Ministry of Water Resources

Bangladesh Water Development Board

Report on Regional Stakeholder's Consultation Workshop, Barishal Zone

Study of Long-Term Monitoring, Research and Analysis of Bangladesh Coastal Zone (Sustainable Polders Adapted to Coastal Dynamics)

Coastal Embankment Improvement Project (CEIP-1)

Venue: Barishal Club Auditorium, Club Road, Barishal

Dated: 30th March 2019

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1. Summary of the Workshop

Bangladesh Water Development Board has constructed 139 polders in the coastal area of Bangladesh since the decade of 1960. Over this long duration of time negative impacts cast in the area inside the polders and on outside environment as well. The embankments, in most cases, have become unfit or dilapidated, on the other hand having felt necessity of introduction of improved design of polders BWDB has undertaken a project titled *Coastal Embankment Improvement Project (CEIP-1)*. There is a research/study component in the project titled *Long Term Monitoring, Research and Analysis on Bangladesh Coastal Zone* whose objective is to provide technical decision supports to the project with a goal of developing better, improved plan and design of embankments. In this research effort, work have been involved a couple of foreign universities, consulting firms and a local consulting firm. There are dire needs of gathering information/opinion from different stakeholders (relevant government organizations, representatives from local government, non-government organizations and local people). With a view to gathering opinion an opinion-sharing regional workshop was held on 30 March 2019 at Barishal Club Auditorium in Barishal city upon drawing in stakeholders in the Barishal region. In the said workshop the State Minister for Water Resources of the People's Republic of Bangladesh, Mr. Zahid Faruk, M. P. was present as the chief guest. The workshop was divided into two sessions; the first one was Plenary session and the second one was Technical and Subject-oriented Group Discussion session. The first session was chaired by Mr. Khandoker Khalequzzaman, Additional Director General, Western Region, BWDB. The later was chaired by Mr. Mohammad Habibur Rahman, PEngg., Chief Engineer and Project Director, CEIP-1, BWDB. The table of content can be referred to for the programmes of the workshop.

1.1 Inaugural Session

At the very outset of the workshop project director, Mr. Mohammad Habibur Rahman rendered a welcome speech. In his speech he introduced the Project to the audience. He mentioned that in the decade sixties while constructing the polders for the first time the main objective was to raise agricultural production by protecting agricultural land from inundation caused by high tide and salinity. However, the polders are no longer workable what was at its initial stage due to the fact of land-use changes, climate change, water-logging inside the polders etc occurred through the time. Over a large extent and long term, obviously therefore, the behavior of changes needs to be understood. Towards that aim the said research work has been undertaken. The PD in his speech called upon the concerned experts and stakeholders to explore and analyze on 7 areas: 1. Management of polder design and land-use inside the polders, 2. Characteristics of changes of coastal rivers and khals, 3. Land subsidence, 4. Weather and climate change, 5. Rise of water level and salinity, 6. Availability and reliability of required data and information (we have to have those what we do not have now), 7. Capacity increase in polder design and management. He specifically mentioned that parameters for polder design should be found out. Underestimation than standard of these shall cause weakening of the polders, likewise overestimation shall cause wasting of much money. In tackling climate

change the cost of this project is 15 million dollars, in which 5 million dollars has been obtained as a grant. However, in order for obtaining the entire amount as the grant effort is going on by the Ministry of Water Resources. He, the PD, expressed his hope that useful results will come out from this research/study. There is a thought towards preparing a master plan basing on the results come out of this study wherein there shall be cluster of projects, those will be put up to the government sequentially by phases.

