mainly women are considered. For social inclusion, a questionnaire was prepared to focus on different ages and

livelihoods. The impact of hazard varies on livelihood basis. Salinity has adverse impact on agriculture but not that much effect on day worker. All of these region have different occupation and livelihood dynamics.

As gender is one of the criteria for the selection of each adaptation option, constraints are easily captured for each adaptaion action in the DAM model. So , policymakers can easily see the impact of gender barriers on the adaptation implementation using the model. They can also undersatnd the effective role of women in the family while taking an adaptation action.

## 5. Uptake

- *Describe project efforts, challenges and successes on supporting uptake<sup>2</sup> of research results.*
- *Recount specific examples of:*
  - *Demand “requests by stakeholders and target actor groups to brief on, produce, partner in, or provide technical assistance to apply evidence, outputs, recommendations or follow-on projects based on the work conducted by your project”*
  - *Endorsement “indication of a binding use (formally or officially communicated by users, for example in office orders, meeting minutes or official messages that have been formally documented and announced) of any products, recommendations or communications from the project research”*

### 5.1 Efforts Towards Research Uptake

- 1<sup>st</sup> workshops (27 August 2020) (See full list in Annex 5) and 2<sup>nd</sup> Workshop (February 5, 2022) (See full list in Annex 3) on the 'Dissemination of Dynamic Adaptation Model (current version)' were delivered by the project PI. Several universities, line agencies, and NGOs were present there. It stated the necessity of a quantitative tool to assess adaptation needs such as 'development and piloting of Climate risk-informed decision-making tools by planning and budget departments at national and sectoral levels in the NAP. We discussed this issue at length and planned to organize a separate meeting with NAP to explore more details.

- In addition, we synchronize our adaptation targets with the national targets in the research framework meeting scheduled on October 4, 2020. Two virtual meetings with Dr. Robert and Dr. Katharine (19th January 2021 and 23rd February 2021) were held to develop survey questionnaires and field results. The participants consulted various complexity among the adaptation measures in a micro-level finding from field surveys. Incorporating field results in the Dynamic Adaptation Model was also a major concern, and possible solutions were discussed in this meeting.

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<sup>2</sup> Research uptake refers to efforts and outcomes in increasing the reach and use of research, such as in policymaking processes

- The method of the research also included the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) to align with the govt's plan and policies.
- We are developing different type of version of DAM like Upazila level or district level, following NAP or BCCSAP.
- Another achievement during this reporting period is the three conference presentations. These peer-reviewed presentations were delivered during March 29-31, 2021, at the 8th International Conference on Water and Flood Management (ICWFM). Besides, four journal papers (two papers on model development and other two for socio-economic consequences and changes) will be published, which are now under the lettering. The title of the papers are:

Paper 1: Relationships among the Adaptation Strategies against Multi-Hazard Impact: Perceptions from coastal community of Bangladesh.

Paper 2: Computing adaptive capacity against salinity hazard in the west coast of Bangladesh by applying Bayesian network - (calibration in the west zone, validation in central and/or east zone)

Paper :3 Regional heterogeneity of adaptation against salinity hazard in Bangladesh coast

Paper 4: Multi-scalar adaptation model to compute adaptation deficiency against salinity hazard in coastal Bangladesh

## 5.2 Challenges of implementation and uptake

- The current research work's target is to be aware of climate change impact, train up the local people, and demonstrate climate-adaptive livelihood practices in Bangladesh's coastal zone. Probability proportional to size (PPS) and cluster sampling methods are used in the representative micro-level administrative units (e.g., Mouzas) to fulfill the objectives and activities mentioned above. The method's changes are now considered a transformation from the macro scale to the micro-scale as well as a causal relation among the micro and macro level adaptations. And it's very challenging to make a real change of scenario when the model shows the result of an area from macro to micro or micro to macro. This process is vital for implementation and model validation. Moreover, we can get success in developing the model. For example, when we see the risk map of the Jhalokanthi district, it is moderately risky for erosion. However, when we see the upazila risk map of Rajapur under the Jhalokanthi district, it is shown as highly risky for erosion hazards.
- The survey questionnaires based on four hazards (Storm Surge, Salinity, Flood, and Erosion) are also designed in this scale range. Several field surveys were conducted between February 6, 2021, and April 4, 2021. However, surveys in Sandwip and Teknaf could not be conducted as planned due to the high prevalence of Covid-19. Later in November 2021, we

completed the survey in Teknaf. It slowed down the overall model development work. Finally, we are trying to recover the time period losses due to the covid-19 pandemic.

- Restrain or social distance order had affected access to local-level information. Regular meetings were arranged to review the progress and discuss additional work plans. The work progress slowed down due to the absence of face-to-face group consultation in a lab environment. Face-to-face meetings or access to physical work in the lab has a positive side that enhances the interactive and peer learning process, giving a better output than online meetings and individuals working from home. From January 2022, the govt. of Bangladesh has imposed restrictions again due to Omicron spreading out. Still, we are suffering and trying to recover the project's time limit.
- Findings from field surveys were incorporated into the Dynamic Adaptation Model and shared with the national and international levels. Despite having a low prevalence of Covid-19 from June 2020 to March 2021, interaction and communication with stakeholders or key members of various Government and Non-Government Organizations were not comparatively strong. The selected study areas are remote from the district or upazilla center. Local stakeholders are not so much familiar with virtual meetings. In fact, there are not enough network and technological facilities to attend virtual meetings. Besides, Due to the long pandemic effect, people are agitated about their socio-economic condition and livelihood. So, the virtual communication method with local stakeholders, line agencies, and NGOs makes the implementation more time-consuming. Way of communication, lack of internet access, lack of technologies, and poverty problems of local people make the mentioned activities more challenging to be fulfilled. Despite the challenges, the research team is continuously working to fulfill the project demands through a series of online meetings conducted with them.
- As our adaptation model deals with the socio-economic condition, it is a very dynamic process. To capture all the consequences in the model, experts suggest surveying as many areas as possible. It will help predict a better scenario. We are surveying only six spots under this project. It's challenging to develop the best-optimized model based on these little survey data. We need more surveys in other areas, and we can still not make progress.

## **6. Research findings**

Climatic and climate change impacts are measured by risk, and it is a challenging task for people to cope with the system. The dynamic adaptation model is an effective tool in this physical setting to minimize the risk of a system, and its framework is designed with more refinement within this time. During this project's implementation phase, several field surveys were conducted to develop and validate the model. Some findings related to the field survey are given below.

- In the study area, livelihood plays a crucial role in practicing adaptation options. Hence, the model should be taken care of these issues.
- Few adaptations like safe drinking water source, safe sanitation, safe housing etc., are basic needs for households; those adaptations did not have monetary feedback. When community people

did not have easy accessibility to primary needs, they find out adaptation measures to ensure their basic needs. For example, drinking water sources, safe housing or safe sanitation didn't give monetary return like livestock or plantation did.

- In the study area, data was collected for a model household basis. Key members of a family or breadwinner gave their perceptions about their adopted measures.
- But, adaptation measures vary from person to person. Adopted measure differs with age and gender as well as their role in the family. But this study has found that the breadwinner plays the decision-making part while choosing adaptation measures. As gender is one of the criteria for selecting the adaptation measures in the study, this learning will be possible to take care of in the model.
- For example, adopted measures are not equally accessible to the members in a family of five. This problem becomes crucial in a joint family when distributing the resources dominated by the family's key members.
- From our field survey, it has been seen that the relationship between Macro to Micro varies with time.
- A non-linear relationship is seen between micro to macro adaptation.
- Barriers should be considered very significant in the case of Gender groups. This is also an important criterion in selecting the adaptation measures. The policymakers can consider these findings to implement future measures by following their own strategy.
- The study has found that Communication Infrastructure is the main barrier while ensuring accessibility in Growth center (Hat/Bazar)
- Cultural Barriers should be considered highly. It is challenging to reduce cultural barriers to the local people. Without removing the cultural barriers, the implementation of other measures may not be effective. For example, in Bangladeshi culture, women are prohibited from going into a market or growth center or they need to take permission from their husbands to go to the market. Besides, cultural norms like domination by males, less value of women's decisions and not involvement in money-related issues decreased women's involvement in adaptation measures. Especially those adaptations which have high monetary returns like livestock, fisheries etc.
- Even distribution of resources to ensure equity in adaptation measures cannot reach people due to political, administrative, and economic barriers. Hence, Govt. initiatives in implementing different adaptation measures lose their effectiveness.
- some adaptations are not related to or dependent on other adaptation practices but are necessary for human existence. For example, safe drinking water is mandatory to live in, but it cannot support adopting other adaptations like communication infrastructure, growth center, livestock, or cropping system. Here safe drinking water is the basic need for human beings for

living. Collecting water from a specific suitable source is an adaptation. In general, people collect the water from a suitable source. Nevertheless, Inadequate sources of water force human beings to adopt another source.

- The local people's demand for adaptation is based on their occupation. Farmers in salinity-prone areas need freshwater sources, whereas people who are involved in shrimp in salinity-prone areas need saline water. It's a big challenge for the decision-maker whether they implement freshwater sources or saline water sources, or both in the same area. Based on strong research findings, the socio-economic view, geo-morphological characteristics, and future sustainability will be considered here.

All of the findings will be tried to accumulate in the model. These learnings will help us make a causal relationship between the macro and micro level adaptation measures incorporated in the model. The final target is to make the availability of the DAM to different levels of stakeholders at the end of the project.

### 7. Demand and endorsement

- The government stakeholders need technical assistance by which they can decide on the right platform of implementation of NAP, BDP 2100, SDGs, and five-year plans. DAM will be developed aligning with those govt's plans.
- Another demand of govt. stakeholders is that Applicability of the plans in Local Governments or small scale. DAM is targeting this point which is one of the advantageous sides of DAM that the model gives results on both small and large scales.
- An additional demand of the Bangladesh govt. is that they need a base model for the whole of Bangladesh considering all regions and all types of present and future climatic disasters by which they can implement BDP 2100, and all development works following only one model. DAM is to be developed in a flexible method that will be developed for the entire country for all hazardous scenarios.
- The DAM model is replicable to other deltaic environments.

Present status of DAM model and future research directions

- DAM 2.0 (complete) Adaptations are defined as planned adaptation and autonomous adaptation. Only planned adaptation deficiencies can be filled by 100%
- DAM 2.1 (complete) Adaptations are defined as planned adaptation and autonomous adaptation. Both planned and autonomous adaptation deficiencies can be filled by any Percentage
- DAM 2.2 (proposed) Adaptions will be based on BCCSAP Themes and Programs. Both BCCSAP thematic deficiencies and related adaptations can be filled by any percentage.

- DAM 2.3 will be our generic model version, where we considered all interrelation of adaptations.
- DAM 2.4 (customized version for BCCSAP as per govt's requirement)
- DAM 2.5 (customized version for NAP as per govt's requirement)
- DAM 3.0 will deal with climate change scenarios for 2050 or 2100.
- DAM 4.0 will be similar to DAM 2.0 series, but this will contain additional survey data. These additional data from different regions and communities will include similar types of data currently used. This additional survey will build the adaptation inter-relationship and interdependence more precisely and the model will be refined.
- DAM 5.0 will be similar to DAM 3.0, but this will contain additional survey data. More survey and more data will help to DAM to be more refined
- DAM 6.0 series will be for the entire country.
- DAM for other deltaic countries in the same or different name.

#### 8. Additional Insights

- *What lies ahead for your team in terms of future research directions and collaboration? If relevant, mention additional activities or research questions that emerged from this project.*

This research project enabled us to establish new networks with researchers, policymakers, and implementers through continuous engagements and meetings. It was concentrated to cover the entire coastal zone of the Ganges-Brahmaputra-Meghna Delta. Therefore, the Dynamic Adaptation Model (DAM) developed in this project is readily available for climate change adaptation programs and projects in the coastal zone. BCCSAP document is updating right now, and our initiatives ([list of projects and relevant outcomes are listed in Annex 8](#)) and outcomes are being incorporated in the updated version of this national document. However, as the National Adaptation Plan (NAP) covers entire Bangladesh, it is important to expand the DAM for the other areas, especially in the other hotspots of Bangladesh Delta Plan 2100. Therefore, we are planning to expand DAM for other areal coverage in the future project with the partners. Moreover, updating DAM in terms of socio-economic information is essential in the model that requires a social survey at a suitable interval. This interval was determined by the weather conditions and climatic seasons. As adaptation practice in the same region is varied with changing weather. Some Adaptations of the rainy season are not practiced in the dry season in the same districts of a region. It should be mainstreamed with the national planning but can be initiated through a follow-up project.

- *Provide any feedback to IDRC and FCDO as research funders:*



- *Candid observations about the overall experience with the project are encouraged.*<sup>3</sup>
- *We welcome recommendations and advice on future research needs or opportunities.*

The joint funding program implemented in this project by IDRC and FCDO is very cooperative, especially in ensuring the required funding. However, the evaluation process of financial reports is very complex and time-consuming. It can be relatively simpler and research-friendly to accelerate the project activities.

- *How can we reduce the environmental and climate impacts of research activities in future project design and implementation? (optional)*

To reduce the environmental and climate impacts of research activities in the future project design and implementation, a detailed inventory of the implemented and upcoming projects needs to be reviewed in the proposal.

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<sup>3</sup> Any sensitive or confidential information should be addressed through a direct exchange with the program officer and documented and filed separately.

*Annexes*

### *Annex 1: List of Trained Members*

List of members who were trained through this project for further knowledge brokering on climate change adaptation

### **Trained Members**

1. Prof. Dr. Mohammad Rezaur Rahman
2. Prof. Dr. Anisul Haque
3. Prof. Dr. Md. Munsur Rahman
4. Prof. Dr. Mashfiqus Salehin
5. Dr. Sonia Binte Murshed
6. Dr. Sara Nowreen

7. Prof. Dr. Md. Anwarul Abedin
8. Prof. Dr. Mostafa Ali Reza Hossain
9. Dr. Nazmul islam
10. Dr. Ayesha Akter
11. Dr. Dhiman Kumer Roy
12. Dr. Tareq Mahmud Abir
13. Md. Abdullah Salman
14. Md. Rasheduzzaman
15. Md. Shamsuzzoha
16. Prof. Dr, Md. Atikul Islam
17. Dr. Munir Ahmed
18. Ms. Marin Akter
19. Md. Manjurul Hossain Shourov
20. Mr. Rayhanur Rahman
21. Mr. A. K. Azad
22. Kamrun Nahar Polin
23. Hamima Huma
24. Sabrina Akter
25. Al-amin
26. Zahid
27. Md. Israfil Haque
28. Md. Rayhan Ahamed
29. Ayon saha
30. Sadia Rahman
31. Arnob Bhattacharjee
32. Akib hasan Dip
33. Muhaiminul Islam
34. Mahmud
35. Atikur Rahman
36. Ripa Das
37. Taheratul Jannat Mohona
38. Jubayer Rashid
39. Najiba Rashid
40. Ritu Thakur
41. Dipok
42. Momotaz Khatun
43. Nabila Almaze
44. Yeasmin Akter
45. Zahidur Rahman
46. Jennifer Imam

*Annex 2: List of Trained Communities*

List of community who were trained through this project for further knowledge brokering on climate change adaptation

### Trained Communities

1. Bangladesh University of Engineering and Technology (BUET)
2. Bangladesh Agricultural University (BAU)
3. Patuakhali Science and Technology (PSTU)
4. Barishal University (BU)
5. Khulna University (KU)
6. Ashroy Foundation
7. BASA Foundation

*Annex 3: List of Knowledge sharing Partners*

The knowledge, outputs and improvements were shared with this partner for introducing Dynamic adaptation model at Policy level of Bangladesh.

### CEGIS Members

1. Malik Fida A. Khan
2. Motaleb H Sarker
3. Md. Atiqur Rahman
4. Dewan Mohammad Ariful Islam
5. Sifath Ara Hossain
6. Audrika Nahian
7. Anika Mahzabin
8. Foez Ahmed
9. Ishman Zuhayr
10. Julker name
11. Md. Monowar-ul-Haq
12. Md. Parvez Shaon Saif
13. Mirajul Hossain
14. Noshin Tabassum
15. Sanjib Sarker Shawon
16. Shajal Mehedi
17. Shakil Ahmed
18. Shoumick Hassan
19. Sumaiya Amin preota
20. Tamim Al Hossain
21. Tanvir Ahmed



*Annex 4: Results from field surveys*

The major outcomes of conducted field surveys for Dynamic Adaptation Model.

### 8.1 Village Level Survey

Initially 7 villages were selected for conducting survey but 2 due to the COVID-19, survey in Sandwip wasn't conducted. Finally, survey was conducted in 6 villages in Bangladesh coast. These 6 villages are selected based on 4 hazards – storm surge, salinity, flood, and erosion. Following methods are followed for survey village selection:

Based on the base values of hazard specific risk zonation and AHP weights among 4 domains (hazard, exposure, vulnerability, and risk) for each of the upazilas of 19 coastal districts, 6 hotspots in the coast are selected which represents at least 2 dominant hazards. Criteria that followed to capture the spatial variability in the region are – 6 selected hotspots cover west, central, east, and an island with at least 2 dominant hazards. This ensures 3 survey villages per hazard. The selected hotspots in this way are shown in Fig.1.

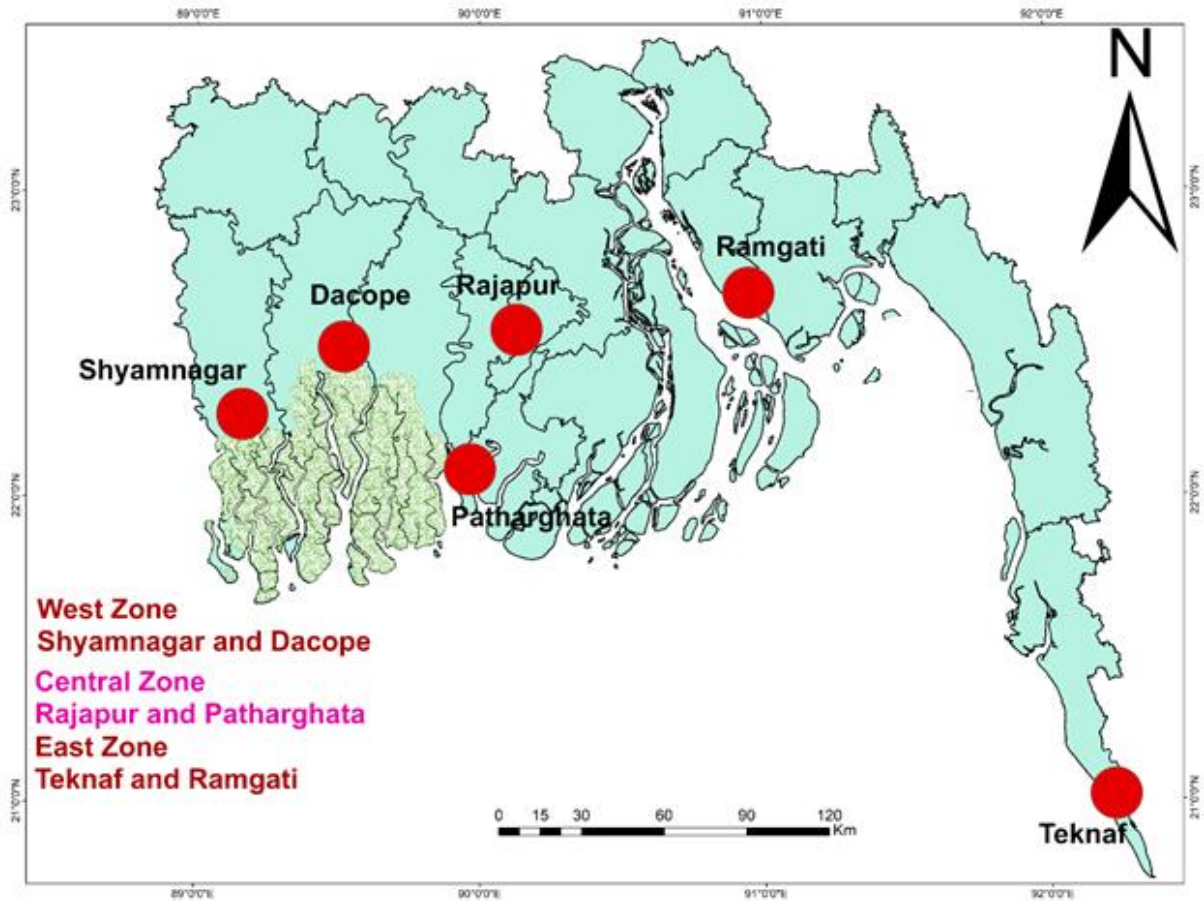


Figure 1: Selected hotspots for survey

After selection of hotspots, statistical sampling method were used to select 6 villages where field surveys were conducted. The selected filed survey villages are shown in Table 1. It is to be noted here that the population data shown in the table is for 2011. Assuming doubling of the population and average household size of 4, a conservative estimate of total number of households are also shown in the table.

Table 1: Selected villages where field survey will be conducted.

District	Upazilla	Union	Mouza	Villages	Region	Population (2011)	No of Household (2021)
Jhalokati	Rajapur	Mathbari	Badnikati	Badnikati	Central	713	356
Barguna	Patharghata	Kakchira	Kakchira	Majerchar	Central	370	185
Satkhira	Shyamnagar	Shyamnagar	Kallyanpur	Kallyanpur	West	390	195
Khulna	Dacope	Bajua	Bajua	Chand Para	West	583	292
Chottogram	Sandwip	Santoshpur	Thak Shontoshpur	Thak Shontoshpur	Island	368	184
Lakshmipur	Ramgati	Char Alexandar	Char Alexandar	Lambakhali	East	986	493
Cox's Bazar	Teknaf	Sabrang	Sabrang	Fathe Ali Para	East	329	165

In all these 7 villages, data was collected for all the available MI indicators shown in Table 2 (Due to the COVID-19, survey in Sandwip wasn't conducted).

### **Exposure and Sensitivity**

Indicators used for exposure and sensitivity are shown in **Table 2**

Table 2: Exposure and sensitivity indicators

Exposure	Sensitivity
Percentage of total population living per square km of area	Female-Male ratio
Katcha house and Jhupry	Disable person
	Dependent person

Based on the objective-1 and objective -2, there are few outcomes from the field survey explained below.

### **8.2 Selection of Indicators**

At first, based on literature and different government report review a list of indicators is identified which are locally practiced in storm surge, salinity, erosion, and tidal flood prone areas to protect themselves from those disasters. After making the list of indicators, these indicators are classified into some planned adaptations. The planned adaptations are defined with aligning the government's disaster and adaptations related plan and policy documents like National Adaptation Programs of Action (NAPA) and the Bangladesh Climate Change Strategy and Action Plan (BCCSAP) etc. Then those indicators are allocated based on the specific hazard.

### **Explanation of Criteria based on project objective-2 and local peoples' opinion**

To fulfill the project objectives, we have selected different micro-level adaptations as well as macro-level adaptations. We have primarily selected 22-macro level or planned adaptations in whole Bangladesh coast. But all those adaptations are not related or rational with specific hazards.

For example, social protection is a common adaptation practice in whole coastal zone, and it is related with selected hazards. But erosion protective works is only related to erosion hazard. Similarly shelter (cyclone shelter) is not related to erosion and salinity. Again, Safe energy source is related to storm surge, erosion, and flood but not to salinity. So, the selected adaptations are classified based on the relation with the hazards.