At this stage of the workshop, welcoming all the team leader of the study Dr. Ranjit Galappatti presented aims, objectives and introduction to the research work. He opined – it is easy to provide short term solutions, but these solutions can trigger changes that go on and on for decades to come and reduces the efficacy of our original solution. The Bengal Delta is continuously evolving, and now our human actions are also affecting how it evolves. When designing CEIP-1 it was felt that these processes were more complicated that had been thought of. He also added – we need to plan and design the polder systems to sustainably satisfy the needs of the community for livelihoods and safety now but anticipating changes that might take place in the future. He went on - necessarily, therefore, in order to design more sustainable polders we need to learn more, which indicates undertaking an initiative of a research work. Therefore, in order to make this research successful it is very much necessary to involve local people in the polder areas to know their experiences, narratives of the problems and suggestions in determining the ways to solutions. As next step having considered the suggestions obtained from this workshop with due gravity, new and appropriate planning and design will be prepared. These potential planning shall be presented to the stakeholders in the polder areas and hence their valuable suggestions shall be sought calling in again, like now.

In the speech as special guest Mr. Mahmudul Islam, Additional Secretary, Ministry of Water Resources said – there are 139 polders in 47 upazillas in 19 districts in coastal area. He added – professionals, end users, chairmen of union councils, representatives from water management committees who are present in this workshop are much knowledgeable and experienced. He believed that they all would be able to contribute much through providing their suggestions.

In the speech as the chair of the plenary session Khandokar Khalequzzaman, Additional Director General, BWDB, said – the background and thoughts at the time when originally the polders were constructed were to make such environment so that people can live in there and live on by agricultural production. But over the course of time the polders got decayed, damaged in large part, and efficacy got decreased due to siltation. Also, extensive changes in land-use have been occurred. He indicated that insufficient funding could be one of the causes of it. The coastal zone has been recognized as one of the hotspots in Bangladesh Delta Plan 2100. He added - appropriate planning and design shall be prepared on the basis of the findings come out of this workshop.

In the speech as the chief guest Mr. Zahid Faruque, MP and State Minister of the MOWR, said, after first construction of the polders people in the polders were in good condition - over a couple of years agricultural activities were possible, people and area were safe from floods. But it was observed at the time of cyclones Sidr in 2007 and Aila in 2009 that those embankments were not adequate to protect the areas. In subsequent time thoughts were evolved that new projects shall have to be undertaken taking into considerations of the factors – climate change, environmental change, decrease of navigability of the rivers etc. Hence, new project has been initiated. It shall not be wise to complete project work only considering theoretical

aspects. Victim people in the concerned areas have experiences on aspects of changes that occurred over a long time. Therefore, planning shall have to made upon blending of both theoretical aspects and practical suggestions. He mentioned with emphasis that along side the government the local people do have a kind of responsibility in maintaining the polders, since the government built those polders for their benefit by spending an enormous amount of money. He also added – after assuming the responsibility of the portfolio of ministry of water resources he keeps trying to realize practical problems in his own eyes by paying visits in different areas in Bangladesh. He reminded all of the fact that whatever big projects be taken by the government none will become sustainable for a long time if not a concerted effort is made by the people and the government. He also mentioned – Bangladesh is stepping forward on the way towards a developed country. All have to work together if the hands of the Public Leader Sheikh Hasina have to be made stronger in order to build the country prosperous.

1.2 Stakeholder's Consultation Meeting (Technical & Subjective)

In this part of the workshop Deputy Team Leader (DTL), Mr. Zahirul Haque Khan, in his presentation he pointed out that there were three characteristics of the coastal area, such as difference in water level between high tide and low tide, salinity in river water, and extensive impact of cyclones and storm surges. Embankment/polder is obviously a huge infrastructure in the coastal area. He pointed out variation of embankment height by showing a map – they are of 4-5 m high in the area by the coast of south western region; 3-4 m high those lie inside the same south western region; they are of 5-6 m high in the area by the coast in middle of the overall Bangladesh coast (such as Bhola, Hatia). They are 6-7 m high in some areas in Noakhali and Chattogram. In the extreme south east they are of 4-5 m. It is seen, therefore, that height of the embankment is determined considering the height of the tide and storm surge. He also added that in the past in determining the height of the embankment in an area the highest water level of the river flowing by was considered. However, in the future alongside the highest water level other considerations like cyclones and storm surges, climate change, sea level rise, land subsidence etc shall have to be taken under consideration.

After the presentation by the DTL was ended, the participants in the workshop started discussion by being divided into different groups. One or two representatives from each group presented the findings of the group discussion and the summary of the overall findings are presented below.

Table: Summary of the overall findings from Stakeholder discussions

Sl. No.	Topic	Key Findings/Suggestions
1	Identified problems regarding the rivers outside the polders	• Decrease in water flow in the rivers; • Rise of bottom level as a result of sedimentation in the rivers; • Illegal encroachment, unplanned/illegal sand mining etc.
	Stakeholders' suggestions in determining solutions to the problems	• Removal of silt by dredging, undertaking necessary measures for river bank protection from erosion;

Sl. No.	Topic	Key Findings/Suggestions
		• Rehabilitation of victims of river bank erosion hazard; • Protecting rivers from illegal occupation etc.
2	Identified problems regarding sluice and sluice-like infrastructures	• Getting decrease/loss of efficacy of the sluices due to siltation outside the sluices; • Lack of adequate number of sluices; • Lack of proper gate operations; • Lack of adequate number of infrastructures; • Not having arrangement of suitable interconnections for fish movements; • Lack of repair and maintenance etc.
	Stakeholders' suggestions in determining solutions to the problems	• Proper maintenance of the sluice outfalls; • Re-design of sluices/infrastructure; • Proper gate operation; • Proper repair and maintenance of sluices.
3	Identified problems regarding embankments	• Inadequate height, width, slope, berm, distance to the embankment from the river bank; • Digging of holes in the embankments by rats; • Erosion of embankments by wave action, • Breakage/damage of some parts of embankments in some locations; • Lack of disaster-resilient embankments; • Lack of repair and maintenance etc.
	Stakeholders' suggestions in determining solutions to the problems	• Increasing height, width, slope, berm, and distance to the embankment from the river bank; • Taking protection measures so that rats cannot dig holes; • Repair of breakage/ damaged embankments; • Preparation of disaster-resilient embankments; • Planned forestation; • Adequate repair and maintenance etc.
4	Identified problems regarding rivers inside embankments	• Water logging created as a result of inadequate drainage; • Decrease in water flow as a result of siltation in the rivers;

Sl. No.	Topic	Key Findings/Suggestions
		• Decrease in workability of rivers, gradual dying of rivers; • Extensive decrease in navigation; • Insufficient water for agricultural activities; • Damage incurred to the natural environment etc.
	Stakeholders' suggestions in determining solutions to the problems	• Making structures and drainage network in order to solve water logging problem; • Removal of siltation from rivers and khals inside embankments; • Holding rain water etc.
5	Identified problems regarding polder water management	• Water management organizations are not efficient producing proper functions; • No manpower or lack of man power for gate operations; • Water management being controlled by influential persons in some places; • Lack of adequate funds for repair and maintenance.
	Stakeholders' suggestions in determining solutions to the problems	• The matter of gate operations could be placed under joint management of controlling government authority and local people/local public representatives; • Solving conflicts created between rice cultivation and fish culture by coordination; • Seeking suggestions from BWDB in case of constructing roads, culverts, bridges etc in coastal areas by other organizations; • Rendering financial help to water management organizations; • Design of embankments considering extent and severity of cyclones and storm surges, fish movements, drainage of water, ecosystem services etc; • Setting up inter-connections between crop fields, beels, rivers and khals by digging/dredging.
5	Stakeholders' suggestions regarding Investment Plan	• Land reclamation and creating new polders; • Planned forestation, creating green belt by planned forestation around the polders;

Sl. No.	Topic	Key Findings/Suggestions
		• Constructing cyclone shelters; • Developing projects in order to dredge rivers/khals; • Compensating victims of river erosion; • Developing projects for rehabilitation; • Allocating funds for repair and maintenance works of old embankments regularly; • Phase-wise improvement of existing embankments in order to tackle the present needs and future demands; • Developing projects in order to create new embankments/ polders; • Strengthening of extension programmes of BWDB; • Provide necessary training to farmers; • Developing planned road communication system.