After fixing up hazard-based adaptations, we have focused in local or autonomous adaptations in micro-level. We found different characteristics and impact as well as practiced adaptations of same hazard in different areas. For example, Satkhira, Patharghata and Cox’s Bazar all are located in seacoast and prone to salinity, but the impact of salinity and its mitigation & adaptation strategy is different. In Satkhira, salinity intrusion is very high. River water as well as groundwater is saline. People use rainwater and filtered water. Whereas, in Patharghata, only river water is saline, and groundwater is saline free. On the other hand, in Cox’s Bazar, only sea water is saline. There is no intrusion saline in river and ground. People use tube well as drinking source. So, same hazard is treated differently in different. To highlight these in our research, we have divided our coastal zone in three small zones – west, east, and central zone. And then we have listed up the local or autonomous adaptations as micro-level adaptation under specific macro-level adaptation. In this method, the specific character and local practices is prioritized in every zone.

**Table 3:** Accessibility of different adaptations in different coastal zones

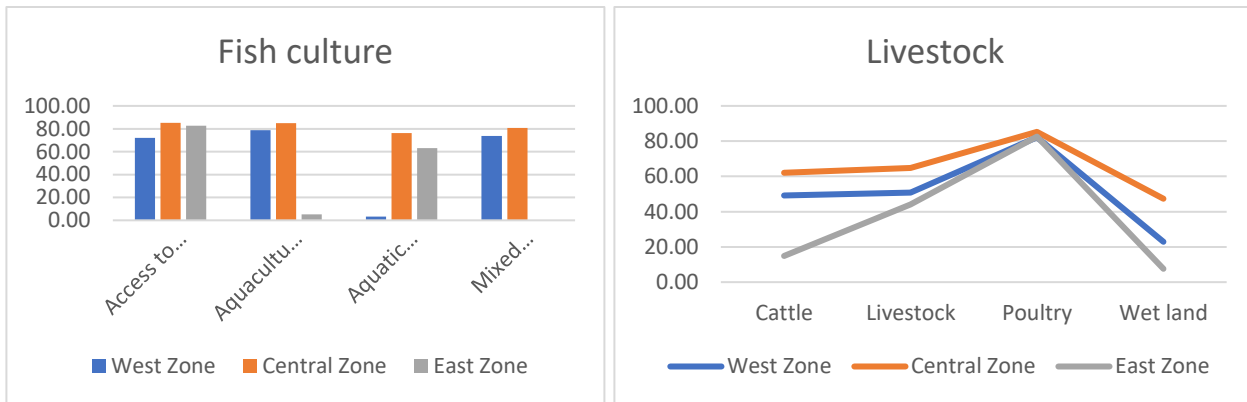
MA	MI	West Zone	Central Zone	East Zone	No	MA	MI	West Zone	Central Zone
Fish culture	Access to capture fish	72.03	85.27	82.57	7	Plantation	Homestead Plantation	83.90	93.30
	Aquaculture pond	78.81	84.82	5.26	8	Migration	Livelihood migration	59.32	43.75
	Aquatic Resources	3.39	76.34	63.16			Permanent migration	4.24	0.00

	Mixed Aquaculture	73.73	80.80	0.00			Temporary migration	11.02	0.00		
Livestock	Cattle	49.15	62.05	14.80	9	Training	vocational training	85.59	85.71		
	Livestock	50.85	64.73	44.08			indigenous Knowledge	82.20	23.66		
	Poultry	82.20	85.27	82.57	10	Social protection	Insurance	2.54	1.34		
	Wet land	22.88	47.32	7.57			Pension	1.69	0.00		
Loan	83.90	86.61	69.41	Savings			96.61	100.00			
Cropping System	Fertilizer (Red/Black/white)	71.19	52.23	23.36	11	Communication	culvert/bridge	47.46	100.00		
	Homestead vegetation	68.64	49.11	0.00			Road length	100.00	100.00		
	lime	71.19	11.16	0.00	12	Health care	Community clinic	0.00	72.32		
	Saline tolerant Plant/fish	71.19	12.95	23.36			Floating medicine unit	0.00	0.00		
	Seed/ Rice bank	0.85	0.00	0.00			Health worker	86.44	85.71		
	Water Hyacinth/ Gobar	67.80	6.70	23.36	13	Growth center	Bazar	100.00	100.00		
	Cropping/Gher intensity	71.19	30.80	23.36			Hat	100.00	100.00		
Safe Drinking Water Source	Fitered water	0.00	0.00	0.00	14	Alternative livelihood	Crab farming	0.00	0.00		
	pond sand Filter	0.00	0.00	0.00			dry fish	0.00	7.14		
	Rain-Water Harvesting	86.44	88.84	0.00			Laboring	5.08	26.34		
	Rain-water harvesting pond	0.00	100.00	0.00			shrimp farming/Agriculture	38.14	0.00		
	Saline water treatment plant	100.00	0.00	0.00			Salt farming	0.00	0.00		
	Tap Water	0.00	0.00	0.00			15	Organizational support	Agriculture/Relief	22.88	38.39
	Tubewell	0.00	0.00	100.00					Fishing	19.49	83.48
Canals	79.66	27.23	21.71	Livestock	9.32	5.36					
Irrigation System	Shallow Tubewell	10.17	0.00	0.00	15	Organizational support	SME	61.02	87.50		
	Deep Tubewell	0.00	0.00	0.00			Dry fish training	0.00	0.00		
	Sluice gate	0.00	27.68	100.00							

In the table 3, it is found that there is a huge difference between the accessibility of several group of autonomous or micro adaptation practices. Fish culture, livestock, cropping system, safe drinking water, irrigation system, alternative livelihood and organizational support are identical macro adaption in these zones.

If we focus on fish culture as a macro or planned adaptation, there are four local or autonomous adaptation under fish culture. The accessibility in access to capture fish is almost same in three

zones because all zones are riverine and coastal zone. But the dissimilarity is found in aquaculture pond, mixed aquaculture, and aquatic resources. In west zone, salinity intrusion is high as river water as well as groundwater is saline. In central zone, only river water is saline, and groundwater is saline free. But, during dry seasons, groundwater is also found a little bit saline. So, in this zone people practiced aquaculture pond and mixed aquaculture as adaptation. In west zone, 'Gher' is very popular and profitable due to high saline water. On the other hand, in east zone there is no intrusion saline in river and ground. Besides, cyclonic impact and tidal bore is very projecting. So, people are not interested in aquaculture. They are dependent on catching sea fish.

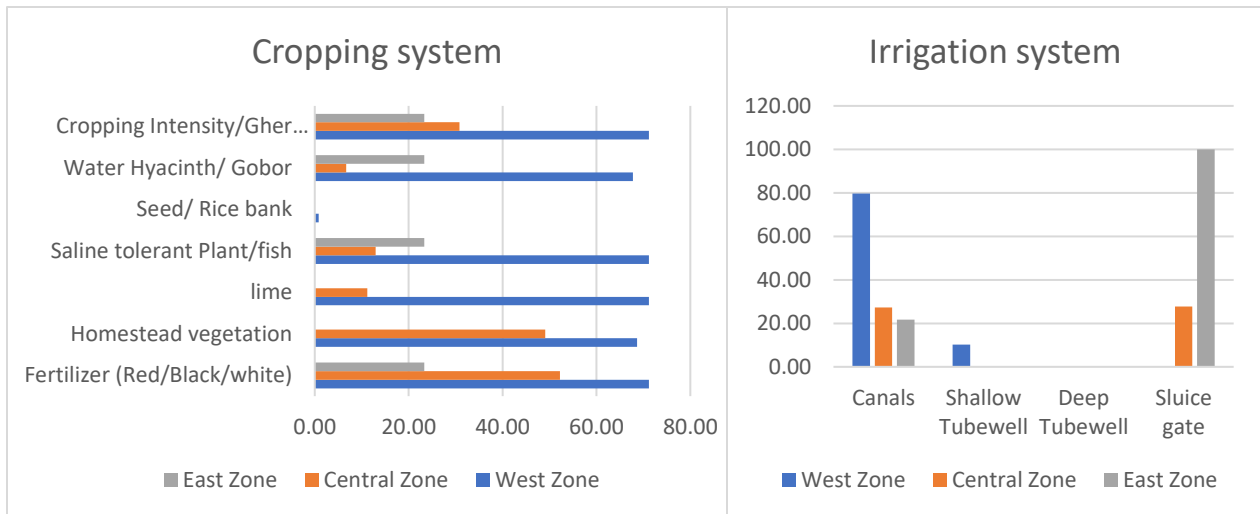


**Figure-2:** Percentage of Fish Culture (left) and Livestock (right) along west, central and east zone.

For livestock in **Figure 2**, due to lack of grazing and wetland in east zone people cannot practice cattle or other livestock. Number of frequent cyclonic and tidal bore effect is another cause that they are not interested in livestock. They can only practice poultry which is movable during cyclone easily.

Non-institutional loan accessibility is almost same in three zones, but its use is different in zones. In west zone people use loan for *Gher* (aquaculture) purpose, whereas in central, it is used as both aquaculture and agriculture purpose. But in east region mainly it is used as fishing but there's other use like small business agriculture etc.

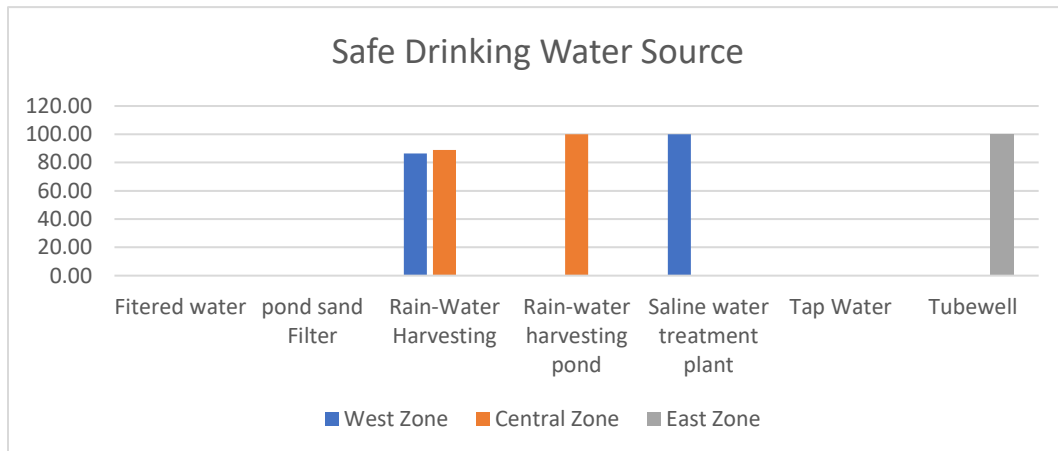
Cropping system and irrigation system in **Figure-3** both are related with geo-physical characteristics, land use pattern and water source or availability. Due to high salinity people are practiced *Gher* where saline water is main resource. So, they use canals to the saline water in *Gher*. So, use of sluice gate is very less in west zone. For the same reason they use lime, *Gobor*, saline tolerant fish and fertilizer. On the other hand, rate of salinity in central zone is reasonably less. So, people are not still interested in *Gher* Agriculture is their main occupation. They use fertilizer, water hyacinth, and lime for agriculture purpose. In east zone, there is a little agricultural the other twos. People are more interested in small business.



**Figure- 3:** Percentage of Cropping System (left) and Irrigation System(right) along west, central and east zone.

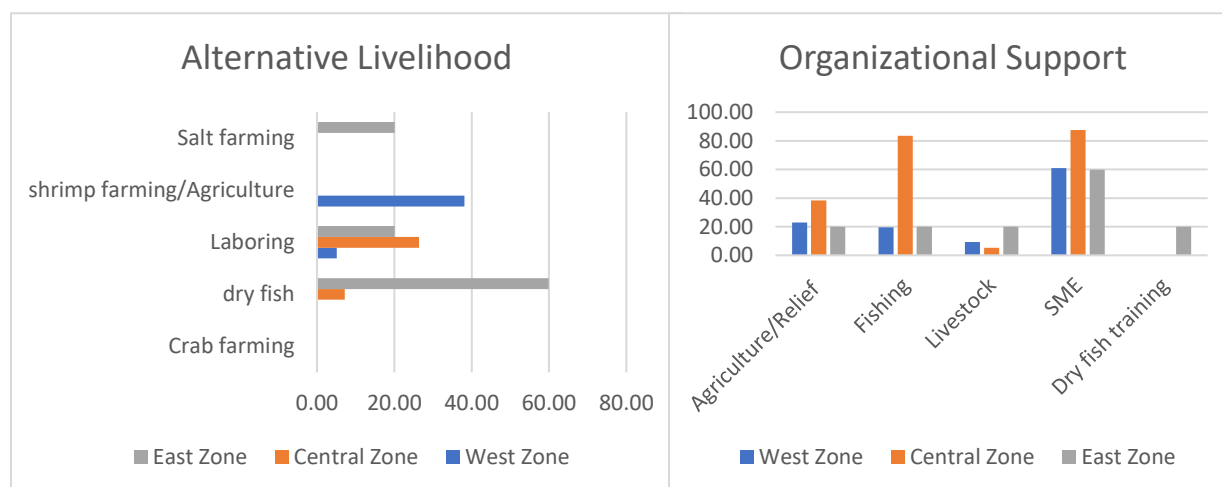
In west zone, river water as well as groundwater is saline. People are mainly dependent on rainwater shown in **Figure-4**. They store rainwater in tank for 4-6 months. After that in dry period. They buy filtered water. Whereas, in central zone, only river water is saline but during dry period it comprehends saline. So, people use rainwater during rainy season. After that, they use pond water

**Figure-4:** Percentage of Safe Drinking Water along west, central, and east zone.



that was stored during rainy season. This pond water is saline free. On the other hand, in east zone, only seawater is saline. There is no intrusion saline in river and ground. People use tube well as drinking source. In west zone, due to availability of saline water over the years shrimp farming is very popular. People choice it as alternative livelihood. But in other two zones it is not practiced. Laboring is the main choice of alternative livelihood in those areas (**Figure-5**).





**Figure-5:** Percentage of Alternative Livelihood (left) and Organizational Support(right) along west, central and east zone.

East zone especially Cox’s Bazar is very famous for dry fish. Different types of sea fish is available. Salt farming is another livelihood choice which is an identical in east zone.

Dry fish training as an organizational support in east zone, the government has taken initiatives with the help of different national and international NGO’s. The central zone is mostly famous for Hilsha fish. Bangladesh government take special activities every to protect the sanctuary of Halsha breeding. Five are in Central zone on six Hilsha sanctuaries. So, every year government take payment for ecosystem services (PES) to the fishermen of that area. So, fishing support is very high in central zone than the other zones. Agricultural support is all about same in every zones. SME as organizational support is very popular practice in all zones

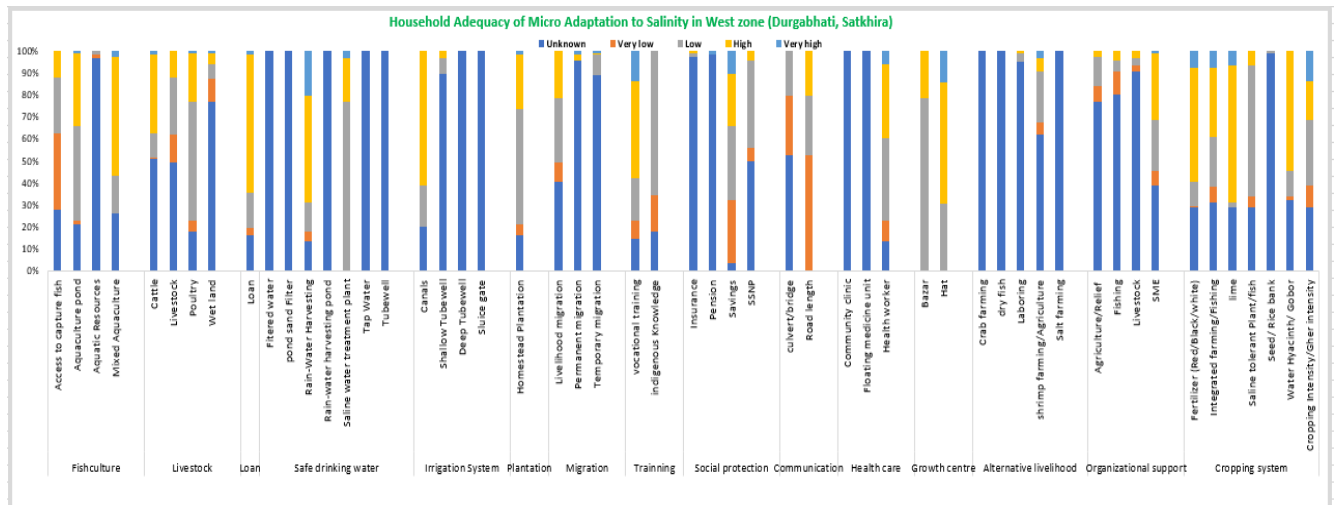
### 8.3 Accessibility and adequacy of Micro Adaptations in West zone (Durgabhati, Satkhira)

Accessibility: **Figure-6** is a graphical representation of the percentage of households is access or no access to a particular micaro adaptation measure.



**Figure-6:** Accessibility to micro adaptation in Durgabhati

Adequacy: Adequacy of an adaptation practice is categorized here as- Very low, low, very high, high, and unknown (for those households that do not have access to that particular adaptation or any adaptation measure that do not have any noticeable impact on their lives.) Here, **Figure-7** is a representation of what percentage of households finds which adaptation practice to be adequate.



**Figure-7:** Adequacy to micro adaptation in Durgabhati

Fish culture: For micro adaptation related to fish culture, Durgabhati has the highest accessibility for aquaculture pond (78.81%), followed by mixed aquaculture (73.73%) and capture fish (72.03%). The population has the lowest accessibility to aquatic resources (3.3%). The reason can be attributed to natural, political and communication barriers. Being a saline affected area where mixed aquaculture is a popular household earning source, most of the households has access to aquaculture ponds. Mostly HHs also found mixed aquaculture to be

highly adequate (54.24% high and 2.54% very high). Most HHs (96%) reported the adequacy of Aquatic resources as unknown because they do not have access to this adaptation. The adequacy of capture fish and aquaculture pond was on the lower side with reported 34.75% very low and 25.42% low for capture fish and 1.69% very low and 43.22% low for aquaculture pond.

**Livestock:** In case of Livestock, the highest percentage of households (82.20%) has access to poultry, followed by livestock (50.15%) and cattle (49.15%). The households have lowest accessibility (22.88%) to wet land because of the high soil salinity level of the study area which is also poses as an obstacle for the fodder of the cattle. Highest percentage of HHs found cattle to be highly adequate 35.59% high and 1.69% very high). More than 70% of the HHs stated the adequacy of wet land as unknown given the fact that they do not have access to it.

**Loan:** Most of the households (89.90%) takes loan for livelihood purposes during times of disasters. A 16.1% of households stated that they do not have access to loan because they either do not need to take a loan or they cannot afford to take a loan. The adequacy of loan was reported high by 62.71% HHs and very high by 1.69%.

**Safe drinking water:** Rainwater harvesting, and saline treatment plant is highly accessible in the study area with an 86.44% and 100% access rate. There is a saline treatment plant near the village that provided safe drinking water for the households. Other than that, many households collect rainwater in big tanks during the rainy seasons which provides them with drinking water for about 4-6 months a year. The study area has n access to filtered water or pond sand filter. As for tube well and tap water, they said the salinity level is too high to use these sources for drinking water. For these adaptations with no accessibility, the adequacy was reported unknown. As for Saline water treatment plant about 77% found their adequacy to be low followed by a reported 19.49% high an 1.69% very high. The reported adequacy of rainwater harvesting was mostly on the higher side with 48.31% high and 20.34% very high.

**Irrigation system:** 79.66% of the households has access to canal and use them for irrigation purpose. A little of 10.17% can use shallow tub wells for irrigation. No HH has access to deep tube well or sluice gate for irrigation. 18.64% HHs found adequacy of canals to be low against the 61.02% HHs who found its adequacy to be high. Due to the low accessibility, only a 3.39% HHs found shallow tube well to be of high adequacy and around 90% reported its adequacy as unknown.

**Homestead Plantation:** A large part of the households (83.90%) has access to homestead plantation. Despite the high soil salinity many households cultivate saline tolerant plans in their households' yards which works as a source of their food and nutrition. The rest of the households (16.10%) do not have access to homestead plantation due to the high soil salinity level. Although most HHs has access to plantation, its adequacy was low as stated by 5.08% (very low) and 52.54% (low) HHs which is again caused by highly saline soil.

**Livelihood Migration:** Livelihood migration is the most common migration the study area. 59.32% of the HHs migrates their livelihood depending on the seasonal changes of soil salinity level. Permanent migration is not commonly accessible because of attachment to their households and 11.02% and 4.24% of HHs had access to temporary and permanent migration. The adequacy

for migration was mostly reported unknown with 29.66% stating temporary migration as of low adequacy and 21.19% as of high adequacy.

**Training:** More than 85% of the HHs has access to vocational training. They attend training sessions organized by various NGOs. A high percentage of HHs 82.20% also finds indigenous knowledge accessible as a micro adaptation for salinity intrusion. However, 16.95% reported its adequacy to be very low and 65.25% reported it to be low. In contrast, they mostly found vocational training's adequacy to be on the higher side (44.07% high and 13.56% very high).

The rest of the HHs with no access stated natural, economic and communication as barriers for their inaccessibility.

**Social protection:** Except for a small percentage of HHs (3.39%), the rest of the HHs (96.61%) has access to savings for social protection. This small percentage attributed their lack of access to their poor economic conditions and natural hazards. Half of the HHs (50%) finds social safety net programs (SSNP) accessible. The rest of the half with no access stated administrative and communication barriers for their lack of access to SSNP. Pension and insurance is not a common social protection measure in the study area and thus, no HHs has access to them. HHs with accessibility to SSNP found its adequacy to be on the lower side (5.93% very low, 39.83% low and 4.24% very low) due to the aforementioned barriers like natural barrier. Saving had a higher adequacy for them with reported 28.81% very low, 33.90% low, 23.73% high and 10.17% very high.

**Communication Infrastructure:** All the HHs have access to road and about 47% has access to culvert/bridge. However, they find communication and administrative barrier to be big obstacles to their access. Adequacy for culvert was mostly on the unknown and lower side for those with no access or for other barriers. Despite a 100% HHs access to roads, its adequacy was reported very low by most of the HHs (52.54% very low and 27.12% low) with no HHs reporting high adequacy.

**Healthcare Provider:** Floating medical unit is not available in the study area. Due to high administrative barrier, Community clinic is not accessible to any HHs. Most of the HHs (86.44%) has access to health workers. For health care they are highly depended on these health workers (with the reported adequacy being 9.32% very low, 37.29% low, 33.90% high and 5.93% very high), as they are the main accessible source for medical care in the study area.

**Growth center:** All the HHs has access to hat and bazar from where they buy their daily necessities. Though their economy and communication possess as big barriers. Due to economic barriers, most HHs (78.81%) found the adequacy of bazar to be low. On the other hand, despite communication posing as a strong barrier, most HHs (55.08%) found hat to be highly adequate.

**Alternate livelihood:** In the study area, shrimp farming/agriculture is the most popular source of alternate livelihood. 38.14% HHs has access to shrimp farming as their alternate livelihood source, followed by 5.08% access to laboring as alternate livelihood adaptation source. Many HHs with no access to shrimp farming stated economic barrier. A large percentage of the HHs stated social barrier for not using day laboring as alternate livelihood adaptation source. No HHs has access to dry fish or salt farming and they stated culture as the most important barrier for no access. No HH

s has access to crab farming which they attributed to their economic barrier. shrimp farming has low adequacy because of natural barriers.

Organization support: SME (Small and Medium sized Enterprises) is the main source of organizational support in the study area. About 60% of the HHs has access to SME. HHs receive support from them in the form of loan, agricultural equipment, and other economic support. After that 22.88% and 18.49% with access to agricultural relief and fishing. They stated administrative barrier as the main reason for their lack of access to various organizational support. A 30.5% of the population with access to SME found it to be highly adequate. The adequacy of other organizational support was reported mostly low or unknown due to lack of access or admin/political barriers.

Cropping system: Most of the HHs has access to various micro adaptations related to cropping system. More than 67% of the HHs has access to Fertilizer (Red/Black/white), Integrated farming/Fishing, lime, Saline tolerant Plant/fish, Water Hyacinth/ Gobor, Cropping Intensity/Gher intensity. Many with access and no access stated natural, economic and communication as main barriers to these adaptations. Among micro adaptation measures for cropping system, more than half of the HHs reported Fertilizer (Red/Black/white) and Water Hyacinth/ Gobor to be highly adequate. Lime had the highest adequacy with a reported 61% HHs stating it to be highly adequate. Because of the highly saline soil, the adequacy for saline tolerant plant/fish was mostly on the lower side with a reported 59.32% low against the reported 6.78% high adequacy.

#### 8.4 Effectiveness of Different Adaptations in different Zones

Effectiveness of micro adaptations vary from zone to zone due to geo morphological characteristics and people needs and beneficent value of those adaptations. Score of effectiveness changes with the effectiveness of autonomous adaptations. **Table 4** describes the variability of the effectiveness score among three zones.

Due to high salinity, mixed aquaculture is the most effective source of earing in west zone. On the contrary, it has the highest score (206.78) of effectiveness among three zones. But due to lacking enough salinity, people of central zone have found it less effective (153.57) and People of east zone has no such access (0) in this adaptation process. Both central (212.50) and east zone (224.34) has highest score in case of access to capture fish, but score varies because of their Perception on effectiveness. In east zone, most of the people recognized as highly effective and some people also made it highly effective. But in central zone, people have mixed opinion which varies from low to high which creates differences in score in same adaptation.

On the basis of peoples' perception, three zones have same opinion which recognizes poultry as the most effective adaptation, but score varies with their perceptions on effectiveness. Due to salinity intrusion and different hazard problems poultry has less effective score in west and east zone.

Increasing salinity has influenced people to explore their livelihood options. Some people were dependent on agriculture, but salinity intrusion has made them to change their livelihood. Day by

day, this could be change in both positive and negative way. In that case people of west zone find livelihood migration as an effective adaptation process. On the other hand, cyclone, and surge with less opportunity of exploring new livelihood options, people of east zone made permanent adaptations as their best migration adaptations process.

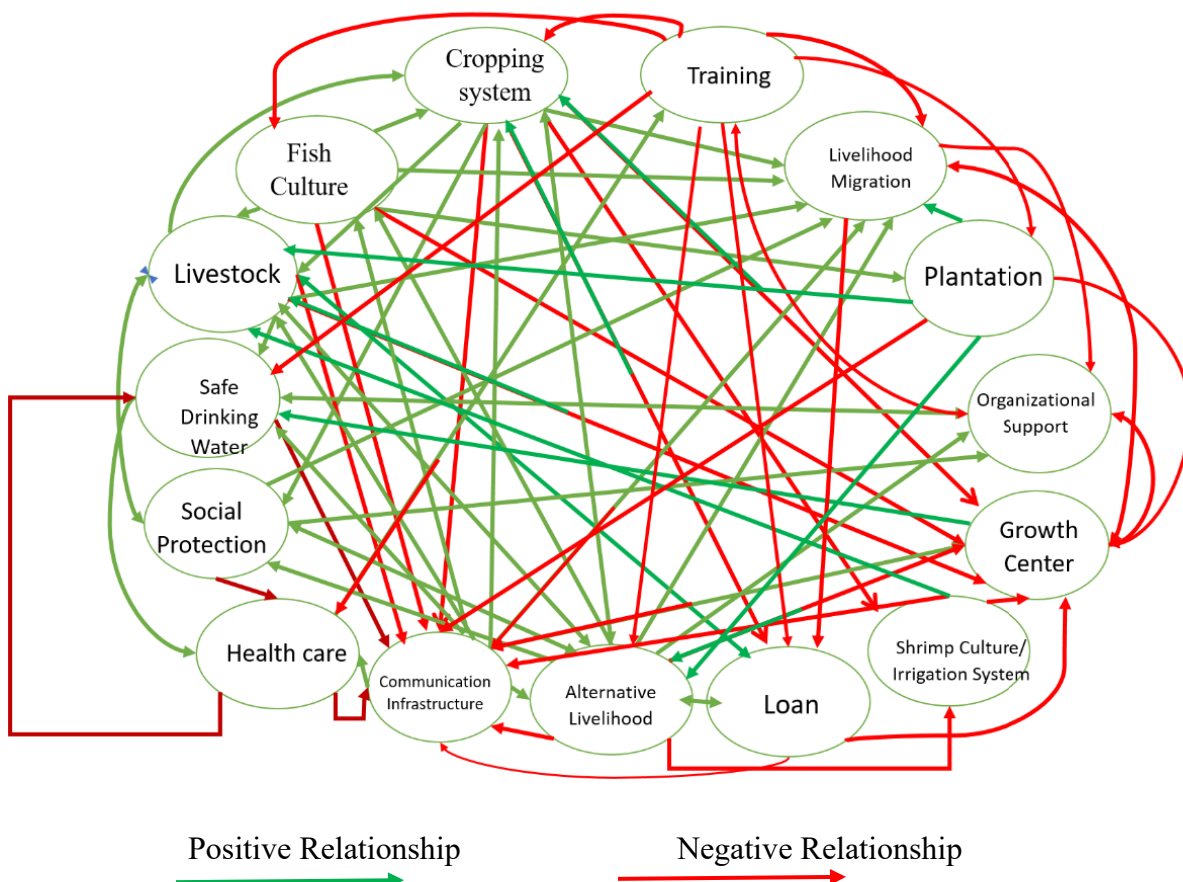
**Table 4:** Effectiveness score of different adaptations in Three zones

No.	MA	MI	West Zone	Central Zone	East Zone
1	Fishculture	Access to capture fish	121.19	212.50	224.34
		Aquaculture pond	190.68	166.52	5.26
		Aquatic Resources	5.08	84.38	108.22
		Mixed Aquaculture	206.78	153.57	0.00
2	Livestock	Cattle	136.44	160.71	47.37
		Livestock	100.85	123.66	52.63
		Poultry (48)	183.05	200.89	174.01
		Wet land	42.37	87.95	11.51
3	Loan	Loan	230.51	191.52	145.72
4	Safe drinking water	Fitered water	0	0	0.00
		pond sand Filter	0	0	0.00
		Rainwater Harvesting	257.63	186.61	0.00
		Rainwater harvesting pond	0	211.16	0.00
		Saline water treatment plant	226.27	0	0
		Tap Water	0	0	0.00
		Tubewell	0	0	390.13
5	Irrigation System	Canals	220.34	41.52	43.42
		Shallow Tubewell	23.73	0	0
		Deep Tubewell	0	0	0.00
		Sluice gate	0	28.13	43.42
6	Plantation	Homestead Plantation	190.68	195.54	189.47
7	Migration	Livelihood migration	131.36	81.70	67.11
		Permanent migration	14.41	0	199.01
		Temporary migration	24.58	0	44.41
8	Trainning	vocational training	233.90	166.96	0.00
		indigenous Knowledge	147.46	23.66	5.92
9	Social protection	Insurance	5.93	9.82	146.71
		Pension	5.93	0	35.20
		Savings	208.47	229.91	90.46
		SSNP	98.31	30.80	150.66
10	Communication	culvert/bridge	67.80	232.59	38.82
		Road length	167.80	254.46	0.00
11	Health care	Community clinic	0	111.61	175.99
		Floating medicine unit	0	9.82	234.21
		Health worker	209.32	180.80	0.00
12	Growth centre	Bazar	221.19	233.04	0.00
		Hat	221.19	183.48	161.18

13	Alternative livelihood	Crab farming	0	0	36.18
		dry fish	0	15.63	48.03
		Laboring	11.02	53.57	60.20
		shrimp farming/Agriculture	83.05	0	46.38
		Salt farming	0	0	46.05
14	Organizational support	Agriculture/Relief	41.53	45.54	46.38
		Fishing	33.05	166.96	131.91
		Livestock	19.49	5.80	66.78
		SME	147.46	175.00	0.00
15	Cropping system	Fertilizer (Red/Black/white)	208.47	109.38	0.00
		Integrated farming/Fishing	177.12	100.00	47.37
		Lime	217.80	20.98	0.00
		Saline tolerant Plant/fish	144.07	0.45	58.88
		Seed/ Rice bank	1.69	25.00	40.79
		Water Hyacinth/ Gabor	188.14	16.74	
		Cropping Intensity/Gher intensity	177.12	76.79	

### 8.5 Causal Relationship among the MA indicators

Based on the perceptions of the respondents, a network is constructed that shows the causal relation among different adaptations. The network is shown in **Figure-8**. This network shows how a particular adaptation is related to several other adaptations within the community. The Green arrow indicates positive relationship, and the red arrow indicates negative relationship with other adaptations. Such as Cropping system has Positive relationship with Livestock and negative relationship with Loan. Besides, two sided arrows indicate relationship of both adaptations in both ways. As an example, Health care has positive relation with Training, but Training has negative relationship with healthcare. It describes that if Training increases then People will be more careful about their health and diseases which decrease the need of health care center. With the increase of health care center need of training will be also increased. One adaptation is connected to other adaptation both negative and positive way, but this also indicates while bringing change to one adaptation, other adaptations will also change their characteristics simultaneously.



**Figure-8:** Causal Relationship among the MA indicators.



*Annex 5: Training and Workshop*

Accomplished Training and Workshop for dissemination of project outcomes

Joint Training Workshop of CDKN and ADCF Project

- Banner



- **Agenda**

Time	Topics for discussion	Orator
10:05 - 10:20	Introduction to Evaluation of Adaptation Trials in GBM Delta and its Upscaling to Climate Financing	Dr. Md. Munsur Rahman
10:20 - 11:50	Approaches, Strategies and Key Findings of the CDKN Project and Proposed Methods for the Implementation of the DECCMA Extension Project	Dr. Anisul Haque and his group
11:55 - 12:15	Approaches and Strategies for the Upscaling of Research Results for a National Climate Financing Proposal	Dr. Mohammad Rezaur Rahman
12: 15 - 12:45	Feedback from the participants	
12:45 - 13:00	Reflections and the way forward	

- **Meeting Minutes**

*Date: August 27, 2020*

*Time: 10 AM to 1:00 PM*

*Location/Venue: Webinar (Zoom)*

<b>Type of Meeting:</b>	Workshop	<b>Notetaker:</b>	A.K. Azad
			Rayhanur
			Rahman

**Title of the workshop:** Training workshop on CDKN and Uptake of climate change adaptation research results in South Asia.

The workshop was started at 10 am with the introducing session of the participants. Around 35 participants involved with disaster and adaptation-related works at the national and international levels attended the workshop from Bangladesh and outside of the country.

After the introductory session Prof. Md. Munsur Rahman deliberated his presentation on the DECCMA project's background, output, and work scope at the policy level. He briefly elucidated the developing  $\Delta$ DIEM, which has identified coastal hotspots for climate financing in Bangladesh. He mentioned that the model was developed by summing up the outcome of more than one project that can be implemented at the national level considering science and policy. The story of different projects (ESPA delta, DECCMA, CDKN) was briefly presented, focusing on how one's outcome is summing up in the next project. Finally, the  $\Delta$ DIEM and adaptation model is developed. Prof. Munsur also shared the next plan on the model to validate it in the field level, the main objective of Uptake of climate change adaptation research results in South Asia project.

After the first agenda Dr. Md. Taibur Rahman presented the concept of the National Adaptation Plan (NAP). He tried to deliberate NAP's basic objectives and their methods of formulating NAP by making it robust and adopted nationally and accepted for GCF. He also detailed the NAP process's key points like the development of metamodel of BDP 2100, working process, monitoring, evaluation, guidelines, and policy development. Prof. Salehin appreciated the method of metamodel-based solutions where ecosystem-based adaptation is focused following the whole world's activity. Prof. Rezaur also supplemented that if the NAP is tied up with the Decade of Ecosystem Restoration (2021-2030) following the Sustainable Development Goals (SDGs), it will be more acceptable.

After that, Prof. Dr. Anisul Haque briefed the approaches, strategies, and key findings of the CDKN project and proposed methods to uptake the climate change adaptation research results in South Asia. He first briefed about the adaptation model's development and its application in policy and decision level. Then he informed about the objectives, methods, findings, and significant limitations of the adaptation model. Scale effect of areas, socio-economic & other barriers, the importance of community perceptions in implementing adaptations and network relations among the adaptation measures were not considered in the present adaptation model. So the current project will fix it up, validate and uptake the climate change adaptation research results with field trials. Prof. Salehin commented on addressing the autonomous adaptation that people adopted, impacting planned adaptation in the model. Besides, the socio-ecological context is also essential to make the model more accurate. He also said that adaptation validation was concerning because it generally takes some time (at least five years) to reflect implementing adaptation options.

Prof. Rezaur Rahman presented four proposal concepts which were developed from the findings of the DECCMA-1 project. Among the four concepts, the school-based green clubs to generate climate and environment resilient future generations were chosen. And Prof. Salehin suggested selecting coastal zones as study areas instead of the Barind tract in the northern region of Bangladesh as the coastal climatic issue is now a hot topic at the national and international level. So, it will be easier to get funds if the study area is in coastal areas. Ecosystem-based adaptation adaptations in the ecologically critical areas were also a good concept as the Government focuses on ecosystem restoration and development in BDP 2100.

After ending the presentation, Prof. Munsur Rahamn thanked all for attending the workshop and declared its ending.

*Annex 6: Adaptation Parameters*

Selected adaptation parameters that used in Dynamic Adaptation Model

**Adaptation Parameters among Macro and Micro-level Units**

**Table 1:** Adaptation Indicators: Macro and Micro Level

Macro Level Adaptation (MA)	Micro Level Adaptation (MI)	Macro Level Adaptation (MA)	Micro Level Adaptation (MI)
1. Livestock	1. No. of poultry 2. No. of Cattle 3. Livestock place 4. Grass/wet land	12. Cyclone Shelter	1. Shelter 2. School cum shelter 3. Collage cum shelter 4. Organizational place 5. Community building
2. Fish Culture	1. Access to capture fish 2. Aquaculture ponds 3. Commercial fish farms 4. Commercial fish hatcheries 5. Mixed aquaculture 6. No of Gher 7. Access to capture Aquatic resources (Sundarban dependent area)	13. Communication infrastructure	1. Road length 2. No. of culvert/bridge
3. Cropping system	1. Floating gardens and hanging vegetable garden 2. Crop diversification practices/ integrated farming/ composite agriculture 3. Saline tolerant plant 4. Fertilizer (Red and Black) 5. Water Hyacinth 6. Lime (CaOH <sub>2</sub> ) 7. Seed/rice bank	14. Alternative Livelihood	1. Handicraft/Handloom 2. Laboring 3. No. of Boat owner 4. Salt Farming 5. Dry fish production
4. Safe water drinking source	1. Tube well 2. Rainwater harvesting in pond 3. Rainwater harvesting in tank 4. Tap water 5. Filtered/supply water 6. Saline water treatment Plant 7. PSF	15. Migration	1. Livelihood Migration 2. Temporary migration 3. Permanent migration
5. Irrigation System	1. Shallow Tube wells 2. Deep wells 3. Canals 4. Shuice gate	16. Plantation	1. Homestead plantation 2. Bamboo bush/Banana tree 3. Forest 4. Coastal Belt
6. Safe Housing	1. Resilient House 2. Paka and semi paka house 3. Shifting house 4. Raising Plinth 5. Floating House	17. Safe Energy Source	1. Electricity 2. Solar 3. Generator
7. Social protection	1. Savings 2. Insurance 3. Pension 4. Social Safety Net	18. Health care provider	1. Floating medical unit 2. No. of health worker 3. No. of community Clinic
8. Training	1. Vocational/technical training 2. Cultural practice 3. Health education and awareness	19. Growth center	1. Hat 2. Bazar
9. Early warning system	1. Indigenous knowledge 2. No. of CPP Volunteer 3. Dry food 4. Awareness building and disseminating system (mobile, TV, Radio)	20. Organizational support	1. Agriculture 2. Livestock 3. Fishing 4. Loan
10. Sanitation	1. Paka 2. Semi paka 3. Katcha 4. Open	21. Erosion control works	1. Erosion protective plantation 2. Erosion Protective Structure
11. Polder		22. Loan	1. Non-institutional

*Annex 7: Team Members of the survey*

Members who were involved for conducting survey and training

Duration and Team Members of the field survey

**Table 1:** Team members' Name and Affiliations in the field survey

Participants' Name	Affiliations
<b>First Field Survey (6th February 2021-10th February 2021)</b>	
<b>Second Field Survey (11th February 2021-18th February 2021)</b>	
Md. Rayhanur Rahman	Institute of Water and Flood Management, BUET
A.K. Azad	Institute of Water and Flood Management, BUET
Marin Akter	Institute of Water and Flood Management, BUET
Hamima Huma	Institute of Water and Flood Management, BUET
Md. Al-Amin	Bangladesh Agricultural University
Md. Zahid Hasan	Bangladesh Agricultural University
Md. Rayhan Ahmed	Patuakhali University of Science and Technology
Arnob Bhattacharjee	Patuakhali University of Science and Technology
Taheratul Jannat Mohona	Khulna University
Ripa Das	Khulna University
Nabila Almaze	BASA, NGO
Yeasimn Aktar	BASA, NGO
Md. Israfil Haq	Bangladesh Agricultural University
Sabrina Akthar	Dhaka Univerisity
Md. Rayhanur Rahman	Institute of Water and Flood Management, BUET
A.K. Azad	Institute of Water and Flood Management, BUET
Sadia Rahman	Institute of Water and Flood Management, BUET
Hamima Huma	Institute of Water and Flood Management, BUET
Akib Hasan Dip	Barisal University
Ayan Shaha	Barisal University
Md. Rayhan Ahmed	Patuakhali University of Science and Technology
Arnob Bhattacharjee	Patuakhali University of Science and Technology
Taheratul Jannat Mohona	Khulna University
Ripa Das	Khulna University
Nabila Almaze	BASA, NGO
Yeasimn Aktar	BASA, NGO
Zahidur Rahman	BASA, NGO



<b>Third Field Survey (3<sup>rd</sup> March 2021-4<sup>th</sup> March,2021)</b> <b>Fourth Field Survey (5<sup>th</sup> March 2021- 17<sup>th</sup> March,2021)</b> <b>Fifth Field Survey (27<sup>th</sup> March 2021-4<sup>th</sup> April,2021)</b>	
Md. Rayhanur Rahman	Institute of Water and Flood Management, BUET
A.K. Azad	Institute of Water and Flood Management, BUET
Hamima Huma	Institute of Water and Flood Management, BUET
Sadia Rahman	Institute of Water and Flood Management, BUET
Akib Hasan Dip	Barisal University
Ayan Shaha	Barisal University
Md. Rayhan Ahmed	Patuakhali University of Science and Technology

<b>Sixth Field Survey (4<sup>th</sup> September 2021-15<sup>th</sup> September,2021)</b>	
Md. Rayhanur Rahman	Institute of Water and Flood Management, BUET
A.K. Azad	Institute of Water and Flood Management, BUET
Sadia Rahman	Institute of Water and Flood Management, BUET
Akib Hasan Dip	Barisal University
Ayan Shaha	Barisal University
Md. Rayhan Ahmed	Patuakhali University of Science and Technology

*Annex 8: List of the associated projects and Documents*

Previous projects and documents and ongoing publications that linked with ADCF project

List of the associated projects, related published articles and working paper for article in preparation

**List of the associated projects**

1. Assessing health, livelihoods, ecosystem services and poverty alleviation in populous deltas (NE/J002755/1), under the Ecosystem Services for Poverty Alleviation (ESPA) programme funded by the UK Department for International Development (DFID), the

Natural Environment Research Council (NERC) and the Economic and Social Research Council (ESRC). Collaborative partners are University of Southampton (UK Lead), IWFMBUET (Bangladesh Lead), Jadavpur University (India Lead), 2010-2018

2. Deltas, vulnerabilities, and climate change: Migration and Adaptation (DECCMA: Grant No. IDRC 107642), under the CARIIAA program of IDRC-Canada and DFID, On-going; Collaborative Partners are University of Southampton (UK Lead), IWFMBUET (Bangladesh Lead), Jadavpur University (India Lead) and University of Ghana (Ghana Lead). 2012-2018
3. Research on Disaster Prevention/Mitigation Measures against Floods and Storm Surges in Bangladesh (SATREPS 0510000000023), funded by JST-JICA Funded; Japanese Lead: DPRI, Kyoto University, Bangladesh Lead: IWFMBUET. 2014-2019.
4. Research on the Morphological processes under Climatic Changes, Sea Level Rise and Anthropogenic Intervention in the Coastal Zone”, The project is funded by Government of Bangladesh and implemented by Water Resources Planning Organization (WARPO), 2018-2019.
5. Research on Sediment Distribution and Management in South-West Region of Bangladesh”, The project is funded by Government of Bangladesh and implemented by Water Resources Planning Organization (WARPO), on 2019-2020.
6. Evaluation of adaptation trials for coastal livelihoods in GBM delta, **CDKN**. 2019-2020
7. Up taking Results of Climate Change Adaptations in South Asia (IDRC: 109219 – 001) 2020-2021.
8. Flood Preparedness Program (FPP), Client: National Resilience Program (UNDP), 2019-2021

Several important articles published during the period stated above are listed below:

1. Marine et al. (2021): Development of an adaptation model by applying non-linear programming to compute adaptation deficiency in climatic hotspots, Progress in Disaster Science: <https://doi.org/10.1016/j.pdisas.2021.100201>.
2. Rahman et al. (2021): Effectiveness of selected planned adaptations in micro level: Evidence from coastal community in Bangladesh, Progress in Disaster Science, [Volume 12](https://doi.org/10.1016/j.pdisas.2021.100208), December 2021, 100208, <https://doi.org/10.1016/j.pdisas.2021.100208>
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4. Akter, M., Kabir, R., Karim, D.S., Haque, A., Rahman, M., Haq, M.A., Jahan, M. and Asik, T.Z. (2019), Determining the most sensitive socioeconomic parameters for quantitative risk assessment, *Climate* 2019, 7, 107; doi:10.3390/cli7090107, <https://www.mdpi.com/2225-1154/7/9/107>
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6. Kabir, R., Akter, M., Karim, D.S., Haque, A., Rahman, M., Sakib, M. (2019), Development of a matrix based statistical framework to compute weight for composite hazards, vulnerability and risk assessments, *Climate* 2019, 7, 56; doi:10.3390/ cli7040056, <https://www.mdpi.com/2225-1154/7/4/56/pdf>
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11. Nicholls, R.J., Hutton, C.W., Lázár, A.N., Allan, A., Adger, W.N., Adams, H., Wolf, J., Rahman, M. and Salehin, M. (2016). Integrated assessment of social and environmental sustainability dynamics in the Ganges-Brahmaputra-Meghna delta, Bangladesh. *Estuarine, Coastal and Shelf Science*, pp. 1-12. doi: 10.1016/j.ecss.2016.08.017.
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15. Sakib, M., Nihal, F., Haque, A., Rahman, M. and Ali, M. (2015) Sundarban as a Buffer against Storm Surge Flooding. *World Journal of Engineering and Technology*, 3, 59-64. <http://dx.doi.org/10.4236/wjet.2015.33C009>
16. Nicholls, R. J., Whitehead, P., Wolf, J., Rahman, M. and Salehin, M. (2015): [The Ganges–Brahmaputra–Meghna delta system: biophysical models to support analysis of ecosystem services and poverty alleviation](#), *Environmental Science: Processes & Impacts*, 17, (6), 1016-1017.
17. Islam, G. M. T., A. K. M. S. Islam, A. A. Shopan, M. M. Rahman, A. N. Lázár and A. Mukhopadhyay (2015). "Implications of agricultural land use change to ecosystem services in the Ganges delta." *Journal of Environmental Management* 161: 443-452.
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### [Working paper for Article in Preparation](#)

#### **Paper 1:**

Relationships among the Adaptation Strategies against Multi Hazard Impact: Perceptions from coastal community of Bangladesh.