In the speech by the conductor of this technical session Prof. Dr. M. Monowar Hossain, Executive Director, Institute of Water Modelling (IWM) said – different groups have expressed their group-wise opinion; however, there are concurrence on many suggestions; past problems have been identified well in the replies of some groups. Perhaps except literature resource problems arisen out in the distant past will nowhere be found. The polders could perhaps serve well until 1980s, 1990s and many targets were realized. However, many changes have occurred in the environment in the polder areas during the time that passed by. He emphasized on the aspect of maintenance of the embankments. He further added – there are various engineering and technical aspects in constructing infrastructures or embankments. Yet knowledge and experiences of local people will play a much valuable role in preparing design of polders. He pointed out method of intelligent dredging in case of river dredging. He pointed out one more important thing that coordination is a requirement among organizations those are working in the coastal areas.

In the speech by the chair, Mr. Md. Habibur Rahman cordially thanked all consulting organizations, the team leader and the deputy team leader of the study, and all who were engaged in arranging this workshop. He thanked the participants attended in from different government and nongovernment organizations despite today being a holiday. He particularly thanked the officers from BWDB for their participation. The consulting organizations engaged in this study have reputations. Therefore, he expects a standard report on the study. The consulting organizations shall make recommendations on the problems to be identified in this workshop. In light of these recommendations projects shall be undertaken in the future.

1.3 Contents of This Report

Summary of the Workshop
Background of the Workshop

Plenary Session

Welcome Address	Mr. Habibur Rahman, PEngg., Chief Engineer and Project Director, Coastal Embankment Improvement Project, Phase-1 (CEIP-1), Bangladesh Water Development Board
Presentation by Team Leader	Dr. Ranjit Galappatti, Team Leader, DHI (Denmark), Presentation of an article on the study titled Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone
Speech by Special Guest	Mr. Mahmudul Islam, Additional Secretary, Ministry of Water Resources, People's Republic of Bangladesh
Speech by Chief Guest	Mr. Zahid Faruk, MP, Honourable State Minister, Ministry of Water Resources, People's Republic of Bangladesh
Speech by Chair	Mr. Khandaker Khalequzzaman, Additional Director General (Western Zone), Bangladesh Water Development Board

Technical and Subject-oriented Group Discussion Session

Presentation by DTL	Mr. Zahirul Haque Khan, Deputy Team Leader and Director, Coast, Port and Estuary Division, Institute of Water Modelling.
Group Discussion Session	Subject-oriented group discussion session participating by local people and professionals.
Speech by Moderator	Prof. M. Monowar Hossain, Executive Director, Institute of Water Modelling.
Speech by Chair	Mr. Habibur Rahman, PEngg., Chief Engineer and Project Director, Coastal Embankment Improvement Project, Phase-1 (CEIP-1), Bangladesh Water Development Board.

Summary of suggestions involving problems and solutions obtained from the stakeholders attended in group session

Appendices

Appendix-1: Photographs of Stakeholder's Consultation Workshop, Khulna

Appendix-2: Questions of Different Groups

Appendix-3: Views of the Stakeholders

Appendix-4: Registered Guests

2. Background of the Workshop

Two consecutive floods occurred in 1954 and 1955, sufferings of the mass caused by the floods, loss and damage of crops due to floods, loss and damage of crops due to inundations created by high tides, intrusion of saline water into agricultural land, creation of prospects for agricultural activities, creating safe environment for the people living along entire Bangladesh coast – all are attributed to the creation of *East Pakistan Water And Power Development Board* by the erstwhile government. In order to achieve all these objectives this organization started construction of coastal embankments in early sixties that continued through subsequent decades. Since then BWDB has constructed 139 polders. These polders play a significant role in production of agricultural produce and providing safety to the people. However, these polders over the course of time created enormous negative impacts to the nature, such as silted-up or getting squeezed or dying of rivers and khals of varying sizes inside the polders, decrease in biodiversity, extinction of species etc.

The rivers cannot, as could before, spread their water flow and sediment onto the flood plains or on distant landmass due to the embankments appearing as obstacles between land and rivers. As a result, many adverse effects are gradually getting significant - like rise of river bed, getting squeezed of rivers in width, decrease in speed of water current etc. This is to say that extensive impacts have cast over the natural environment both outside and inside the embankment across the entire coastal area.

In the initial planning of construction of embankments, the main attention was given towards protection of agricultural land. The matters of protecting water resources in rivers and canals, maintaining harmony between environments inside and outside the polders, protecting overall environment etc could not effectively make rooms for considerations in the initial planning. A shortfall is apparent in preparing designs of embankments due to the lack of information and data involving tackling of storm surges caused by high-rated cyclones. In addition, the extent of this shortfall has increased as a result of already changed and changing climate. The need of constructing timely, improved, and effective polders, is now therefore felt, for the sake of increase in agricultural produce, considering the issues of increase in storm surge height due to severe cyclones, adverse effects caused by climate change such as sea level rise, severe wind actions, creating environment of free movements for fish, maintaining biodiversity. In order to achieve these objectives Bangladesh government has undertaken a project titled *Coastal Embankment Improvement Project, Phase 1*.

The salient objectives of this long-term study:

- To create a framework for polder design, based on understanding of the long term and large-scale dynamics of the Bengal delta and on sustainable polder concepts.
- To present an overview of values of relevant parameters at locations in the polder area, now and in the future, as boundary conditions for polder design and management.

- To develop a long term investment plan for implementation of the proposed design and management improvements leading to integrated water resources management, targeting sustainable development goals.
- To build the analytical foundation and technical capacity of BWDB and other stakeholders including local communities, as appropriate, to engage in science driven decisions on floods, storm surges and drought hazards in the coastal region of Bangladesh.

In order to construct sustainable and effective polder taking into considerations of the aspects of past planning regarding embankment, lessons learned regarding preparation of designs, and meeting requirements of now and the future, there is a research component under this project (CEIP-1) titled *Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone.*

In order to extend support to this research work it is very much necessary to gather opinions, information, data from different government and non-government organizations, people of different classes in the coastal area. Towards this aim it is one of the useful means to arranging a workshop involving concerned stakeholders. There will be more than one workshop so that entire coastal area comes under such information gathering endeavour. As part of this endeavor a workshop was held in Barishal city on 30 March 2019 by participation of the stakeholders covering area from the Baleshwar River in the west and to the Shahbajpur Channel of the Meghna River in the east. In this workshop Mr. Zahid Faruk, MP, State Minister of the Ministry of Water Resources of the People's Republic of Bangladesh was present as the chief guest.

3. Introduction

Bangladesh is located at the confluence of the three great trans-Himalayan rivers – the Ganges, the Brahmaputra and the Meghna (GBM). While over 90 percent of the catchment of the GBM system lies outside of Bangladesh, more than 200 rivers and tributaries and distributaries of the GBM system drain through the country via a constantly changing network of channels, tidal inlets and creeks, before emptying out into the Bay of Bengal. Thus, the coastal zone of Bangladesh, a landmass just above the mean sea level, is continually influenced by these Himalayan drainage systems that form one of the largest and most active deltas in the world.

The coastal zone of Bangladesh spans over 710 km of coastline and is prone to multiple threats. Sixty two percent of the coastal land has an elevation less than 3 meters and eighty-three percent is within 5 meters above mean sea level. The flow of the rivers entering the GBM delta is the third largest in the world and river floods occur regularly, often leading to flooding of one thirds of the country. In 1998, the flooded area covered as much as two thirds of the country. With a sediment supply of 1 billion tons per year, this is the delta with the largest sediment supply in the world. This leads to accretion of the land area in the coastal zone (5-10 km^2/year, mainly in the Meghna Estuary), and to highly unstable river branches and estuaries.