#### **Abstract**

Climate change is a process that serves as a trigger for natural hazards. Due to the rapid changes of climate in the last century, natural hazards like cyclone-induced storm surges, salinity intrusion, and riverbank erosion become a major concern for the coastal people's lives and livelihoods of Bangladesh. To cope against the impacts of these hazards various adaptation strategies have been taken by both Govt. of Bangladesh and the people of the local community. These formal and individual actions of adaptations are different by their implementation scale. But among these adaptation strategies, there are strong connections that have been found to properly regulate the whole adaptation process of a community against a hazardous event. Depending on several

indicators such as hazard categories, hazard magnitudes, geography, and geomorphology of a location, etc. the relationships among the adaptation strategies are varying from zone to zone or place to place. Unluckily, the relationships among the adaptation strategies are staying at the community level as a latent approach which isn't properly documented in any policy or actions of the Bangladesh Govt. By considering this fact, this study aims to identify the relationships among the adaptation strategies for different hazard scenarios in the coastal zone of Bangladesh.

This study is carried out in the coastal area of Bangladesh where the risk assessment of Storm surge, Salinity, and Riverbank erosion was done by fuzzy synthetic evaluation method. To assess the risk of these hazards sixteen indicators are used. For more precision, the coastal area is divided into three zones (South, Central, and East) depending on the geographic features of Bangladesh. Prioritization of selected hazards in a specific zone was done by Analytical Hierarchy Process. And to select the study area Probability Proportional to Size (PPS) method is used in every prioritized hazard affected district of the three zones.

For conducting the survey, A semi-structured questionnaire was developed using the SAATY scale to collect community perceptions on the importance of adaptation strategies against Storm surge, Salinity, and Riverbank erosion. Analytical Hierarchy Process is used to prioritize the perceptions of the importance of adaptation strategies. Also, a Pairwise Comparison Matrix (PCM) was developed to collect the relationship data among the adaptation strategies. Finally, a five-point Likert Scale is used to understand the effectiveness of the relationships among the adaptations. The data collection procedures were focused on major livelihoods of the study area and collected through Focus Group Discussions.

The study results show that the importance of an adaptation strategy at the community level is highly dependent on respondents' present demand. Because implementation of adaptation strategies is completely different at macro and micro scales. For example, implementation of adaptation strategies from Govt. are generally infrastructure minded and didn't seem to consider the basic needs of community people whether practicing adaptation measures at a community level is in small scale and livelihood oriented. It also shows that relationships among the adaptation strategies which are generally implemented by a community are highly related to economic return. Which is considered as regulatory adaptation strategies. On the other hand, the implementation of adaptation strategies by the government is worked as a catalytic on the adaptation strategies which is adapted by a community against a hazard. This whole adaptation process of a community is working through a supportive and dependent procedure. The effectiveness of the relationships is reliant on the accessibility of the respondents to an adaptation strategy and its adequacy against a hazard

**Keyword:** adaptation strategies, Relationship, SAATY scale, Demand, Perceptions

**Paper 2: Computing adaptive capacity against salinity hazard in the west coast of Bangladesh by applying Bayesian network - (calibration in the west zone, validation in central and/or east zone)**

**Abstract: Under Proceedings**

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**Abstract: Under Proceedings**

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**Abstract: Under Proceedings**



**Field Survey Information and detailed Study site Map:**

**Checklist**

**HH based Information (SALINITY)**

<b>Household No:</b>	<b>Assessor's Name and date:</b>	<b>Hazard</b> <input type="checkbox"/> <b>Salinity</b>
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**Household Identifier**

Name of the Senior Head of the HH:	Literate family member:	Disable people
Contact No.	Main Occupation:	Village
Number of total HH Head:	Total dependent person	Post
Total Earning Person:	Below 18	Ward no.
Total male and female Family member:	HH Status	Mouza.

**Fish Culture- Importance will focus on accessibility**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু লব্ধের পছন্দ / সময় উপায় কি	<b>Barrier</b> কি ধরনের সমস্যা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	<b>MA/MI</b> সম্পিত ও উপায়িতার নম্বর	<b>MA list</b>
Access to capture fish (মাছ ধরা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Safe Housing Social protection. Training Early warning system sanitation
Aquaculture ponds (মাছছর পুকুর)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		polder Communication infrastructure Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Mixed Aquaculture মাছ চাষ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Access to Aquatic resources জলজ সম্পদ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

***Livestock Importance will focus on necessity***

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু লব্ধের	<b>Barrier</b> কি ধরনের সমস্যা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছবছের পকরবতনত কি	<b>MA/MI</b> সম্পিত ও উপায়িতার নম্বর	<b>MA List</b>

		পছর / সময় উপার িছর			ভাছলা না খারাপ প্রভাব ফেছল		
Poultry (হাঁস মুরগি)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source
Cattle (িরুছািল)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system
Livestock place (গিয়াল ঘর)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		sanitation polder Communication infrastructure Plantation
Wet land চারণ ভূগম	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Health care provider Loan Growth center Alternative Livelihood organizational support

**Loan Importance will focus on accessibility & effectiveness**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুিু লবছের পছর / সময় উপার িছর	Barrier কি ধরছনর সমসযা হয়?	Environmental (plus/minus) পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	MA/MI সম্পর্ক ও উপর্ারিতার নম্বর	MA List
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Non-institutional (অপ্রাতষ্ঠাগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high		উপরে দেবেন
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**Cropping system Importance will focus on accessibility & necessity**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা কিটুকু লবছের পছর / সময় উপার িছর	Barrier কি ধরছনর সমস্যা হয়?	Parent	Environmental (plus/minus) পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	MA/MI সম্পিত ও উপারীতার নম্বর	MA list
Saline tolerant plant লবণ সগহক্ষু িছ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source
Integrated farming (সমগিত চাষ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system
Seed/rice bank (গিালা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		sanitation polder Communication infrastructure Plantation
Fertilizer (Red and Black) সার	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high minus		Safe Energy Source Health care provider Loan Growth center

Lime (CaOH <sub>2</sub> ) চুঁ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Alternative Livelihood organizational support
Water Hyacinth কচুগর পাঁ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Cropping intensity বাংসগরক ফসল সংখ্যা	1 2 3 4 5	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high minus		

***Safe water drinking source Importance will focus on accessibility & necessity***

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা িতটুঁ লবছের পছর / সময় উপির িছর	Barrier কি ধরছনর সমসয়া হয়?	Parent	Environmental (plus/minus) পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	MA/MI সম্পিত ও উপিরিতার নম্বর	MA list
Tube well (হাত কল)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe
Rain-water harvesting in tank ( বট্টির পাগির টয়াংক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Housing Social protection. Training Early

Tap water (ট্যাছপার পাগি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		warning system sanitation polder Communication infrastructure Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Filtered water (গফল্টার পাগি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Pond Sand Filter	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Rain-water harvesting in pond (বহুঁর পাগির পুকুর)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Saline water Treatment plant গমষ্টি জহলর কারখািা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Irrigation System Importance will focus on accessibility & necessity**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুি় লবহের	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) পকরছবহের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	MA/MI সম্পিত ও উপারিতার নম্বর	MA list
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		পছর / সময় উপার িছর					
Shallow Tube wells (গমাটর/শ্যাছলা গমগশ্ি)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe
Deep wells (গিপ কল)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Housing Social protection. Training Early warning system sanitation
Canals (খাল/িালা)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		polder Communication infrastructure Migration Plantation Safe Energy
Sluice gate Sluice gate (স্লুইস গিট)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Source Health care provider Loan Growth center Alternative Livelihood organizational support

**Plantation Importance will focus on accessibility & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু লবছের পছর / সময় উপার কিছর	<b>Barrier</b> কি ধরছনর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	<b>MA/MI</b> সম্পিত ও উপারিতার নম্বর	<b>MA list</b>
Homestead plantation (বাগির চারপাছশ্র কিছ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Migration Importance will focus on Barrier**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু লবছের পছর / সময় উপার কিছর	<b>Barrier</b> কি ধরছনর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	<b>MA/MI</b> সম্পিত ও উপারিতার নম্বর
Livelihood Migration (জীবিকা পগরবতিত)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	



Temporary Migration (স্থল পগরবতিত)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Permanent Migration (স্থায়ী পগরবতিত)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Training Importance will focus on availability & accessibility**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা কিটুকু লবছের পছর / সময় উপার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	MA/MI সম্পিত ও উপারিতার নম্বর	MA list
Vocational/technical training (কাগরিরী গেগিং)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Indigenous Knowledge (গদশীয় জ্ঞাি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural				

**Social protection Importance will focus on availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুি় লবছের পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	<b>MA/MI</b> সম্পিত ও উপারীতার নম্বর	<b>MA list</b>
Savings (সঞ্চয়)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe Housing
Insurance (হিসুছরপ)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider
Pension (গপিশি়ি)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Loan Growth center Alternative Livelihood organizational support
Social Safety net Program (বয়স্ক/প্রগত বকী ভাতা)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**polder (effectiveness)**

MI Adaptation	Accessibility	Community Perception /Adequacy
Polder	1. Yes 2. No	1. Unknown 2. Very Low 3. Low 4. High

***Communication infrastructure Importance will focus on accessibility & effectiveness***

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা কিটুকু লব্ধের পছন্দ / সময় উপার্জিত	Barrier কি ধরনের সমস্যা হয়?	Parent	Environmental (plus/minus) পরিবেশের পরিবেশনত কি ভাঙ্গা না খারাপ প্রভাব ফেছল	MA/MI সম্পন্ন ও উপার্জিত নম্বর	MA list
Road length (পাকা রাস্তা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source
culvert/ bridge (গিজ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan

							Growth center Alternative Livelihood organizational support
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**Health care provider Importance will focus on accessibility & availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা তিটুিু লবছের পছর / সময় উপির িছর	<b>Barrier</b> কি ধরছনর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছবছের পকরবতনত কি ভাছলা না খারাপ প্রভাব ফেছল	<b>MA/MI</b> সম্পিত ও উপিরীতার নম্বর
Floating medical unit (ভাসমাি গিগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
health worker (স্বাস্থ্যকর্মী)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
No. of community Clinic (গিগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Growth center Importance will focus on accessibility & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু লব্ধের পছন্দ / সময় উপায় িছর	<b>Barrier</b> কি ধরনের সমস্যা হয়?	<b>Environmental (plus/minus)</b> পরিবেশের পরিবেশনত কি ভাঙ্গা না খারাপ প্রভাব ফেছল	<b>MA/MI</b> সম্পিত ও উপায়িতার নম্বর	<b>MA list</b>
Bazar (বাজার)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe Housing
Hat (হাট)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Social protection. Training Early warning system sanitation polder Communication infrastructure Health care provider Loan Growth center Alternative Livelihood organizational support

***Alternative Livelihood Importance will focus on availability & effectivity***

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু লব্ধের পছন্দ / সময় উপায় িছর	<b>Barrier</b> কি ধরনের সমস্যা হয়?	<b>Environmental (plus/minus)</b> আবহাওয়ার পরিবেশনত কি ভাঙ্গা না খারাপ প্রভাব ফেছল	<b>Parent</b>	<b>MA/MI</b> সম্পিত ও উপায়িতার নম্বর	<b>MA list</b>
Salt farming লবি চাষ	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high			Livestock Cropping system Safe water

			7.Cultural				drinking source Irrigation System Safe Housing
Laboring কামলা	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5.Religiuos 6. Natural 7.Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high			Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source
Dry fish শুটগক	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5.Religiuos 6. Natural 7.Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high			Health care provider Loan Growth center Alternative Livelihood organizational support
Crab Farming কাকাঁিা চাষ	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5.Religiuos 6. Natural 7.Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high			
Shrimp Farming গচংিী চাষ	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5.Religiuos 6. Natural 7.Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high			

**Organizational support Importance will focus on accessibility, effectivity & availability**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুি়ি লবছের পছর / সময় উপিার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	MA/MI সম্পর্ক ও উপর্্রীতার নম্বর
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Agriculture	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		
Livestock	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		
Fishing	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		
SME (Micro credit)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		

**Line agency**

<b>MI Adaptation</b>	<b>Accessibility</b>
Commercial Fish Firms	1. Yes 2. No 3. Not Available
Commercial Gher	1. Yes 2. No 3. Not Available

**HH based Information (FLOOD)**

<b>Household No:</b>	<b>Assessor's Name and date:</b>	<b>Hazard</b> <input type="checkbox"/> Flood
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**Household Identifier**

Name of the Senior Head of the HH:	Literate family member:	Disable people:
Contact No.	Main Occupation: farmer	Para
Number of total HH Head:	Total dependent person	Post
Total Earning Person:	Below 18	Ward no.
Total Female member: member:	Total Male	Housing status.
		Mouza.

**Fish Culture- Importance will focus on accessibility**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুি়ু বননযার পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> অসমছয় যয যিান দছুযাযগ কি রিম প্রভাব্ যেছে	<b>MA/MI</b> সম্পিয ও উপিারিতার নম্বর	<b>MA list</b>
Access to capture fish (মাছ ধরা)	1. Yes 2. No 3. Not	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system



	Available		6. Natural 7.Cultural				Safe water drinking source Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Aquaculture ponds (মাছছর পুকুর)	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Livestock Importance will focus on necessity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা তিতুটি বননয়ার পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> অসমছয় যয য়ান দছুযাযগ কি র়ম প্রভাব্ য়েছে	<b>MA/MI</b> সম্পিয় ও উপারীতার নম্বর
Poultry (হাঁস মুরগি)	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high minus	

Cattle (কিছুছািল)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high minus	
Livestock place (গিয়ালা ঘর)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Cropping system Importance will focus on accessibility & necessity**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা িতটুিু বননযার পছর / সময় উপার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) অসমছয় যয িান দছুযাযগ কি িম প্রভাব্ যেছে	MA/MI সম্পিয ও উপিারীতার নম্বর	MA list
Floating gardens or hanging vegetable garden (মাচা সবজি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation
Integrated farming (সমগিত চাষ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Seed/rice bank (গিালা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

							Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
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**Safe water drinking source Importance will focus on accessibility & necessity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু বননযার পছন্দ / সময় উপার চিহ্ন	<b>Barrier</b> কি ধরনের সমস্যা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> অসম্ভব যখন দখলায় কি কি প্রভাব আছে	<b>MA/MI</b> সম্প্রদায় ও উপারিতার নম্বর	<b>MA list</b>
Tube well (হাত কল)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source
Rain-water harvesting in tank (বৃষ্টির পানির ট্যাংক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system
Tap water (ট্যাপের পানি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		sanitation polder Communication infrastructure Migration

Filtered water (গিল্টার পাগি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
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***Irrigation System Importance will focus on accessibility & necessity***

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা কিটুকু বননয়ার পছন্দ / সময় উপার চিহ্ন	Barrier কি ধরনের সমস্যা হয়?	Parent	Environmental (plus/minus) অসম্ভব যয যান দছুযাযগ কি রিম প্রভাব যেহে	MA/MI সম্পিয ও উপারিতার নম্বর	MA list
Shallow Tube wells (গমাটর/শ্া গলা গমগশ্ি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe
Deep wells (গিপ কল)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation

Canals (খাল/িালা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Sluice gate ( স্লইস গিট)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Plantation Importance will focus on accessibility & effectivity**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা তিতুটি বননয়ার পছর / সময় উপির িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) অসমছয় যয য়ান দছুযাযগ কি রিম প্রভাব্ য়েছে	MA/MI সম্পিয ও উপিরীতার নম্বর
Homestead plantation (বাগির চারপাছশ িাছ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Bamboo Bush/ Banana tree (বাশাঁ ঝার/কলা িাছ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Safe Housing Importance will focus on accessibility & necessity**

MI Adaptation	Accessibility y আছে কি না?	Community Perception /Adequacy যা আছে তা িতুটি বননয়ার পছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) অসমছয় যয য়ান দছুযাযগ কি রিম প্রভাব্ য়েছে	MA/MI সম্পিয ও উপিরীতার নম্বর	MA list

		/ সময় উপার িছর					
Paka and semi paka house (পাকা/আধ পাকা বাগি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe Housing Social protection.
Shifting house (বাগি সরাসরি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Raising Plinth (বাগি উচুকরণ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Floating House (ভাসমাি বাসা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Migration Importance will focus on Barrier**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception / Adequacy</b> যা আছে তা তিটুিু বননযার পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> অসমছয় যয যান দছুযাযগ কি রিম প্রভাব্ যেছে	<b>MA/MI</b> সম্পিয ও উপিারীতার নম্বর
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Livelihood Migration (ঐক্যবিত্ত) পগরবিত্ত)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Temporary Migration (স্থল পগরবিত্ত)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Permanent Migration (স্থায়ী পগরবিত্ত)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Social protection Importance will focus on availability**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুিু বননযার পছর / সময় উপার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) অসমছয় যয যান দছুযাযগ কি রিম প্রভাব যেছে	MA/MI সম্পিয ও উপারিতার নম্বর	MA list
Savings (সঞ্চয়)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System

Insurance (হিসুহরল)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Pension (গপিশি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Social Safety net Program (বয়স্ক/প্রগত বন্ধী ভাতা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Training Importance will focus on availability & accessibility**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা কিটুকু বননয়ার পছন্দ / সময় উপার িছর	Barrier কি ধরছনর সমস্যা হয়?	Parent	Environmental (plus/minus) অসমছয় যয য়ান দছুযাযগ কি রিম প্রভাব্ যেছে	MA/MI সম্পিয ও উপারীতার নম্বর	MA list
Vocational/technical training (কাগরিরী গেগিাং)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source



Health education and awareness (শাগররীক গশক্ষা ও সহচতিতা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation
Cultural practice (সাত্তুকগতক তুশীলি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support

**Early warning system Importance will focus on accessibility**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা তিতটুি বননযার পছর / সময় উপিার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) অসমছয় যয যিান দছুযাযগ কি রিম প্রভাব্ য়েছে	MA/MI সম্পিয ও উপিারীতার নম্বর
Dry food (শুকি খাবার)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

Disseminating system (mobile, TV, Radio)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Indigenous knowledge (গেঞ্জীয় জ্ঞান)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Sanitation Importance will focus on accessibility & necessity**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা কিটুকু বননয়ার পছন্দ / সময় উপায় কিছর	Barrier কি ধরনের সমস্যা হয়?	Parent	Environmental (plus/minus) অসম্ভব যয যান দুখায়গ কি রিম প্রভাব যেহে	MA/MI সম্প্রিয় ও উপায়িতার নম্বর
Paka (পাকা টয়ছলট)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Semi paka (আধা পাকা টয়ছলট)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Katcha কাচাঁ টয়ছলট	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

Open (গাখালা টয়ছলট)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
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**Shelter Importance will focus on accessibility & effectivity**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা কিটুকু বননয়ার পছর / সময় উপার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) অসমছয় যয য়ান দছুযাযগ কি রিম প্রভাব্ যেছে	MA/MI সম্পিয ও উপারীতার নম্বর	MA list
Shelter (আশ্রয় গকন্দ্র)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source
School Cum Shelter (স্কুল ও আশ্রয় গকন্দ্র)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system sanitation
Organizational place (সরকাগর িয়া)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		polder Communication infrastructure Migration Plantation

Community building (কগমউগিষ্টট গবজডাং)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
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**Communication infrastructure Importance will focus on accessibility & effectivity**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা তিতুঁিু বননয়ার পছর / সময় উপার িছর	Barrier কি ধরছনর সমসয়া হয়?	Parent	Environmental (plus/minus) অসমছয় যয য়ান দছুযায়গ কি রিম প্রভাব্ যেছে	MA/MI সম্পিয় ও উপারিতার নম্বর
Road length (পাকা রাস্তা)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
culvert/bridge (গিঁ)	1. Yes  2. No  3. Not	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

	Available		6. Natural 7. Cultural			
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**Safe Energy Source Importance will focus on accessibility & availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু বননযার পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> অসমছয় যয িান দছুযাযগ কি রিম প্রভাব্ য়েছে	<b>MA/MI</b> সম্পিয ও উপিারীতার নম্বর
Electricity (গবেুৎ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Solar (গসালার)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Generator	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Health care provider Importance will focus on accessibility & availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু বননযার পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> অসমছয় যয িান দছুযাযগ কি রিম প্রভাব্ য়েছে	<b>MA/MI</b> সম্পিয ও উপিারীতার নম্বর

Floating medical unit (ভাসমাি গিগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
health worker (স্বাস্থকমী)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
No. of community Clinic (গিগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Loan Importance will focus on accessibility & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু বননযার পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Environmental (plus/minus)</b> আবহাওয়ার পকরবতনয কি ভাছো না খারাপ প্রভাব্ যেছে	<b>MA/MI</b> সম্পিয ও উপিারীতার নম্বর
Non-institutional (অপ্রাতষ্ঠাগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**polder (effectiveness)**

<b>MI Adaptation</b>	<b>Accessibility</b>	<b>Community Perception /Adequacy</b>
Polder	1. Yes 2. No	1. Unknown 2. Very Low 3. Low 4. High 5. Very high

**Growth center Importance will focus on accessibility & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা তিতটুিু বননয়ার পছর / সময় উপির িছর	<b>Barrier</b> কি ধরছনর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> আবহাওয়ার পকরবতনয কি ভাছো না খারাপ প্রভাব্ যেছে	<b>MA/MI</b> সম্পিয ও উপিরিতার নম্বর	<b>MA list</b>
Bazar (বারিার)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Hat (হাট)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Alternative Livelihood Importance will focus on availability & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুি়ি বননযার পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> আবহাওয়ার পকরবতনয কি ভাছো না খারাপ প্রভাব যেছে	<b>MA/MI</b> সম্পিয ও উপিারিতার নম্বর
Handicraft/ Handloom (হাছতর ততগর জিগিস)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Laboring (শ্রম)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
No. of Boat owner (গৌকা মাগলক)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Organizational support Importance will focus on accessibility, effectivity & availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুি়ি বননযার পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> অসমছয় যয যিান দছুযাযগ কি রিম প্রভাব যেছে	<b>MA/MI</b>
Agriculture	1. Yes  2. No	1. Unknown 2. Very Low 3. Low 4. High	1. Social 2. Political 3. Economic 4. Communication		1. Unknown 2. Very Low 3. Low 4. High	



	3. Not Available	5. Very high	5. Religious 6. Natural 7. Cultural		5. Very high	
Livestock	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Fishing	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
SME (Micro credit)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Line agency**

<b>MI Adaptation</b>	<b>Accessibility</b>
Commercial Fish Firms	1. Yes 2. No 3. Not Available
Commercial fish hatcheries.	1. Yes 2. No 3. Not Available

**HH based Information (Storm Surge)**

<b>Household No:</b>	<b>Assessor's Name and date:</b>	<b>Hazard</b> <input type="checkbox"/> <b>Storm Surge</b>
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Name of the Senior Head of the HH:	Literate family member:	Disable people
Contact No.	Main Occupation:	Village
Number of total HH Head:	Total dependent person	Post P
Total Earning Person:	Below 18	Ward no.
Total Male & Females Family member:	Disable people	Mouza.

**Fish Culture- Importance will focus on accessibility**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু ঘুকণবিছের পছর / সময় উপার কিছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপারীতার নম্বর
Access to capture fish (মাছ ধরা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Aquaculture ponds (মাছছর পুকুর)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Access to capture	1. Yes 2. No	1. Unknown 2. Very Low 3. Low	1. Social 2. Political 3. Economic		1. Unknown 2. Very Low 3. Low	

Aquatic resources জলাজ সম্পদ	3. Not Available	4. High 5. Very high	4. Communication 5. Religious 6. Natural 7. Cultural		4. High 5. Very high	
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**Livestock Importance will focus on necessity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception / Adequacy</b> যা আছে তা কিটুকু যুক্তবিশেষ পছন্দ / সময় উপার্জন কিছর	<b>Barrier</b> কি ধরনের সমস্যা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেহের পকরতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপারিতার নম্বর
Poultry (হাঁস মুরগি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Cattle (কি- ছালি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Livestock place (গিয়ালা ঘর)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Cropping system Importance will focus on accessibility & necessity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু ঘুকণবিছের পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপারিতার নম্বর	<b>MA list</b>
Integrated farming (সমগিত চাষ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Seed/rice bank (গিালা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support

**Safe water drinking source Importance will focus on accessibility & necessity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b>	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপারিতার নম্বর
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		যা আছে তা িতটুিু ঘুকণবিছের পছর / সময় উপার িছর				
Tube well (হাত কল)	1.Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Rainwater harvesting in tank ( বষ্টির পাগির ট্াংক)	1.Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Tap water (ট্াছপর পাগি)	1.Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Filtered water (গিলটার পাগি)	1.Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

***Irrigation System Importance will focus on accessibility & necessity***

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুিু ঘুকণবিছের পছর	Barrier কি ধরছনর সমসয়া হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পিি ও উপারিতার নম্বর

		/ সময় উপার িছর				
Canals (খাল/িালা)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Sluice gate Sluice gate ( স্লুইস গিট)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Plantation Importance will focus on accessibility & effectivity**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুিু মুকণঝিছের পছর / সময় উপার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পি ও উপারিতার নম্বর	MA list
Homestead plantation (বাগির চারপাছের িাছ)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source

Bamboo Bush/ Banana tree বাঁশ বাড়	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
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**Safe Housing Importance will focus on accessibility & necessity**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা কিটুকু ঘুকণবিছের পছর / সময় উপার িছর	Barrier কি ধরছনর সমস্যা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পি ও উপারিতার নম্বর	MA list
Resilient Housing	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source

Paka and semi paka house	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Shifting house	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Raising Plinth	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Migration Importance will focus on Barrier**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু যুকণবিহের পছর / সময় উপার কিছর	<b>Barrier</b> কি ধরছনর সমস্যা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছা না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপারিতার নম্বর
Livelihood Migration (জীবিকা পগরবতিত)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	



**Social protection Importance will focus on availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু ঘুকণবিছের পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিি ও উপিারীতার নম্বর	<b>MA list</b>
Savings (সঞ্চয়)	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source
Insurance (হিসুছরপ)	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system
Pension (গপিেি)	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		sanitation polder Communication infrastructure Migration
Social Safety net Program (বয়স্ক/প্রগত বন্ধী ভাতা)	1.Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support

**Communication infrastructure Importance will focus on accessibility & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু ঘুকণবিছের পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিি ও উপিারিতার নম্বর
Road length (পাকা রাস্তা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
culvert/bridge (গিজ)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Training Importance will focus on availability & accessibility**

<b>MI Adaptation</b>	<b>Accessibili ty</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু ঘুকণবিছের পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিি ও উপিারিতার নম্বর	<b>MA list</b>
Vocational/technical training (কাগরিরী গেগিাং)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuous 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source

Health education and awareness স্বাস্থ্য শশক্ষা এবং সনচত তা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Irrigation System Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Migration Plantation Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Cultural practice সাংস্কৃতিক কর্মমাণ্ড	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

**Early warning system Importance will focus on accessibility**

MI Adaptation	Accessibility আছে কিনা?	Community Perception /Adequacy যা আছে তা িতটুিু ঘুকণবিছের পছর / সময় উপিার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পিি ও উপিারীতার নম্বর	MA list

Dry food শুকন া খাবার	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Safe water drinking source Safe Housing Social protection. Training Early warning system sanitation polder Communication infrastructure Plantation Health care provider
Disseminat ing system (mobile, TV, Radio) প্রচার ব্যবস্থা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Loan Growth center Alternative Livelihood organizational support
CPP Volunteers সাইনলা প্রস্তুত স্বচ্ছানসবক	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		
Indigenous knowledge (গদৌয় জ্ঞাি)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

***Sanitation Importance will focus on accessibility & necessity***

MI Adaptation	Accessibilit y আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুিু ঘুকণঝিছের পছর / সময় উপিার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পিি ও উপিারিতার নম্বর

Paka	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Semi paka	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Katcha	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Open	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**polder (effectiveness)**

MI Adaptation	Accessibility	Community Perception /Adequacy
Polder	1. Yes 2. No	1. Unknown 2. Very Low 3. Low 4. High 5. Very high

**Shelter Importance will focus on accessibility & effectivity**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা কিটুকু ঘুকণবিছের পছর	Barrier কি ধরছনর সমসয়া হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনি কি ভাহ া না খারাপ প্রভাে ফেছ	MA/MI সম্পি ও উপিরািতার নম্বর

		/ সময় উপার িছর				
Cyclone Shelter ঘূষণমঝাড় আশ্রয় স্বকন্দ্র	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
School Cum Shelter	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Organizational place	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Community building জ সাধার স্বণর ভব	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Safe Energy Source Importance will focus on accessibility & availability**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা িতটুিু ঘুকণঝিছের পছর / সময় উপার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরতনি কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পি ও উপিারিতার নম্বর

Electricity শব্দদ্যৎ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Solar স্বসৌরশক্তি	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Generator	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Health care provider Importance will focus on accessibility & availability**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা তিটুটি ঘুকণিহের পছর / সময় উপার িছর	Barrier কি ধরছনর সমস্যা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পি ও উপারিতার নম্বর
Floating medical unit (ভাসমাি গিগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
No of health worker (স্বাস্থ্কর্মী)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

			7.Cultural			
No. of community Clinic (গিগিক)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Loan Importance will focus on accessibility & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু ঘুকণঝিছের পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent Adaptation</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপিারীতার নম্বর
Non-institutional	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Growth center Importance will focus on accessibility & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু ঘুকণঝিছের পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপিারীতার নম্বর



Bazar	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Hat	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Alternative Livelihood Importance will focus on availability & effectivity**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception / Adequacy</b> যা আছে তা কিটুকু ঘুকণবিহের পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপারিতার নম্বর
Handicraft/ Handloom হস্তশিল্প / তাঁত	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Laboring শ্রমিক	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Salt Farming লবণ চাষ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

Dry Fish Production শুটগক	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
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**Organizational support Importance will focus on accessibility, effectivity & availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception / Adequacy</b> যা আছে তা তিটুি যুকণবিছের পছর / সময় উপিার িছর	<b>Barrier</b> কি ধরছনর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনি কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পি ও উপিারী তার নম্বর
Agriculture	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Livestock	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Fishing	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
SME (Micro credit)	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Line agency**

<b>MI Adaptation</b>	<b>Accessibility</b>
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Commercial Fish Firms	1. Yes 2. No 3. Not Available
Commercial fish hatcheries.	1. Yes 2. No 3. Not Available

**HH based Information (Erosion)**

<b>Household No:</b>	<b>Assessor's Name and date:</b>	<b>Hazard</b> <input type="checkbox"/> <b>Erosion (নদী ভাঙ্গন)</b>
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<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception / Adequacy</b> যা আছে তা কিটুকু ভঙ্গন পছন্দ / সময় উপস্থিত	<b>Barrier</b> কি ধরনের সমস্যা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকছেছে পকরেনত কি ভাছা না খরাপ প্রভাে ফেছ	<b>MA list</b>
Erosion protective Plantation ভঙ্গন রক্ষক গাছ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	Livestock Cropping system Safe water drinking source Safe Housing Erosion Control Network Training Early warning system sanitation polder Communication infrastructure Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organization support

## Household Identifier

Name of the Senior Head of the HH:	Literate family member:	Disable people
Contact No.	Main Occupation:	Village
Number of total HH Head:	Total dependent person	Post P
Total Earning Person:	Below 18	Ward no.
Total Male & Females Family member:	Disable people	Mouza.

### Plantation Importance will focus on accessibility & effectivity

### Safe Housing Importance will focus on accessibility & necessity

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা কিটুকু ভাগছনর পছর / সময় উপিার িছর	Barrier কি ধরছনর সমসযা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনত কি ভাছ া না খাৰাপ প্রভাে ফেছ	MA/MI সম্পিত ও উপিারীতার নম্বর
Shifting house শিবি স ারনা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1 2. Unknown 3. Very Low 4. Low 5. High 6. Very high	
Floating House ভাসমান িসা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1 2. Unknown 3. Very Low 4. Low 5. High 6. Very high	

**Migration Importance will focus on Barrier**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা তিতটুিু ভাঙ্গছনর পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনত কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিত ও উপারীতার নম্বর
Livelihood Migration জীবিকা প িনত	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Temporary Migration সামবিক সর যাতি	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Permanent Migration স্থায়ী সর যাতি	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Social protection Importance will focus on availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতটুিু ভাঙ্গছনর পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনত কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিত ও উপারীতার নম্বর
Savings (সঞ্চয়)	1. Yes  2. No	1. Unknown 2. Very Low 3. Low 4. High	1. Social 2. Political 3. Economic 4. Communication		1. Unknown 2. Very Low 3. Low 4. High	

	3. Not Available	5. Very high	5. Religious 6. Natural 7. Cultural		5. Very high	
Insurance (ইনসুরেন্স)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Pension (পেনশন)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Social Safety net Program (বয়স্ক/প্রতিবন্ধী ভািতা)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Training Importance will focus on availability & accessibility**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা িতটুিু ভাঙ্গছনর পছর / সময় উপার িছর	Barrier কি ধরছনর সমসয়া হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেনতনত কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পিত ও উপারিতার নম্বর
Vocational/ technical training (কাতেগী পেতনিং)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

Indigenous Knowledge (পেশীয় জ্ঞান)	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
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**Erosion protective work Importance will focus on availability & Effectivity**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা কিটুকু ভাঙ্গছনর পছর / সময় উপার কিছর	Barrier কি ধরছনর সমস্যা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনত কি ভাছ ানা খারাপ প্রভাে ফেছ	MA/MI সম্পিত ও উপারিতার নম্বর
Geo-bag কিনু সিন্তা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
Erosion Protective Structure ব্রক/িকাঁ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Communication infrastructure Importance will focus on accessibility & effectivity**

MI Adaptation	Accessibility আছে কি না?	Community Perception /Adequacy যা আছে তা কিটুকু ভাঙ্গছনর পছর / সময় উপার কিছর	Barrier কি ধরছনর সমস্যা হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনত কি ভাছ ানা খারাপ প্রভাে ফেছ	MA/MI সম্পিত ও উপারিতার নম্বর



Road length পাকা াস্তা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	
No. of culvert/ bridge বিজ	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high	

**Safe Energy Source Importance will focus on accessibility & availability**

MI Adaptation	Accessibility আছে কি না?	Community Perception / Adequacy যা আছে তা িতটুিু ভাঙ্গছনর পছর / সময় উপার িছর	Barrier কি ধরছনর সমসয়া হয়?	Parent	Environmental (plus/minus) পকরছেছের পকরেতনত কি ভাছ া না খারাপ প্রভাে ফেছ	MA/MI সম্পিত ও উপারী তার নম্বর	MA list
Electricity বিদুুং	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Livestock Cropping system Safe water drinking source
Solar রসালা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		Safe Housing Erosion Control Network

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা কিটুকু ভাগছন্নর পছর / সময় উপার কিছর	<b>Barrier</b> কি ধরছন্নর সমসয়া হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনত কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিত ও উপারী তার নম্বর	<b>MA list</b>
		5. Very high	7.Cultural				Training Early warning system sanitation polde r Communication infrastructure Safe Energy Source Health care provider Loan Growth center Alternative Livelihood organizational support
Generator রজনর ট	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

*Health care provider Importance will focus on accessibility & availability*

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা তিতুিু ভাঙ্গছনর পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনত কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিত ও উপারিতার নম্বর
Floating medical unit ভাসমান হাসপারাল	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		

*Loan Importance will focus on accessibility & effectivity*

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতুিু ভাঙ্গছনর পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনত কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিত ও উপারিতার নম্বর	<b>MA list</b>
Non-institutional অপ্রাবষ্ঠাবনক ধা	1. Yes 2. No 3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religiuos 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		See above

*Alternative Livelihood Importance will focus on availability & effectivity*

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা িতুিু ভাঙ্গছনর পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরেতনত কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিত ও উপারিতার নম্বর	<b>MA list</b>

Laboring কামলা	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural		1. Unknown 2. Very Low 3. Low 4. High 5. Very high		See below
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**Organizational support Importance will focus on accessibility, effectivity & availability**

<b>MI Adaptation</b>	<b>Accessibility</b> আছে কি না?	<b>Community Perception /Adequacy</b> যা আছে তা তিটুটিু ভাঙ্গছনর পছর / সময় উপার িছর	<b>Barrier</b> কি ধরছনর সমসযা হয়?	<b>Parent</b>	<b>Environmental (plus/minus)</b> পকরছেছের পকরতনত কি ভাছ া না খারাপ প্রভাে ফেছ	<b>MA/MI</b> সম্পিত ও উপিরীতার নম্বর
Agriculture কৃবি	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural			
Livestock গিবদ্	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural			
Fishing মাছ	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural			
SME (Micro credit) বকস্তু	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural			

Housing বাসা	1. Yes  2. No  3. Not Available	1. Unknown 2. Very Low 3. Low 4. High 5. Very high	1. Social 2. Political 3. Economic 4. Communication 5. Religious 6. Natural 7. Cultural			
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**Semi-Structured Questionnaire to address Gender criteria**

**Semi-Structured Questionnaire – GENDER**

SL	Question	Opinions	Remarks
1.	Do you have access in poultry /Duck rearing?	1. Yes 2. No	
1.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
1.2	Do you face any constraints to take poultry as an adaptation?	1. Yes 2. No	
1.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
1.3	Is poultry/ Duck rearing also contributes to your living or empowerment?	1. Yes 2. No	
2	Do you have access in cattle rearing?	1. Yes 2. No	
2.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	

2.2	Do you face any constraints to take cattle rearing as an adaptation?	1. Yes 2. No	
2.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
2.3	Is cattle rearing also contributes to your living or empowerment?	1. Yes 2. No	
3.	Are you involve in mixed aquaculture?	1. Yes 2. No	
3.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
3.2	Do you face any constraints to take mixed aquaculture as an adaptation?	1. Yes 2. No	
3.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
3.3	Is mixed aquaculture also contributes to your living or empowerment?	1. Yes 2. No	
4.	Do you have access in capturing aquatic resources?	1. Yes 2. No	
4.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
4.2	Do you face any constraints to take capturing aquatic resources as an adaptation?	1. Yes 2. No	
4.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial	Specify..... S- C-

		4. Communicational 5. Religious 6. Political 7. Others	F- Co- R- P- O-
4.3	Is capturing aquatic resources also contributes to your living or empowerment?	1. Yes 2. No	
5	Do you have any floating or hanging vegetables garden?	1. Yes 2. No	
5.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
5.2	Do you face any constraints to take vegetables garden as an adaptation?	1. Yes 2. No	
5.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
5.3	Is floating or hanging vegetables garden also contributes to your living or empowerment?	1. Yes 2. No	
6.	Do you have access in seed/rice bank?	1. Yes 2. No	
6.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
6.2	Do you face any constraints to take seed/rice bank as an adaptation?	1. Yes 2. No	
6.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious	Specify..... S- C- F- Co-

		6. Political 7. Others	R- P- O-
6.3	Is seed/rice bank also contributes to your living or empowerment?	1. Yes 2. No	
7.	Do you have access in safe drinking water source?	1. Yes 2. No	
7.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
7.2	Do you have any constraints to access in safe drinking source?	1. Yes 2. No	
7.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
7.3	As an adaptation measure, is current drinking water source enough to you?	1. Yes 2. No	
8.	Do you take raising plinth as an adaptation measure?	1. Yes 2. No	
8.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
8.2	Do you have any constraints to take raising plinth as an adaptation?	1. Yes 2. No	
8.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P-



			O-
8.3	As an adaptation measure, is raising plinth enough for safe housing?	1. Yes 2. No	
9.	Do you have any savings?	1. Yes 2. No	
9.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
9.2	Do you have any constraints to make savings?	1. Yes 2. No	
9.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
9.3	Is your savings also contributes to your living or empowerment?	1. Yes 2. No	
10.	Do you have any Insurance?	1. Yes 2. No	
10.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
10.2	Do you have any constraints to have an insurance?	1. Yes 2. No	
10.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-

10.3	Is your insurance also contributes to your living or empowerment?	1. Yes 2. No	
11.	Are you involve in any SSNP?	1. Yes 2. No	
11.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
11.2	Do you have any constraints to involve in the SSNP?	1. Yes 2. No	
11.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
11.3	Is SSNP also contributes to your living or empowerment?	1. Yes 2. No	
12	Do you have any Vocational/technical training?	1. Yes 2. No	
12.1	If yes, how much it's effective to adopt any adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
12.2	Do you have any constraints to get any Vocational/technical training?	1. Yes 2. No	
12.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
12.3	Is your training also contributes to your living or empowerment?	1. Yes 2. No	
13	Are you involve in any cultural practice for awareness building?	1. Yes 2. No	
13.1	If yes, how much it's effective in the context of adaptation?	1. Unknown 2. Very Low 3. Low	

		4. High 5. Very High	
13.2	Do you face any constraints to involve in cultural practices?	1. Yes 2. No	
13.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
13.3	Are the cultural practices enough for awareness building program?	1. Yes 2. No	
14	Do you have any education on health?	1. Yes 2. No	
14.1	If yes, how much it's effective in the context of adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
14.2	Do you face any constraints to have health educations?	1. Yes 2. No	
14.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
14.3	Is your current health education enough for leading a healthy life?	1. Yes 2. No	
15	Do you save dry food before a disaster?	1. Yes 2. No	
15.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
15.2	Do you have any constraints for saving dry food?	1. Yes 2. No	
15.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational	Specify..... S- C- F-

		5. Religious 6. Political 7. Others	Co- R- P- O-
15.3	Is dry food enough to adapt during a disaster?	1. Yes 2. No	
16.	Do you have access in dissemination system before a disaster?	1. Yes 2. No	
16.1	If yes, how much it's effective for the context of adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
16.2	Do you have any constraints to access in dissemination system?	1. Yes 2. No	
16.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
16.3	Is your current dissemination system enough for warning before a disaster?	1. Yes 2. No	
17.	Do you have access in proper sanitation?	1. Yes 2. No	
17.1	If yes, how much it's effective in the context of adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
17.2	Do you face any constraints to have a proper sanitation system?	1. Yes 2. No	
17.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
17.3	Is current sanitation system is enough for you?	1. Yes 2. No	

18.	Do you have access in Cyclone Shelter?	1. Yes 2. No	
18.1	If yes, how much it's effective in the context of adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
18.2	Do you face any constraints to adopt cyclone shelter as an adaptation?	3. Yes 4. No	
18.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
18.3	Is current facilities and number of cyclone shelter enough for taking as an adaptation measure?	1. Yes 2. No	
19.	Do you have access in road or other communication infrastructure?	1. Yes 2. No	
19.1	If yes, how much it's effective in the context of adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
19.2	Do you face any constraints in communication infrastructure for helping as an adaptation measure?	1. Yes 2. No	
19.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
19.3	Is current road or communication infrastructure enough for taking as an adaptation measure?	1. Yes 2. No	
20.	Do you migrate your livelihood as an adaptation?	1. Yes 2. No	
20.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low	

		4. High 5. Very High	
20.2	Do you face any constraints to migrate your livelihood for adaptation?	1. Yes 2. No	
20.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- O- C- F- Co- R- P-
20.3	Is livelihood migration also contributes to your living or empowerment?	1. Yes 2. No	
21.	Do you have access in homestead plantation?	1. Yes 2. No	
21.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
21.2	Do you face any constraints to access in homestead plantation as an adaptation?	1. Yes 2. No	
21.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
21.3	Is homestead plantation also contributes to your living or empowerment?	1. Yes 2. No	
22.	Do you have access in Community clinic?	1. Yes 2. No	
22.1	If yes, how much it's effective in the context of adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	

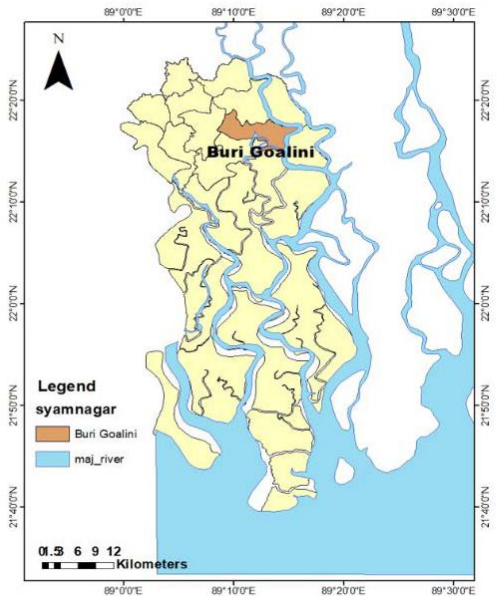
22.1	Do you face any constraints to adopt community clinic as an adaptation?	1. Yes 2. No	
22.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
22.3	Is current facilities and number of community clinic enough for taking as an adaptation measure?	1. Yes 2. No	
23.	Do you have access in loan?	1. Yes 2. No	
23.1	If yes, how much it's effective as an adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
23.2	Do you face any constraints to take loan as an adaptation?	1. Yes 2. No	
23.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial 4. Communicational 5. Religious 6. Political 7. Others	Specify..... S- C- F- Co- R- P- O-
23.3	Is loan also contributes to your living or empowerment?	1. Yes 2. No	
24.	Do you have access in Growth centers?	1. Yes 2. No	
24.1	If yes, how much it's effective in the context of adaptation?	1. Unknown 2. Very Low 3. Low 4. High 5. Very High	
24.2	Do you face any constraints to adopt growth center as an adaptation?	1. Yes 2. No	
24.2.1	If yes, What are the constraints? Please specify and rank it.	1. Social 2. Cultural 3. Financial	Specify..... S- C-