In fact, the entire coastal belt is subject to regular erosion and deposition process. The large amount of sediments deposited form loose land mass and obviously subsides under natural conditions of overburden pressure. It is also known that their formations of peat soil the coastal deposits. It has been noticed that the subsidence rate may be higher in places due to anthropogenic factors like drainage and ground water extraction. On top of that there are tectonic movements in the deep subsoil, caused by the horizontal plate movements.

The coastal zone of Bangladesh contributes 32 percent of the land area and hosts nearly 28 percent of the population (i.e. nearly 42 million). The coastal population is projected to grow to 61 million by 2050. A high pace of population growth characterizes coastal districts. This trend continues to push millions of people to live in the low-lying coastal areas, which are highly vulnerable to natural hazards. However, in recent years it has been noticed that population growth is much lower than rest of the country, specially in the western part of the coastal belt, possibly resulting from out migration due to several factors including increase in storm surges and cyclonic events.

The coastal lands, being subject to regular flooding by saline water during high tides, could not be used for normal agricultural production. In 1960s polder technology was initiated to build coastal polders surrounded by embankments preventing the spilling of saline water onto the lands at high tides and thus the coastal area became suitable for cultivation. The Coastal Embankment Project made possible the reclamation of large tracts of land for agriculture from 160 onwards. Polder building proceeded continuously until today. We now have 1.2 million hectares reclaimed in 139 active polders in the coastal zone of Bangladesh where most of the people in this area live.

In over half century of its existence, a number of challenges have surfaced that threaten the long-term safety and even the very existence of the polder system. With the aim to possible solution of the problems, the project “Long Term Monitoring, Research and Analysis of

Bangladesh Coastal Zone (Sustainable Polders Adapted to Coastal Dynamics)" arranged a Stakeholder's Consultation Workshop at the Barishal Club in Barishal on 30/03/2019. The people living in the polders of the southern region of the country participated in the workshop. Mr. Zaheed Farooque, MP, Honorable Minister of State, Ministry of Water Resources, attended the Workshop as Chief Guest. As Special Guests, Mr. Mahmudul Islam, Additional Secretary, Ministry of Water Resources attended the workshop. The chairman of the workshop was Mr. Khondaker Khalequzzaman, Additional Director General (Western Region), BWDB. Approximately 150 participants attended the workshop who were Govt. officers, Professionals and the individuals from the polders of Braishal, Jhalakathi, Patuakhali, Bhola and Barguna,

4. Inaugural Session

4.1 Welcome Address

Mr. Md. Habibur Rahman, PEngg., Chief Engineer and Project Director, Coastal Embankment Improvement Project (CEIP-1), Bangladesh Water Development Board.

The project director started his welcome address upon expressing his sincere thanks to the chief guest and all other guests and participants for attendinf the workshop. At first with deep reverence he remembered father of the nation, Bangobandhu Sheikh Mujibur Rahman, Bangomata Sheikh Fajilatunnessa Mujib, 30 lakh martyrs and 2 lakh Birangana mothers and sisters red in the liberation war. He expressed his gratitude towards the Prime Minister, Sheikh Hasina whose dynamic leadership Bangladesh has turned into a middle-income country from a least developed country.

He expressed the need of the present study though there have been many studies done so far on coastal region of Bangladesh. He mentioned that 139 polders have so far been constructed by Bangladesh Water Development Board since nineteen sixties. During nineteen sixties and seventies, the main objective of constructing coastal polders was to enhance agricultural production through protecting land from inundation caused by high tides. However, climate and land-use has changed drastically since then and river sedimentation has created extensive waterlogging problems in the study area. Moreover, river erosion and cyclonic storm surge are posing tremendous threats to the sustainability of the polders. In recent years, the polder damage and waterlogging caused by Sidr and Aila has revealed the vulnerability of the polders designed 50 years ago. He mentioned that Meghna Brahmaputra delta is one of the largest deltas in the world. The dynamic hydro-morphological behavior of the delta over a long period needs to be understood on a large extent. Professionals and stakeholders relating to the project, therefore, would have to analyze on seven aspects/factors in order to understand behaviors over a long-term; these aspects/factors are:

1. Management of polder design and land-use inside the polders;
2. Characteristics of changes of coastal rivers and khals;
3. Land subsidence;
4. Weather and climate change;
5. Rise of water level and salinity;

6. Availability and reliability of required data and information (we have to have those what we do not have);
7. Capacity increase in polder design and management.