		<ul style="list-style-type: none"> <li>4. Communicational</li> <li>5. Religious</li> <li>6. Political</li> <li>7. Others</li> </ul>	F- Co- R- P- O-
24.3	Is current facilities and number of growth centers contribute to your living or empowerment?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ul>	
25.	Do you take alternative livelihood as an adaptation? Please mention	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ul>	<ul style="list-style-type: none"> <li>1. Handloom/ Handicraft</li> <li>2. Dry fish production</li> <li>3. Laboring.</li> <li>4.</li> <li>5.</li> <li>6.</li> <li>7.</li> </ul>
25.1	If yes, how much it's effective as an adaptation?	<ul style="list-style-type: none"> <li>1. Unknown</li> <li>2. Very Low</li> <li>3. Low</li> <li>4. High</li> <li>5. Very High</li> </ul>	
25.2	Do you face any constraints to take alternative livelihood as an adaptation?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ul>	
25.2.1	If yes, What are the constraints? Please specify and rank it.	<ul style="list-style-type: none"> <li>1. Social</li> <li>2. Cultural</li> <li>3. Financial</li> <li>4. Communicational</li> <li>5. Religious</li> <li>6. Political</li> <li>7. Others</li> </ul>	Specify..... S- C- F- Co- R- P- O-
25.3	Is alternative livelihood also contributes to your living or empowerment?	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ul>	
26.	Do you have any access in organizational support for adaptation? Please mention	<ul style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ul>	<ul style="list-style-type: none"> <li>1. Agricultural support</li> <li>2. Fishing Support</li> <li>3. Livestock support</li> <li>4. SME</li> <li>5. Savings/ Insurance related support</li> <li>6. Plant related support</li> <li>7. HH related support</li> </ul>



			8. 9,
26.1	If yes, how much it's effective for adaptation?	<ol style="list-style-type: none"> <li>1. Unknown</li> <li>2. Very Low</li> <li>3. Low</li> <li>4. High</li> <li>5. Very High</li> </ol>	
26.2	Do you face any constraints to take organizational support for adaptation?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
26.2.1	If yes, What are the constraints? Please specify and rank it.	<ol style="list-style-type: none"> <li>1. Social</li> <li>2. Cultural</li> <li>3. Financial</li> <li>4. Communicational</li> <li>5. Religious</li> <li>6. Political</li> <li>7. Others</li> </ol>	Specify..... S- C- F- Co- R- P- O-
26.3	Is organizational support also contributes to your living or empowerment?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	

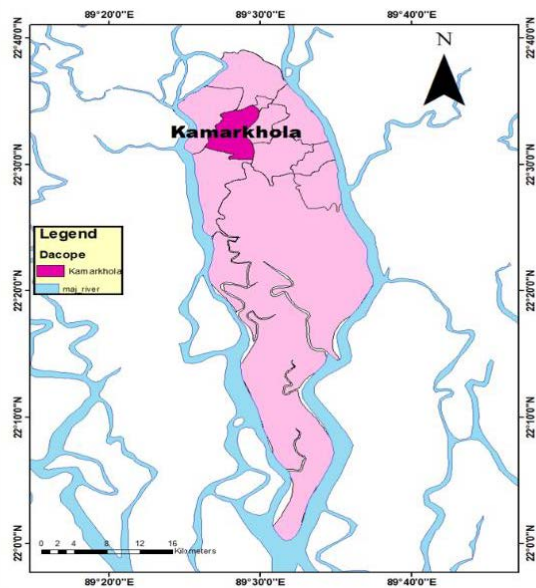
**Detailed Study Sites Map:**



**Village 01 : West Durga Bhati . Union: BuriGoalini**

**Upazilla: Shyamnagar District: Satkhira**

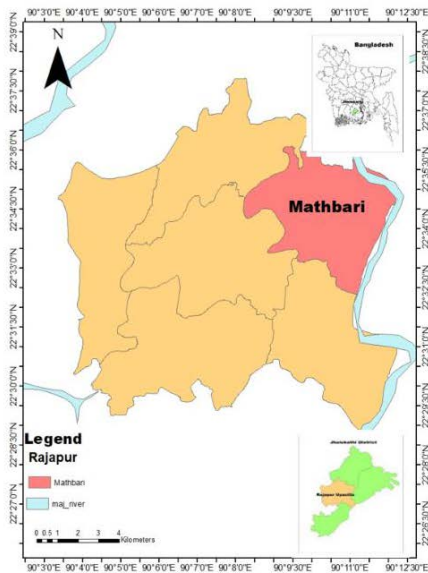
**Survey Implementation date: 6<sup>th</sup> February – 11<sup>th</sup> February 2021**



**Village 02 : Jaliakhali Union: Kamarkhola Upazilla: Dacope**

**District: Khulna**

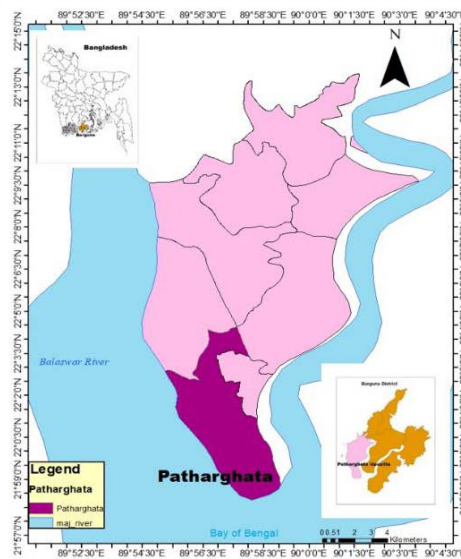
**Survey Implementation date: 12<sup>th</sup> February – 18<sup>th</sup> February 2021**



**Village 03 : Pokhrajana. Union: Mathbari Upazilla: Rajapur**

**District: Jhalokathi**

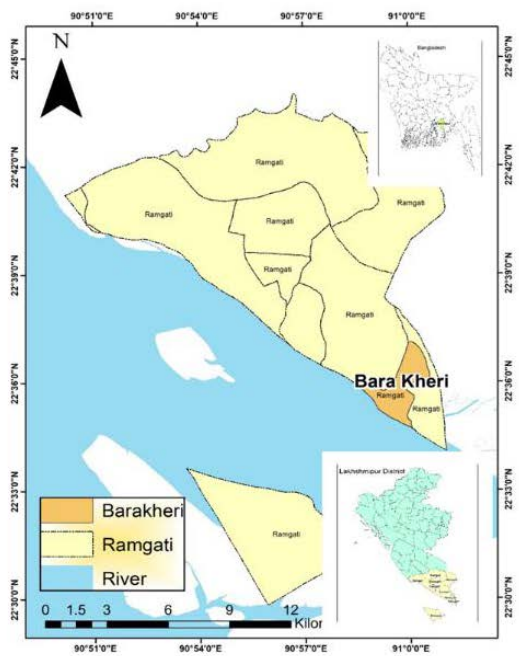
**Survey Implementation date: 4<sup>th</sup> March– 7<sup>th</sup> March, 2021**



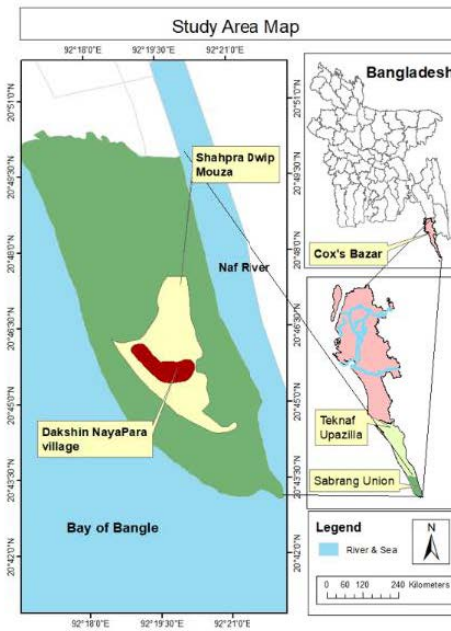
**Village 04 : Rohita Union: Patharghata Upazilla: Patharghata**

**District: Barguna**

**Survey Implementation date: 8<sup>th</sup> March– 18<sup>th</sup> March, 2021**



**Village 05 : Raghunathpur. Union: Bara Kheri Upazilla: Ramgati**  
**District: Lakshimpur**  
**Survey Implementation date: 26<sup>th</sup> March– 4<sup>th</sup> April, 2021**



**Village 06 : Dakshin para. Union: Sabrang Upazilla: Teknaf**  
**District: Coxsbazar**  
**Survey Implementation date: 1<sup>st</sup> September– 15<sup>th</sup> September , 2021**

*Annex 9: Thesis Aligned with This Project*

*Number of completed and ongoing theses under this project*

*Completed and On-going Thesis*

8.6 **Completed Thesis 1: Md. Rayhan Ahmed (PSTU)**

**Exploring the Role of Climate Change Adaptation in People's (Non)-Migration Decision: A Case from Coastal Area of Bangladesh**

**Md. Rayhan Ahmed**

*MS in Disaster Science and Emergency Management  
Patuakhali Science & Technology University (PSTU), Bangladesh*

## **Abstract**

Despite confronting severe climatic risks, many people prefer to remain in climate hazard-prone areas rather than migrate. Environmental non-migration behavior, however, has gained relatively little research attention in the field of migration processes. This study aims to unveil the determinants motivating voluntary environmental non-migration decisions in coastal Bangladesh, an area highly exposed to flooding, coastal erosion, salinity and cyclone. Applying a Probability Proportional to Size (PPS) method follows cluster sampling, we selected 400 household respondents for a questionnaire survey from Buri Goalini Union of Satkhira. Applying a mixed method (i.e., both quantitative and qualitative) approach, major empirical results of this study suggest that even though all respondents lived in a similar situation in terms of climatic hazard and exposure, 60.5% of the respondents reported themselves as voluntary non-migrants. Furthermore, these non-migrants enjoyed higher socioeconomic and socio psychological advantages and availed more local support from different government and non-government organizations than involuntary non-migrants. Again, adaptation to agriculture, fisheries, lives tock, and alternative livelihood appeared to build their higher degree of aspiration compared to involuntary non-migrants. All these features lead to a favorable environment that ultimately drove the respondents to become voluntary non-migrants.

**Keyword:** Climate Change, Disaster, (Non)-Migration, Climate Change Adaptation

## 8.7 Completed Thesis 2: Sabrina Akther (DU)

### **Thesis on Adaptation Practices of the Affected Population due to Recent Cyclonic Storm Surge Induced Salinity Intrusion: A Case Study of Shyamnagar in Coastal Bangladesh**

**Sabrina Akther**

*MSc in Disaster Science and Management  
University of Dhaka (DU), Bangladesh*

## **Abstract**

The impact of gradually increasing soil salinity has become a major concern for the people living in the coastal regions of Bangladesh as it continues to deteriorate the life and livelihood of people living there. Climate change, sea level rise, and the increasing frequency of cyclones have further worsened the situation. Though salinity intrusion is now a slow-moving process, its impacts are obvious on the coastal population of Bangladesh. This study aims to address the impact of recent cyclonic storm surges on salinity intrusion and the effectiveness of related adaptation practices in the Shyamnagar Upazila of Satkhira district, one of the worst affected areas from cyclone and salinity. To discern the impact of cyclonic storm surge on salinity intrusion, this study considers the cyclones from 2019 to 2021, which are Cyclone Fani, Bulbul, Amphan, and Yaas. Data obtained from Landsat 8 are used to map the soil salinity by applying an equation that uses Normalized difference Salinity Index to turn Top of Atmosphere reflectance value into Electric conductivity values. This process helped to identify the temporal and spatial variation in soil salinity from the years 2019 to 2021. Overall, strong (8-16 dS/m) and very strong (>16 dS/m) soil salinity showed an increasing trend in the study area. To examine the effectiveness of adaptation practices against salinity intrusion, a community-level field study constituting survey of 118 households was conducted in the West Durgabhati village of Shymnagar Upazila. A five-point Likert scale is used to evaluate the effectiveness and related barriers. The findings of the study reveal that about 70% of the population have converted their livelihood to shrimp/crab farming from Agriculture due to excessively saline lands. The effectiveness of fisheries and aquaculture-related adaptation practices was high, wherein the effectiveness of any type of agricultural crop production was low. The community perceived the effectiveness of rainwater harvesting as a safe drinking water source to be very high. Even though government and organizational support were noticeable, the community perception of their effectiveness was low. This study helps to understand that the effectiveness of any adaptation strategy is strongly dependent on the household's accessibility and adequacy to that particular practice. Finally, the study provides a pathway for developing a time-sensitive and cost-effective remote sensing-based soil salinity mapping process which will help to observe and interlink the impact of soil salinity change over the years on various adaptation practices in the coastal regions of Bangladesh.

## 8.8 On-going Thesis 1: Marin Akter (Phd, Math, BUET)

### **Dynamic Adaptation Model for Climatic Risk Minimization**

**Marin Akter**

*Department of Mathematics, Bangladesh University of Engineering and Technology (BUET),  
Bangladesh*

#### **Abstract**

Risks are assessed to evaluate impacts of climatic hazards on human system. The locations where these impacts are the maximum are called risk hotspots. Characteristically, risk in a system varies non-linearly with exposure, hazards and vulnerability. Hence, risk reduction of a system also behaves nonlinearly. Due to this nonlinearity, risk minimization in a resource-starved region is a

difficult task. A nonlinear adaptation model that can quantify adaptation is an effective tool in this physical setting. Climatic risk in a human system is dynamic due to changing nature of hazard, socio-economic systems, community perception, barrier, accessibility, adequacy, and equity. There is an added dynamism in the system because risks are redistributed when a specific adaptation is implemented in different scales within the system.

Therefore, to accommodate all these is a single modeling structure, a conceptual framework of a dynamic adaptation model is developed in this study that will minimize risk in a specific climatic risk hotspot. In that case, a system approach needs to be followed where the system is embedded within the natural and human systems which is characteristically nonlinear. It is also necessary to identify priority of investment of adaptation for risk-based planning. Investment on a particular adaptation should also consider overall impacts on other existing and planned adaptations which also have influences on the risk minimization.

In this study, we have developed a dynamism of an Adaptation Model by applying nonlinear programming. Risk in this Adaptation Model is defined as a nonlinear function of hazard, exposure and vulnerability following IPCC, AR5 approach. The model computes adaptation deficiency to minimize future climatic risk in selected hotspots. The model is applied in Bangladesh coastal zone to compute adaptation deficiency in risk hotspots to identify the required adaptation to minimize future climatic risks.

**Keywords:** Risk Assessment, Dynamic Adaptation Model, Mixed mode solutions, CHANs, ABM.

## 8.9 On-going Thesis 2: Hamima Huma (MSc, IWFM, BUET)

### **Sustainable Adaptation Measures due to Storm surge: A case study in Coastal Region**

**Hamima Huma**

*MSc in Institute of Water and Flood Management*

*Bangladesh University of Engineering and Technology (BUET), Bangladesh*

#### **Abstract**

The effect of storm surge and cyclone in coastal areas have increased environmental damages and endangered the sustainability of the ecosystem as well as the viability of community livelihood. People of coastal region have practiced several adaptation measures to reduce the fatalities and damages and cope up with the storm surge and changing effect of climate change. This study aims to explore adaptation measures of coastal community. The study will also develop a method to define sustainability of those adaptation practices. However, another finding will be to indicate the drivers behind unsustainability. The study will be conducted in the coastal region of Bangladesh where storm surge and cyclone are the major natural hazard. The sample size will be selected by

using Probability proportional to size (PPS) and cluster sampling method. To measure sustainability of adaptation practices eight criteria will be considered: Community perception, environmental perception, barrier, accessibility, adequacy, gender, equity and age. The data will be collected by using several PRA tools such as Semi-structures interviews (SSI), Key Informant Interviews (KII), and Focus Group Discussion (FGD). For assessing sustainability fuzzy logic will be the quantifying tool. Fuzzy membership function will also be used to find out the drivers of unsustainability. The conclusion will be to facilitate better local adaptive capacity and to improve adaptation measures to be more sustainable.

Keywords: Storm surge, Adatation Measures, Sustainability, Coastal region, Fuzzy logic



## **Adaptation Model identifies adaptation requirements for climate risk reduction**

**A model has been used to compute the adaptation deficiency that needs to be addressed to minimize mid-century climate risks in the coastal zone of Bangladesh. As such risks are the combination of exposure, hazard and vulnerability, a nonlinear programming system has been formulated in the Adaptation Model. This model can help decision makers to take the necessary developmental actions to meet adaptation and environmental policy targets, which will help millions of poor people living under the threat of climate change.**

### **Key messages**

- ❖ The Adaptation Model will help to reduce the risks generated by hazards (such as storm surges, salinity, erosion and floods), exposure and vulnerability of a specific region.**
- ❖ The model will assist the government to understand the need to prioritize adaptation.**
- ❖ The model will help policy makers to take decisions on investment priorities for risk-based planning to minimize climate risks at a particular area.**

### **Background**



Global warming and anthropogenic climate change and the need to tackle them are now widely acknowledged as among the greatest challenges facing our society. Adaptation, therefore, has become the focus of climate change research, with policy implications.

Therefore, the identification of the most effective adaptation options is of utmost importance for a country with severe resource constraints, to maximise benefits from the available resources. Prior to this, the sensitive zones that are the most vulnerable to climate change need to be identified and then adaptation prioritized in those zones where minimization of risk is possible. Figure 1 shows a critical embankment protected by a banyan tree near Galachipa upazilla, which is an example of a risk and vulnerability scenario in the coastal area of Bangladesh. Which is an example of a risk hotspot the adaptation model might identify? Through analyzing the reasons of failure and reconstruct the embankment with the concept of build back better (BBB) need to introduce to ensure safety of the embankment.

Moreover, a particular set of adaptation actions in a specific region may transfer the risk to the adjacent regions. Therefore, we have developed a system approach, where the model is embedded within the natural and human systems. A System approach is based on the generalization that everything is inter-related and interdependent. This approach has emerged demographic and geographic condition and natural variabilities of climatic events to manage and organize complexity in a region. To accommodate the system response in this study, nonlinear programming was applied to the Adaptation Model. It is due to fact that risk in this Adaptation Model is defined as a nonlinear function of hazard, exposure and

vulnerability, following the IPCC AR5 approach (IPCC, 2013).

The model is applied in the coastal zone of Bangladesh, which faces a risk of storm surges, to compute the **adaptation deficiency**<sup>4</sup> in the risk hotspots, which will help to identify the required adaptation to minimize climate risks.

## Model Development

The major technical tool of this study is a nonlinear programming system. It is an optimization tool, which involves calculation

*Figure 1: A critical embankment protected by a banyan tree near Galachipa Upazila, Patuakhali.  
Photo Credit: MD. Rayhanur Rahman*

of the extrema (maxima, minima or stationary points) of an objective function over a set of unknown real variables (known as socio-economic parameters and hazard parameter of this study) and is conditional to the satisfaction of a system of equalities and inequalities, collectively termed as constraints. In this research, an objective function and the related constraints are developed from the weighted scores of domain parameters for the concerned study region. The relative weighted scores are calculated by using Principal Components Analysis (PCA) (Jeong et al., 2009), which is a well-established tool for weight calculation.

## How was the model applied to determine adaptation needs?

Adaptation model can be applied for risk minimization in any region for any hazard. As an application, storm surge hazard is considered to assess the risk where adaptation model is applied. According to the Akter, et.al. (2019), 15 indicators were selected from a combined list of the 19 most sensitive

<sup>4</sup> Adaptation deficiency represents the deficit of an adaptation in a region, is calculated by

$$\text{adaptation deficiency} = \text{adaptation need} - \text{present value of an adaptation}$$

and most significant socio-economic indicators for storm surge generating risk analysis in the study area.

**Table 1:** List of indicators for storm surge generating risk.

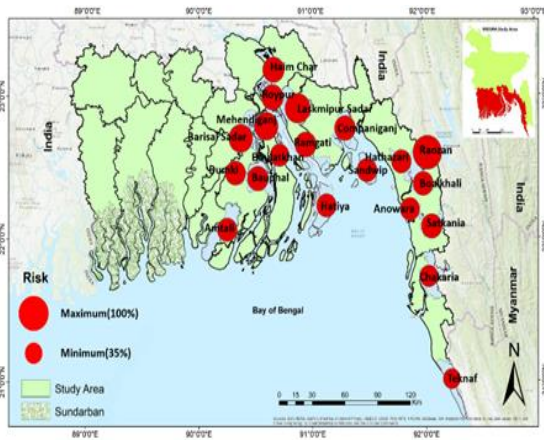


Figure 2: Hotspot due to storm surge

<b>Exposure</b>
Cropped land Number of households Population density
<b>Sensitivity</b>
Disabled people Dependent people Female to male ratio Poverty rate
<b>Adaptive capacity</b>
Plantation Pucca & Semi-Pucca House Loan Polder

Growth center Cyclone shelter Communication infrastructure Literacy rate
---

Exposure, Sensitivity and Adaptive capacity come from how they response a system. Exposure refers to the parameters which are directly affected due to any hazard. Sensitivity domain comes from the combination of demographic and geographic condition. Indicators in sensitivity domain work towards the risk of a system. The adaptive capacity indicators represent adaptation in the study area. Indicators in adaptation domain have a negative impact on risk. It means that it works against the risk in a region.

The total 15 indicators in table 1 are used to assess risk for storm surge, data sources of these indicators are from the year 2011. Figure 2 shows a hotspot map where model will be applied to minimize storm surge generating risk and the hotspot map is made for only future risk (figure 2). Hotspot locations were identified where future risks are high to very high. Top 20 risk hotspots are identified in the study. Here, the year 2050 is considered to represent the future risk scenario. As data for socio economic indicators (Indicators of Exposure, Sensitivity and Adaptive Capacity domain) is not available for the projections of socio-economic indicators up to 2050, to assess the future risks (which is required to identify the hotspots), only a projection of the risk of storm surges to 2050 is done by considering the changed external forcing (fluvial flows and sea level) of storm surge events to 2050. Hence, in these 20 risk hotspots, the Adaptation Model is applied to compute adaptation deficiencies, which, if addressed, will minimise the future risks in these hotspots.

### How can the model be used for investment planning? / What does this mean for investment planning?

The 20 hotspots are arranged in Table 2 in descending order based on their ranking. The top ranked hotspot (Raozan) is the location with the maximum future risk score (100), and the bottom ranked hotspot (Teknaf) is the location with the minimum future risk score in the list (35), on a normalized 0-100 scale. The adaptation needs in Table 2 are arranged alphabetically, with the higher the percentage indicating the higher the need for that particular adaptation measure.

Table 2 can be used to decide investment planning on adaptation to minimise future storm surge risks in the study area. For example, Table 2 shows that Raozan has the maximum adaptation **deficiency**<sup>1</sup> of 69% in terms of cyclone shelters. The highest skyline in a hotspot shows the maximum adaptation deficiency for the hotspot, which needs immediate investment to minimize future risks there. The maximum adaptation deficiency in different hotspots are marked by shaded zones in Table 2. It can be seen that the most needed adaptation investment is cyclone shelters in 10 hotspots, followed by plantation (eight hotspots). Two hotspots are equally deficient in two adaptations (cyclone shelters and plantations in Mehendiganj, ranked fourth, and cyclone shelters and polders in Boalkhali, ranked 12<sup>th</sup>). So, in terms of a single investment priority to minimise future risks in the region, cyclone shelters should get the highest priority, followed by plantations.

### Three options for risk-based planning

To reduce future risks in a hotspot to a minimum, policy makers have three options for risk-based investment planning. Option-1: parallel investment in all the adaptation to

the required level as shown in Table 2. This will need a substantial investment and may not be a preferred option. Option-2: sequential investment on a particular adaptation in different hotspots starting from the rank-1 hotspot (for example cyclone shelter starting from Raozan for this study area). Option-3: sequential investment on different adaptations based on magnitude of adaptation deficiency starting from top ranked hotspot. For example, in Raozan, investment should be made sequentially in cyclone shelters, polders, loans, pucca & semi-pucca houses, communication infrastructure, growth centers and plantations. In this hotspot, investment is not required in the literacy rate, as the adaptation deficiency is zero here. The selection of any specific option will depend on the availability of funds and priority, based on the socio-political scenario. In all the three options, investment in any adaptation to meet the required level of deficiency to minimize future risks will increase the present state of adaptation (adaptation deficiency is computed based on the present state or base condition). This will have an impact on the entire socio-economic condition of the study area. The system response due to this changed socio-economic condition can be computed (results not shown in this application) by iterating the entire application process of the Adaptation Model, i.e., starting from the identification of risk hotspots, formulating a nonlinear programming system, calculating the changed adaptation deficiency and preparing Table 2 for the new condition. With iterated application of the Adaptation Model, it is possible to reduce the future storm surge risks in all the hotspots of the study area to the minimum possible level. Further investment in any adaptation beyond this minimum level will be considered as 'surplus' for the system.

**Table 2:** Computed adaptation deficiency in different hotspots

Hotspot Name	Hotspot Rank	Adaptation Deficiency in Percentage							
		Communication infrastructure	Cyclone shelter	Growth Center	Literacy Rate	Loan	Pucca & Semi-pucca house	Plantation	Polder
Raozan	1	46	69	36	0	54	50	33	66
Lakshampur Sadar	2	53	70	53	0	29	48	64	41
Barisal Sadar	3	32	69	56	0	43	45	65	0
Mehendiganj	4	51	62	23	4	44	49	62	18
Roypur	5	31	65	54	0	37	49	55	67
Haim Char	6	42	67	46	7	49	49	17	65
Ramgati	7	30	65	39	20	62	46	73	15
Companiganj	8	50	56	52	0	48	56	70	0
Bauphal	9	49	63	53	0	45	54	67	0
Satkania	10	37	67	37	0	55	51	16	65
Dumki	11	55	66	46	0	36	53	65	8
Boalkhali	12	22	68	46	0	47	49	10	68
Sandwip	13	19	17	41	0	66	70	82	37
Amtali	14	71	60	52	0	24	61	75	0
Hatiya	15	52	40	62	37	38	58	32	31
Hathazari	16	50	85	59	0	53	60	39	84
Anowara	17	27	46	44	0	59	55	74	7
Daulatkhan	18	36	49	56	22	54	56	61	7
Chakaria	19	32	51	46	8	45	57	16	49
Teknaf	20	40	55	59	53	25	56	0	46

## Conclusion

Currently, several organisations are working with the Bangladesh government to reduce risk in the coastal area. The government and policy makers need to decide on investment priorities before doing risk-based planning to minimise future climate risks. This is particularly important where there are resource constraints and the decisions depend

on the socio-political reality of the region. It is also extremely important for them to know how a system will behave (the system here has biophysical and socio-economic components) if an investment is made in any adaptation at any location to minimise future climate risks in the region. To answer these questions, our model can compute the adaptation deficiency at a location that will minimize future climate risks in that location.



This deficiency needs to be addressed if future climate risks are to be minimized in that location. The Adaptation Model has been applied in the coastal zone of Bangladesh to compute the adaptation deficiency in 20 hotspots that face a risk of storm surges. These deficiencies, if addressed, will

minimize future storm surge risks in these hotspots. This output from the model can be used by the policy makers to decide on appropriate investment options for risk-based planning that will minimize future storm surge risks in the identified hotspots.

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## Effectiveness of Selected Planned Adaptations: Expectation and Reality

Cyclone shelter, plantation, paka & semi-paka house, loan, and communication infrastructure are five adaptation measures selected to assess their effectiveness in a coastal community of Bangladesh. After evaluating people's perception, barriers and causal relations among the adaptation measures, it is found that *cyclone shelter, paka & semi-paka house, loan, and communication infrastructure* are not effective in local scale although they are recognized to

be effective in regional scale. Only *plantation* is found to be effective at both the local and regional scale because of its high economic return.

### Key Messages

- ❖ Planned adaptation measures in regional scale need to be considered the barriers which an adaptation measure faces in operational phases at a local scale.
- ❖ causal relations among the adaptations and barriers make different existing adaptations (planned and autonomous) at local scale connected to each other.
- ❖ It is important that community perception at local level need to be considered during policy planning and implementation decision of adaptation measures in the regional scale. Because if it is ignored, there is every possibility that effectiveness of these adaptations will be perceived as 'ineffective' at the local level. regional scale

200 years that caused the death of more than 900,000 people (Blaikie et al. 1994; Ali 1999; Paul 2009a; Islam, 2004).

After the 1991 Chittagong Cyclone, the government of Bangladesh has taken several structural and non-structural initiatives in reducing the fatalities and damages. In recent times, adaptation has become the center of attention in both climate change research and policy implementation in Bangladesh so as to deal with limited resources (Akter et al, 2020). Adaptation is the process of adjustment to climate alteration that includes adjustments in behavior or economic structure that reduce the susceptibility of society to changes in the climate system (Smith et al, 1996). To assess implication of adaptation measures to a community, it is important to identify the risk hotspots, local demand for prioritizing adaptation measures, adaptation deficiency compared to the adaptation need, and implementation of adaptation measures.

After evaluating the past studies, it is realized that there is still a research gap

### Introduction

The unique geographical feature, the dominance of floodplain, high density of population, low elevation from sea level and geomorphological issues make this country more susceptible to climatic hazards. The coastal zone of Bangladesh, with the most dynamic delta in the world, has about 710 km long coastline which covers about 20% of total land area and over 30% of the cultivable lands of the country (BWDB, 2013a; Hossain and Selvanathan, 2013). The current average size of agricultural land per capita is 0.138 acre, but this will be reduced to 0.0617 acre by 2050 and population is expected to increase to 57.9 million (PDO-ICZMP 2004b). This coast is well known for severe cyclones and induced surges experiencing at least 70 major cyclones during the past

### Method

evaluating effectiveness of planned adaptation measures at the community level. This study is designed to assess the effectiveness of the planned adaptation



measures at both the local and regional scales. Five planned adaptations are selected which are considered sensitive and effective in regional scale and a field site is selected where these adaptations are implemented at the community level. A field survey is conducted at the community level to assess effectiveness of these adaptation measures at local level. Comparison is then made to identify the differences of effectiveness of these five planned adaptation measures at the local and regional scales.

The study is mainly based on primary data collected by household surveys. Secondary data are also collected from BBS (BBS 2011). A semi-structured questionnaire is prepared to collect primary household data through KII and FGD across the study area.

In this study, Galachipa upazilla of Patuakhali district is selected as the study area which is highly vulnerable for cyclone induced storm-surges because of its geographical location on the bank of the Ramnabad River. Sampling for selecting the units of observations (households), cluster sampling method is adopted in this study where the unions are considered as clusters. However, 430 respondents were surveyed in 10 days. After applying the PPS technique, three Mouzas of Galachipa upazila are finally selected for the survey. These are: (1) Dakhsin Panpatty mouza from Panpatty union (2) Dari Baherchar mouza from Amkhola union and (3) Atkhali mouza from Dakua union.

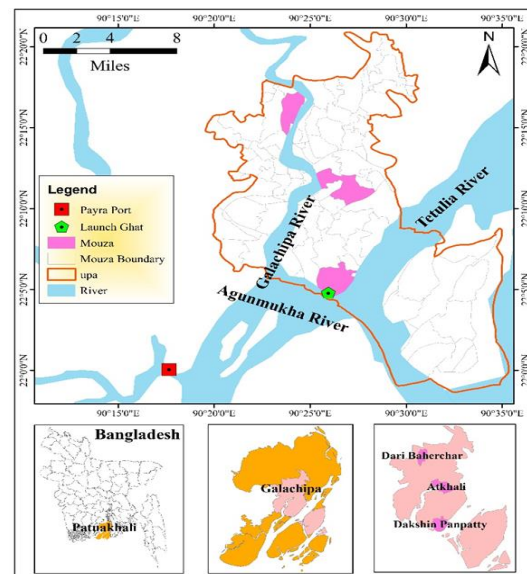


Figure 1: Study Area

The criteria to select these adaptation measures are: (a) among the top 10 most sensitive adaptation measures are available in the study area (b) adaptation measures which have more than 50% deficiencies compared to future need and therefore effective in regional scale (Akter et al., 2020).

Likert scale is applied to measure peoples' perception on the effectiveness of adaptations. An indexing formula is developed to rank the adaptations based on their Likert score.

### **Likert Scale**

A five-point Likert scale (Likert, 1932) is used to investigate the people's perception. Each household respondent is asked to select one of the five options given below in order to describe the effectiveness of selected adaptation practice.

1 = Totally ineffective, 2 = Ineffective, 3 = Not understandable, 4 = Effective, 5 = Highly effective

The level of effectiveness or the options of Likert scale are defined as (Islam et al, 2019):

Totally ineffective: Only a little benefit is available for the people with significant difficulties. As a result, outcomes are far away from expectations.

Ineffective: People are getting some benefits, but the level of usefulness is below expectation. In other words, the benefits are outweighed by difficulties, but this gap is not significant.

Not understandable: People are confused to rate the adaptation as the advantages and disadvantages remain unclear to them.

Effective: People are getting good benefits that can be considered as satisfactory. Although there are some difficulties within the functions of the adaptation, but the level of advantages is outweighed by the level of disadvantages.

Highly effective: People are getting very good benefits from adaptation that can be considered as highly satisfactory. However, minor difficulties are found within the functions of the adaptations, which is negligible.

### ***Index***

The following indexing formula is developed to rank the adaptations based on a calculated score using percentage of frequency and weight of each Likert option

$$\text{Effectiveness Score} = \{(PTI \times 1) + (PI \times 2) + (PNU \times 3) + (PE \times 4) + (PHE \times 5)\} \dots \dots \dots (1)$$

Here PTI = percentage of totally ineffective, PI = percentage of ineffective, PNU = percentage of not understandable, PE = percentage of effective, and PHE = percentage of highly effective.

### ***Probabilistic Analysis of Barriers***

There are few barriers (social, economic, religious, cultural and political) for the local people when they practice any specific

adaptation. These barriers are internally dependent on each other, i.e., they are mutually inclusive. Sometimes, each individual faces one or more barriers at a time. The impact of barriers are assessed in the probabilistic way.

Venn diagram is constructed to describe the difficulties of taking selected adaptations. A complex inter-relationship among different adaptation measures practiced in the field is established through descriptive statistical method and Venn diagram

### **Community perceptions on effectiveness of existing adaptation practices**

(Figure 2).

The ranking is done using the highest to lowest weighted score. In Table 1, plantation gets the highest score of 397 and ranked as Number 1. Coastal plantation is believed to work as a buffer against the cyclonic wind and surge wave. In addition, homestead plantation provide the community timber for housing, food and fruits, fuel and money.

Another adaptation practice *loan* is ranked as an ‘effective’ adaptation in the study area. Based on community perceptions, the weighted score of *loan* is 337.

community has a mixed perception on the existing state of *communication infrastructure*. With a score of 230, the rank for *communication infrastructure* is 3.

**Table 1:** Community perceptions on effectiveness of existing adaptation practices

Adaptation	Practices	Highly ineffective	Ineffective	Not understandable	Effective	Highly effective	Total
Communication Infrastructure	Rank	1	2	3	4	5	3
	no	38	200	81	31	0	350
	%	10.9	57.1	23.1	8.86	0	100
	E.S	10.86	114.3	69.43	35.43	0	230
Pucca and Semi pucca House	Rank	1	2	3	4	5	5
	no	82	173	66	28	1	350
	%	23.4	49.4	18.9	8	0.29	100
	E.S	23.43	98.86	56.57	32	1.428	212.3
Loan	Rank	1	2	3	4	5	2
	no	8	34	132	174	2	350
	%	2.29	9.71	37.7	49.7	0.57	100
	E.S	2.29	19.43	113.1	198.9	2.85	336.6
Plantation	Rank	1	2	3	4	5	1
	no	2	18	47	205	78	350
	%	0.57	5.14	13.4	58.6	22.3	100
	E.S	0.57	10.29	40.29	234.3	111.4	396.9
Cyclone Shelter	Rank	1	2	3	4	5	4
	no	95	131	92	32	0	350
	%	27.1	37.4	26.3	9.14	0	100
	E.S	27.14	74.86	78.86	36.57	0	217.4

The local NGO informed that the number of loan receivers generally increase before monsoon and after a climatic hazard. Several NGOs (Grameen Bank, Codek, SHEDF, ASA) are active in the study area as loan providers.

*Communication infrastructure* is considered as a long-term adaptation. Due to significant financial involvement, the government is a dominant stakeholder in the implementation of this adaptation. As an adaptation in the study area, the In the study area, 95% of respondents live in *katcha house* which is made of mud, tin, timber, bamboo, and other temporary materials. Financial barrier plays a major role behind selection of *katcha house* as a dwelling. As the majority of respondents live is *katcha house*,

**Future perception of community on effectiveness of adaptation**

Based on the weighted score of ‘effectiveness’, *cyclone shelter* is ranked 4 with a weighted score of 217 indicating low effectiveness at community level. Especially female group of the respondents identified several barriers like social, cultural, religious, and political during moving to *cyclone shelter* at the time of disaster. Besides, the shortage of number of *cyclone shelters*, distance from home and poor communication systems are other reasons behind the low ‘effectiveness’.

In the study area, 95% of respondents live in *katcha house* which is made of mud, tin, timber, bamboo, and other temporary materials. Financial barrier plays a major role behind selection of *katcha house* as a dwelling. As the majority of respondents live is *katcha house*, effectiveness of *semi-pucca* and *pucca house* gets a low score (212) and ranked in 5.

The respondents in the study area predicted the future effectiveness of selected adaptation measures based on the implementation of these adaptation measures in the near future (see Table 2). Here, the respondents used their imagination to answer the question and hence the uncertainty of these results are high.

Table 2 shows the future perceptions of community on effectiveness of selected adaptations. The scores show an increasing trend, meaning that effectiveness of different adaptations will increase in future. For example, at present, the effectiveness score of *cyclone shelter* is 217 and

Adaptation Practices	After 10 year	After 20 year	After 30 year
	E.S	E.S	E.S
Communication Infrastructure	379	427	476
Paka and semi-paka house	378	429	478
Loan	399	446	481
Plantation	441	479	495
Cyclone shelter	373	437	485

after 30 years it will 485.

### Barriers for adopting adaptation measures

Social, cultural, economic, political, and religious constraints are identified as major barriers for adopting adaptation measures in the study area. These barriers largely influence respondent's decision during adopting a specific adaptation practice. Impact of barriers are calculated in probabilistic way.

For probabilistic score (Table 2), a Venn diagram is constructed as shown in Figure 2. The figure shows that majority of the respondents face at least one barrier, few respondents face two or three barriers. No respondents face four or more barriers. Total probabilistic score of facing one barrier is 1.51 where the top three barriers are economic (0.67), social (0.61) and cultural (0.13). Interestingly, religious barrier has the minimum impact (0.04).

Total probabilistic score shows that 98% of respondents in the area face at least one barrier and only 2% respondents do not face any barrier.

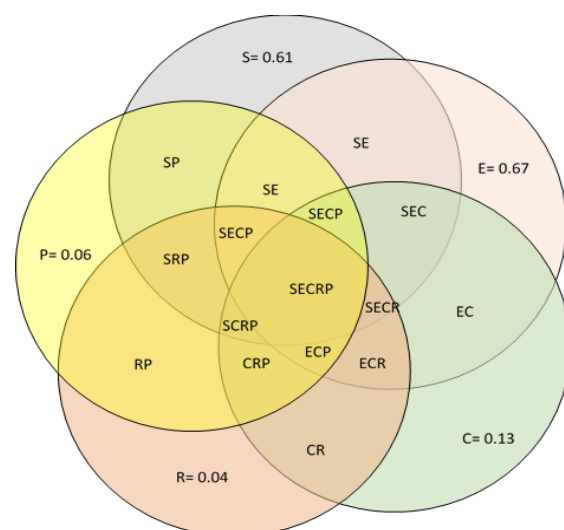


Figure 2: Venn diagram of barriers (mutually inclusive) in the study area. Here,

S= Social Barriers, C= Cultural Barriers, E= Economic Barriers, R= Religious Barriers, P= Political Barriers. Sample size =350

During the field survey, it was found that the barriers have indirect impact on adaptation measures. Figure 3 shows impact map of barriers on adaptation measures. It is seen that economic barrier has a very high impact on *paka and semi-paka house* (Figure 3). Social barrier has a very high impact on *cyclone shelter* followed by cultural barrier (high impact), religious barrier (moderate impact), political barrier (low impact). *Plantation* is an adaptation that needs some initial investment that acts as a high impact barrier against *plantation* (Figure 3). Even with this barrier, the high monthly return from plantation and its role to reduce storm surge effects makes this adaptation as ‘highly effective’. When we look into the barrier, it is found that impact of economic barrier is very high against *loan* is due to the high interest rate. Political barrier has a very high impact on *communication infrastructure* as construction of this infrastructure is highly biased by the political leaders that effect the accessibility for the common people.

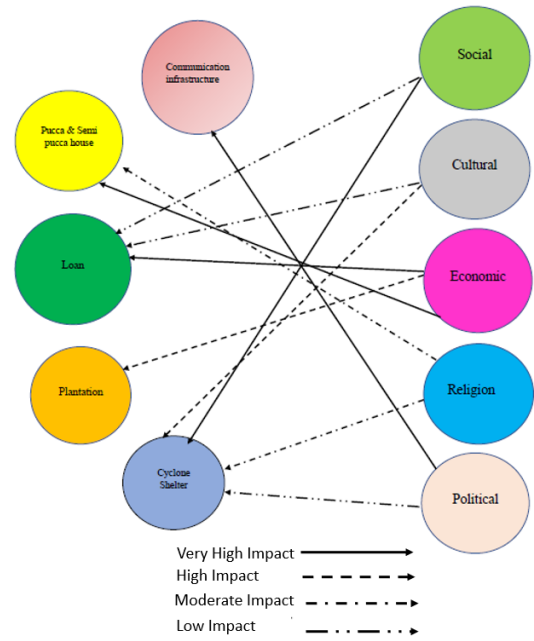


Figure 3: Impact of barriers on adaptation practices in the study area.

### Causal relation among adaptations

Causal relation shows how a particular adaptation measure is related to other adaptation measures within the community and the impact pathways of adaptations along with ‘strength’ of the pathways (Figure 4).

The unidirectional ‘strong’ causal network relation among *cyclone shelter*, *communication infrastructure* and *paka & semi-paka house* shows that *communication infrastructure* is ‘more weighted’ than *cyclone shelter* and *paka & semi-paka house*. *Loan* and *paka & semi-paka house* have a ‘strong’ ‘bidirectional’ causal relation that means *loan* is ‘more weighted’ than *paka & semi-paka house*. Similarly, ‘more weighted’ *communication infrastructure* and *plantation* have a ‘weak’ impact on *paka & semi-paka house*. The unidirectional causal relation among *communication infrastructure*, *cyclone shelter*, and *paka & semi-paka house* shows that a better communication is essential

(‘strong’ impact) for increased effectiveness of a *cyclone shelter*. The bidirectional causal network between *loan* and *paka & semi-paka house* shows that people can only (‘strong’ impact) build a better-quality house if loan is available (‘more’ weighted) and better the quality of house, requirement of taking a loan is less (bidirectional).

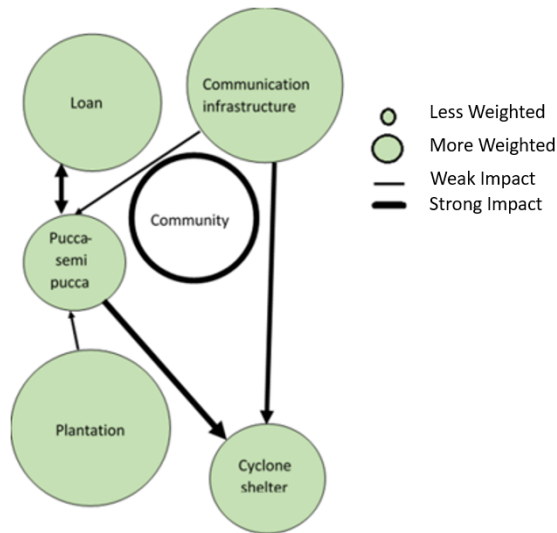


Figure 4: Network of causal relation among the adaptation practices.

### Discussion and Conclusion

We have assessed whether these expectations of effectiveness of planned adaptation measures in regional scale are also perceived effective in reality at the local scale. Table 3 shows that cyclone shelter, which is the most sensitive planned adaptation and have 52% deficiency to minimize future risk in regional scale (thus demand for an immediate investment) is only 9% effective as perceived in the community at local scale. Planned adaptation measures in regional scale do not consider the barriers which an adaptation measure faces in operational phases at a local scale. In addition to

barriers, adaptations have causal relations among themselves. These causal relations make different existing adaptations (planned and autonomous) at local scale connected to each other.

Table 3: Expectation and reality

Planned Adaptations	Expectation in Regional Scale		Reality at Local Scale
	Sensitivity Rank	Deficiency	Effectiveness
Cyclone shelter	1	52%	9%
Plantation	2	54%	59%
Paka & semi-paka house	7	63%	8%
Loan	8	61%	50%
Communication infrastructure	9	66%	9%

(Source: Akter et al., 2019; Akter et al., 2020; Field Survey 2020)

In summary - if community perception at local level is ignored during policy planning and implementation decision of adaptation measures in the regional scale, there is every possibility that effectiveness of these adaptations will be perceived as ‘ineffective’ at the local level.

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## **Empowerment of women by using local adaptation practices in coastal area of Bangladesh: Benefits and Constraints**

Women in coastal Bangladesh struggle hard to withstand natural disasters. Economic, social, cultural and religious constraints surges their hardship. The study uncovers the barriers faced by women and reveals that empowering women by taking different types of adaptation

### **Key Messages**

- ▶ Women is the backbone of a family as they play a key role in protecting, managing and recovering their household and assets during and after a disaster by practicing different types of income generating activities.
- ▶ Involving in an income generating activities through local adaptation practices, women have to face least one or more than one barrier that interrupts empowerment of women
- ▶ Still in 21<sup>st</sup> century, women face constraint in access to assets, information and services as well as they are victim as domestic and social violence in Bangladesh.

measures will help them to cope with natural disaster and also improve their economic condition.

Bangladesh has 710 km coastline which is well known for its tropical cyclones from the Bay of Bengal. These are one of the major causes of disaster in Bangladesh. The high number of casualties is due to the fact that cyclones are mostly associated with storm surges (Jayeda & Mohammad, 2013). The impact of the cyclone on coastal community varies across societies and communities but it is widely experienced that cyclones affect women and men

differently. Women are more vulnerable than men before, during and after the cyclone in Bangladesh (Juran & Trivedi, 2015). This is due to their poverty, their attitudes, social norms, and their marginal position in the social system (Md. Sadequr 2013). Although gender mainstreaming is largely absent in formal disaster management, women execute pre-disaster activities that increase resiliency. Again, women are always involved with income



generating activities like homestead plantation and gardening, integrated plantation, livestock rearing, aquaculture and handloom activities for supporting her family during and after hazardous events. But women still face inequalities in various sectors like social, economic, cultural and political institutions. Men tend to control income distribution, property, access to credit, decision-making processes, and sources of food. Women have limited access to and control over natural resources, or money and more importantly are less mobile and have limited access to information. In this context, this study aims to find out;

1. The coastal adaptation practices adopted by local women groups
2. Function of adaptation for women's empowerment
3. Barriers for adopting the adaptation measures by local women group.

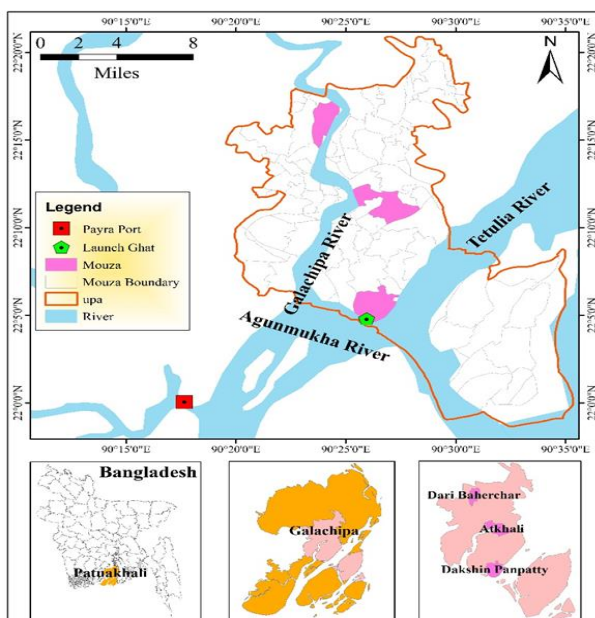
## Method

### Introduction

The study is mainly based on primary data collected by household surveys. Secondary data was also collected from BBS (BBS 2011). A semi-structured questionnaire is prepared to collect primary household data through KII and FGD across the study area.

In this study, Galachipa upazilla of Patuakhali district is selected as the study

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Figure 1: Study Area

on the bank of the Ramnabad River. After applying the PPS technique, 3 mouzas of Galachipa upazila are finally selected for the survey. These are: (1) Dakhsin Panpatty mouza from Panpatty union (2) Dari Baherchar mouza from Amkhola union and (3) Atkhali mouza from Dakua union (Figure 1).

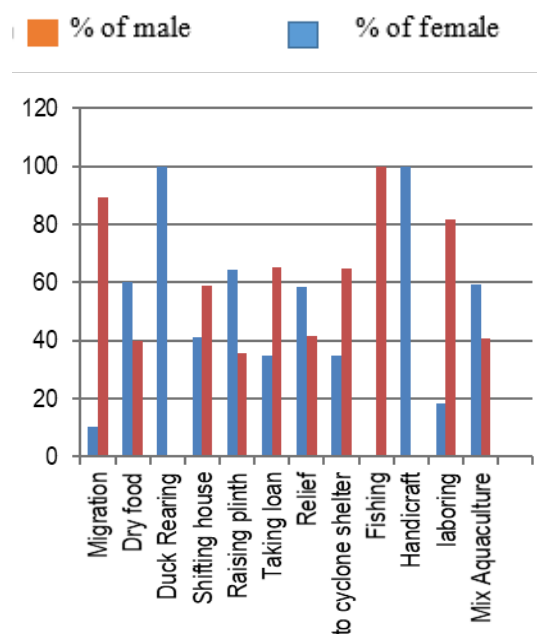
Sampling for selecting the units of observations (households), cluster sampling method is adopted in this study where the unions are considered as clusters. However 430 respondents were surveyed in 10 days and 80 questionnaires were excluded due to poor data quality. About 15 Focus Group Discussion (FGD) has been done at the local tea stalls and local hat (local village market). Key Informant Interviews (KII) were taken from local government primary teachers, UP member and different member of local committee of disaster risk reduction. Engagement of local NGO also ensured to reduce the communication gap among local people. The HHs survey and KIIs output has been validated during the FGDs.

Local adaptation practices have been found out according to peoples' opinion. Gender based involvement in local adaptation

practices and adaptation practices based on household basis has been measured by cross-tabulation.

### Gender wise Involvement in Local adaptation

100% women respondents are rearing duck and hen for economic support and also nutrition purpose for the family. From the all respondents in the study area it was seen that Women are more active than men to preserve dry foods that is very essential during disaster time and to collect relief for the family during and after a disaster. The survey shows that 38% female are taking loan as an adaptation and they use it on small business (tea shops, vegetable garden), poultry farm, Handicraft or handloom and also use it for repair house after a disaster or on shifting house location.



Sometimes very poor women migrate as an adaptation strategy and the chances of

migration are increased after a disaster. About 10% women migrate as an adaptation strategy and maximum women migrate to urban areas and work as domestic worker and a big number are working in the RMG industry.

### Women’s Contribution in Adaptation

The role of women in disaster situations is far more effective and they also have a lot of contribution on adaptation. About 100% women in the study area are connected with different types of economic activities which help to adapt as well as to empower themselves.

Again, 62% woman raise the plinth of their houses and 40% women shift their houses to less vulnerable areas to avoid catastrophic damage.

About 90% of women respondents have knowledge about integrated plantation. Women perform their role in homestead garden that ensure food security for family. A few women respondents who are living outside the polder area are planting shrubs and herbs around the house that can protect soil erosion during flood or normal tide water.

Moreover, 40% woman take loan from different organizations like ASSA, Grameen Bank and they use it into small business or for fixing their house after a disaster. However, 10% women Respondents are using migration and alternative employment as an adaptation.

### Traditional role of women in family

For minimizing the impact of climatic events, women traditionally practice some adaptation and nutrition security.

Figure 2: Gender wise involvement in Local adaptation

Poultry and livestock rearing economically empower women and act as a safety net during or after a disaster. From the field survey it is noticed that 100% respondents are rearing poultry or livestock and most of them are rearing both (Table 1). Maximum activities of poultry and livestock rearing are done by women. Women are more engaged in feeding, cleaning and collecting the egg from poultry shed and collecting milk from livestock.

Table 1: Gender wise involvement in poultry and livestock rearing activities

Activities of poultry and livestock rearing	Male Role	Female Role
<b>Making livestock and poultry shed</b>	***	*
<b>Feeding</b>	*	***
<b>Cleaning</b>	*	***
<b>Collect egg and milk</b>	*	***
<b>Marketing</b>	***	**
<b>Vaccination</b>	*	***
<b>Graze</b>	**	**
<b>High rate of involvement (***)</b>		
<b>Predominant (**)</b>		
<b>Involvement (*)</b>		
<b>Not-involvement (x)</b>		

Women in the study area are traditionally involved in homestead vegetable gardening. Not only the homestead garden increase income and ensure food security but it also helps to reduce homestead soil erosion during flood. Homestead vegetable, fruits, spices cultivation are especially important in overcoming seasonal availability of foods and promotes household self- sufficiency.

Table 2: Gender wise involvement in Homestead Gardening Activities

Homestead Gardening Activities	Male Role	Female Role
<b>Make Platform</b>	**	***
<b>Fertilizing</b>	*	***
<b>Fencing</b>	**	***
<b>Irrigation</b>	x	***
<b>Seeding</b>	**	**
<b>Weeding</b>	**	***
<b>Plowing</b>	***	*
<b>Support pillar</b>	**	**
<b>Marketing</b>	***	*
High rate of involvement (***)		
Predominant (**)		
Involvement (*)		
Not-involvement (x)		

Male member of a family participated more in vegetable bed preparation, plowing, crop protection and marketing while female members participated more in applying irrigation, mulching, making platform, planting, weeding, staling, fencing, and harvesting of vegetables. Women are more involved than male person in homestead gardening activities.

### Women's contribution to increase income

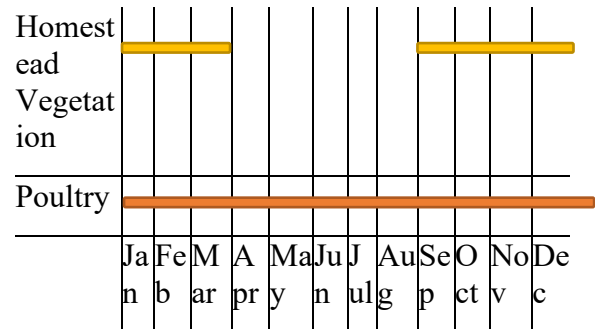
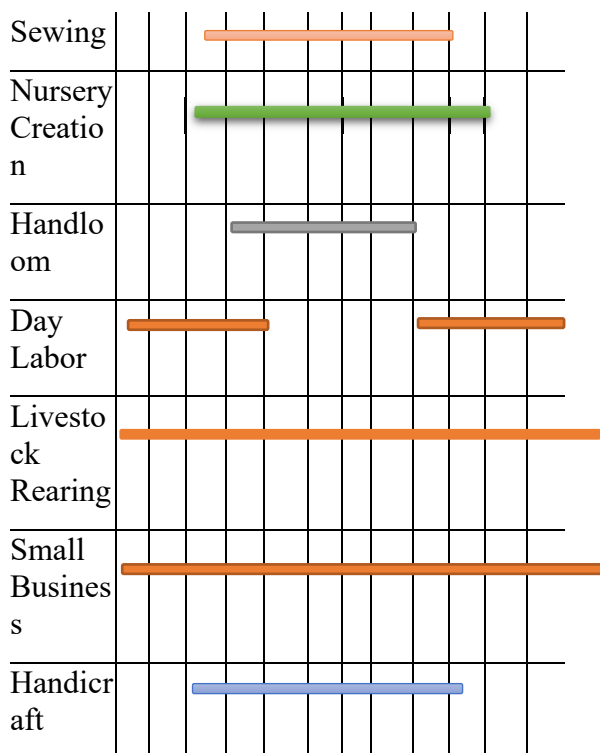
62% respondents are increasing their household income by poultry rearing and 43% women by livestock rearing. About 13% women are doing homestead vegetable gardening which has both economic and nutrition value for the household. Over 20% women are sewing nokshi kantha and involved with different handicrafts. A

significant number of women respondents about 2% particularly from extremely poor landless households, also engage in paid labor in construction and earthwork.

### Function of adaptation for women empowerment

From the table no 3, it is seen that handicraft, handloom, and sewing are done specially in the rainy session when the other sectors have less work. Some activities like poultry rearing, livestock rearing, small business (tea shop) are running over the calendar. About 15% women engage in paid labor as adaptation measure which can increase their household income. But women cannot take this option over the year, they mention that in rainy session they cannot find work at all. Women are active in homestead plantation from September to March.

Table 3: Seasonal variation of Different income generating activities of women in study area



### Barriers to women empowerment

It is found that respondents face different types of barriers to adopt local adaptation practices. The barriers are mainly social, economic, political, religious and cultural. All of these barriers directly and indirectly slow down the adaptation activities.

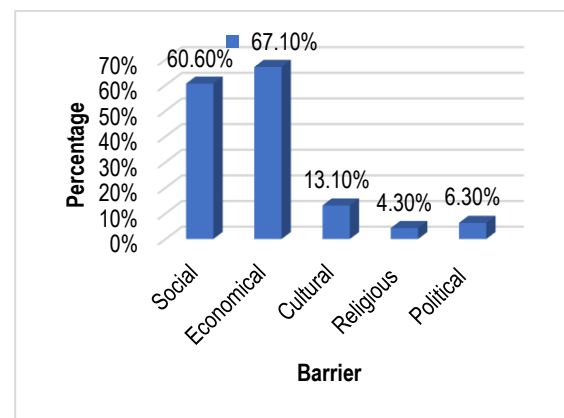


Figure 3. Barriers faced to climate adaptation in Galachipa Upazilla (multiple response)

61% respondent faces only 2 barriers. Among them, respondents facing both social and economic problems are the highest and it is 31%. Only 8% respondent faces 3 barriers, on which, social, economic and cultural barriers are faced by 4% respondents.

Table 4: mutually inclusive barriers in the study area.

Barrier	Percentage (%)	Barrier	Percentage (%)
Both Social & Economical	31	Both Economical & Cultural	7
Both Social & Cultural	9	Both Economical & Religious	1
Both Social & Religious	2	Both Economical & Political	4
Both Social & Political	4	Both Economical & Cultural	1
Both Religious & Political	0	Both Cultural & Political	1

In figure 3, the big circle indicates the more influence and small circle indicates less influence to women empowerment.

From the field survey result it is clear that women's empowerment is mostly impacted by economical barrier and social barrier. This is because of less access to resources, less access to information and the male dominant family system coupled with social barrier. Women's empowerment depend on economic condition; when a female member is earning money from any activity, it increases her value to the family.

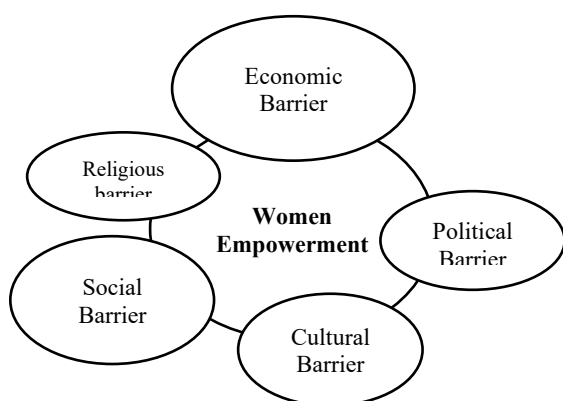


Figure 4. Barrier to women empowerment

60% respondents face social barrier to adaptation that comes from household and community level. Women stated that physical, sexual and emotional violence increases during and after a disaster. Sometimes women are facing domestic violence for taking any step to their empowerment. Women reported that they also face harassment in cyclone shelter and in relief queues. In society, women's ability in decision-making is not the same as men which are the social barriers for women.

About 13% respondents are facing cultural barrier to empower. The scope of women education is very low here. Some women respondents said that they have less access to the local market, they cultivate but they cannot sell it to the local market directly. As a result, they have to sell these vegetable at home at a low price.

During interview sessions, majority of the key informant reported that conservative religious groups never believe in the concept of women empowerment.

Political barriers strongly influence the perception of the community. Local leaders or influential people often occupy spaces in cyclone shelter due to their political power. That creates negative impact to choose this as an adaptation.

### Relations between barriers and women empowerment option

From the study it has been found that every adaptation measure has at least one or more than one barrier that influence empowerment of women through local

adaptation practices to the community. Homestead gardening and poultry or livestock rearing is an effective adaptation measure and financial activity but women face social, cultural and political barriers in this sector. Taking loan is an important as well as a controversial adaptation practice which is mainly influenced by economic barriers. Economic barriers directly

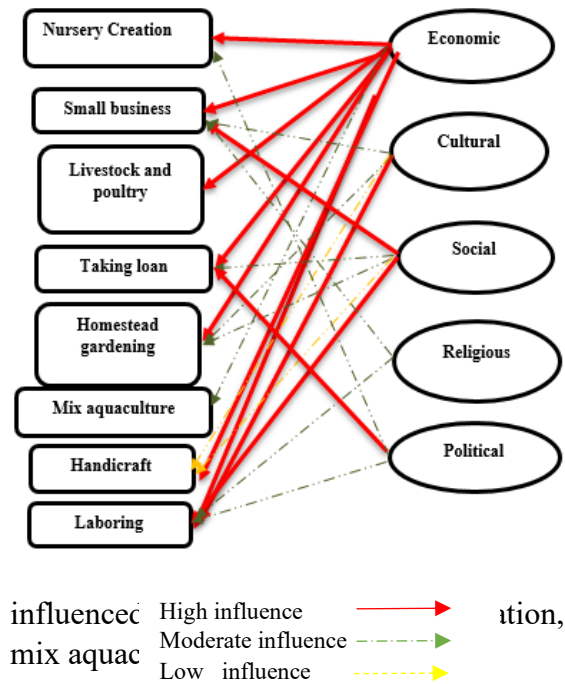


Figure 5. Influential map of barriers for

### Conclusion

women empowerment in the study area

Data and arguments in this study establish that women play a key role in protecting, managing and recovering their household and assets during and after a disaster by practicing different types of income generating activities. When women can add income to their family, they can participate in decision-making of their family. That is

a way they may be empowered. But women face constraint in access to assets, information and services as well as they are victim as domestic and social violence.

### References

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### Acknowledgements

1.1  
2.1 The study was carried out under Climate and Development Knowledge Network (CDKN) delta project administered by ICLEI - Local Governments for Sustainability, South Asia

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9. Annex 11: Photos

Photos of Survey Scenarios

Photos of Different Scenerios:



**Focus Group Discussion during field survey for gender**





*Erosion Protection Structure using GEO bag*



*Communication conditions of Paschim Durgabhati*



*Flood Shelter*



*Irrigation System (Locally known as 90T)*





*Only one Drinking water source of Rohita village, Barguna*



*Collapsed school building due to massive erosion of Bishkhali river. Pukhrajana, Rajapur, Jhalokathi*





*Non-functionng sluice gate found at Rohita, Barguna*

*People made their livestock place at the top of the embankment. Rohita, Barguna*



*New embankment of Rohita village after Sidr 2008, Patharghata, Barguna*

*Barren land due to an increase in soil and water salinity during dry season. Rohita, Barguna*



*A non functioning PSF found at Rohita village, Barguna*





Number of rat holes are found in earthen embankment which reduces the durability of embankment. Rohita village, Barguna



Raising plinth with geo bag are practicing as local adaptation in lakhshmipur



An old cyclone shelter with less facilities is found in Rohita village, Barguna





Local culverts are collapsing due to high water velocity in Raghunathpur village, Lakhshampur

L



A vulnerable road in Raghunathpur village, Lakshmipur protected through geo bag.



Planned adaptation often failed due to massive bank erosion of the Meghna river. Raghunathpur village, Lakshmipur.





The mighty Meghna river

## Annex 12: Project outputs

Please include a list of all project outputs, engagement activities, and capacity<sup>5</sup> strengthening from the project in tables such as those below. You can find a list on the online CLARE monitoring centre at your project review link (contact [Erika Malich](#) if you do not have this link).

As relevant, add further materials (e.g. agendas, meeting minutes, reports) that are relevant to this report.

Output Type (Journal article, blog post, etc.)	Title	Authors	Where it was published	Date of publication
Journal	Sustainability of the coastal zone of the Ganges-Brahmaputra-Meghna delta under climatic and anthropogenic stresses	Md. Munsur Rahman , Anisul Haque , Robert J. Nicholls, Stephen E. Darby, Mahmida Tul Urmi, Md. Maruf Dustegir, Frances E. Dunn, Anika Tahsin, Sadmira Razzaque, Kevin Horsburgh, Md. Aminul Haque	Science of the Total Environment <a href="http://dx.doi.org/10.1016/j.scitotenv.2022.154547">http://dx.doi.org/10.1016/j.scitotenv.2022.154547</a>	15 March 2022
Journal	Development of an adaptation model by applying non-linear programming to compute adaptation deficiency in climatic hotspots	Marin Akter , Anisul Haque, Dewan Sadia Karim, Munsur Rahman, Mashfiqus Salehin, Rubaiya Kabir, Mohammad Abdul Alim, Mohammad Asif ul Haq	Progress in Disaster Science <a href="http://dx.doi.org/10.1016/j.pdisas.2021.100201">http://dx.doi.org/10.1016/j.pdisas.2021.100201</a>	2 September 2021

<sup>5</sup> Capacity strengthening includes award recipients (individuals) and activities run through projects (typically in a group setting, such as training or workshops).

<b>Output Type (Journal article, blog post, etc.)</b>	<b>Title</b>	<b>Authors</b>	<b>Where it was published</b>	<b>Date of publication</b>
Journal	Effectiveness of selected planned adaptations in micro level: Evidence from coastal community in Bangladesh	Md. Rayhanur Rahman, Anisul Haque, A.K. Azad, Marin Akter, Hamima Huma, Mehedi Hasan Shuvo, Umme Khadeja Peal, Md. Munsur Rahman	Progress in Disaster Science <a href="http://dx.doi.org/10.1016/j.pdisas.2021.100208">http://dx.doi.org/10.1016/j.pdisas.2021.100208</a>	27 October 2021

<b>Engagement event with stakeholders (event name and description)</b>	<b>Number of participants (% female)</b>	<b>Country where event took place (for virtual events, select the location of the main event organizer)</b>	<b>Date of engagement</b>
Training workshop on CDKN and Uptake of climate change adaptation research results in South Asia.	28 (30% Female)	IWFM, BUET (Webinar _Zoom)	27 <sup>th</sup> August 2020
Knowledge brokering learning exchange on Approaches, Strategies and Key Findings of CDKN project and proposed approaches for the implementation of DECCMA Extension Project	23 (35% Female)	IWFM, BUET (Webinar _Zoom)	17 Sep 2020 14:30 - 16:30
Follow up meeting	17 (30% Female)	IWFM, BUET (Webinar _Zoom)	Nov 12, 2020 11am - 12pm
Dissemination workshop on Dynamic Adaptation Model	19 (30% Female)	IWFM, BUET (Webinar _Zoom)	Jan 12, 2021 11.00 am to 1.0 pm.
Status of the dynamic adaptation model and its required refinement: meeting with overseas partners:	11 (40%)	IWFM, BUET (Webinar _Zoom)	Jan 19, 2021 7:00 PM to 8:30 PM

<b>Engagement event with stakeholders (event name and description)</b>	<b>Number of participants (% female)</b>	<b>Country where event took place (for virtual events, select the location of the main event organizer)</b>	<b>Date of engagement</b>
Prof Robert Nicholls and Dr Katharine Vincent			
Workshop on share the experiences and contents of data collection in Khulna and Satkhira and further planning for analysis and its feeding in Dynamic Adaptation Model.	28 (30%)	IWFM, BUET (Webinar_Zoom)	February 23rd, 2021 6:00 PM to 7:30 PM
DECCMA Upscaling Project: Progress Meeting with overseas partners: Prof Robert Nicholls and Dr Katharine Vincent	11 (40%)	IWFM, BUET (Webinar_Zoom)	May 27, 2021, 4:00 pm - 5:30 pm
DECCMA Upscaling Research Project Meeting with overseas partners: Prof Robert Nicholls and Dr Katharine Vincent	11 (40%)	IWFM, BUET (Webinar_Zoom)	Jan 13, 2022 7 pm
Meeting on the Dynamic Adaptation Model (DAM) with CEGIS	42 (35%)	IWFM, BUET (Webinar_Zoom)	February 5th, 2022 7:00 PM to 9:00 PM

<b>Capacity activity (award, training, etc.)</b>	<b>Name of activity</b>	<b>Participants (total participant number or awardee name)</b>	<b>Duration (in days / months)</b>
Training	ADCF Project Model Framework: Indicator List	6 (BUET Team)	1 day
Meeting	ADCF Project Methodology	6 (BUET Team)	7 days
Meeting	ADCF Project: Selection of hotspot for field survey	26 (Faculties and Students)	2 days
Meeting	DFRM trial	12 (BUET Faculty members And students)	1 day
Meeting	DAM demonstration meeting	12 (BUET Faculty members And students)	1 day
Training	First Field Survey	12 (BUET and Partner Organizations)	5 days
Training	Second Field Survey	13 (BUET and Partner Organizations)	9 days

<b>Capacity activity (award, training, etc.)</b>	<b>Name of activity</b>	<b>Participants (total participant number or awardee name)</b>	<b>Duration (in days / months)</b>
Training	Third Field Survey	14 (BUET and Partner Organizations)	2 days
Training	Fourth Field Survey	14(BUET and Partner Organizations)	13 days
Training	Fifth Field Survey	12 (BUET and Partner Organizations)	7 days
Training	Sixth Field Survey	8 (BUET and Partner Organizations)	9 days