He said that the present study is included in the Coastal Embankment Improvement Project, Phase-1 as a research component in order to implement those analyses activities appropriately. Reputed international organizations are involved in this research activities such as Collorado University and Columbia University, USA; Danish Hydraulic Institute, Denmark; Deltares, Netherlands; and Institute of Water Modelling; Bangladesh. He mentioned that the Columbia University has got more than one hundred Nobel laureates. He mentioned that the principal objective of the study is to study the long term hydro-morphology of the coastal region and predict future magnitudes of parameters related to preparing designs and management. At present, 0.5 m sea level rise is expected by 2050. A study on land subsidence is currently going on by joint initiatives of the Dhaka University and the Columbia University which will provide data and information on land subsidence. There is 6000 km embankment along the entire coast of Bangladesh. Hence, six thousand crore taka is needed for increasing the heights on polders by 1m. Enormous amount of cost is involved in increasing the heights of selected 17 polders by 1.5-2.5 m under the Coastal Embankment Improvement Project. Huge money of the government, therefore, will be saved if the required height of embankment can be determined accurately through the study.

Th PD said that the honourable Prime Minister expects that the entire coastal area from Sundarban to Teknaf will be brought under the scope of this study, and the study will result in an investment plan wherein there shall be a handful of projects worthy of implementation. He observed that it is not possible to make improvements for all 139 polders simultaneously. Therefore, the implementation plan has to be formulated by splitting the polders into a number of clusters. About 15 million dollars of the project costs comes from the Climate Change Trust Fund whereas 5 million dollars is obtained as grant from the World Bank. He asked to prepare a master plan based on the results achieved from the present study with clusters of projects and those projects will be proposed to the government for implementation by phases. Fund can be sought from the development partners such as World Bank, the government of Japan in providing financial assistance on this kind of projects.

He said that we are currently in Phase-1 of CEIP and other polders will be improved in future phases. The consulting organizations of the present study have experiences and reputations on such works and the team leader has over 30-year work experience in Bangladesh. Therefore, a good study report is expected under his leadership based on which future projects will be formulated. He again expressed his thanks and gratitude to all especially the Chief Guest and he ended his speech by chanting slogan ‘Joy Bangla’.

4.2 Speech by Team Leader

Dr. Ranjit Galappatti, Team Leader, the study titled Long Term Monitoring, Research and Analysis on Bangladesh Coastal Zone

The Team Leader started his introductory speech on research work upon welcoming all present in the workshop. He said that the silt coming with high tide cannot enter the areas inside the polders due to existence of embankment and as a result the delta building process of the coastal Bangladesh has stopped. It is necessary to plan and design the engineering interventions considering the future changes studying the long term hydro-morphology in order to ensure sustainable development, long-term security, improved standard of living and employments. He said that it is easy to provide short term solutions, but these solutions can trigger changes that go on and on for decades to come and reduces the efficacy of the original solution. The Bengal Delta is continuously evolving, and now our human actions are also affecting how it evolves. It was felt during designing CEIP-1 that the hydro-morphological processes of the Bengal delta are more complicated than they had been thought of. New problems are attributed to climate change, different activities relating to rivers outside of Bangladesh, water management and system operations, river erosion, land subsidence, poor construction and maintenance of works.

He said that it is necessary to plan and design the polder systems in a way that they not only satisfy the present needs of the community but also anticipate changes that might take place in the future. Therefore, knowledge more is an essential requirement for preparing design of sustainable polders and a research activity is needed. The people in the polder areas have achieved experiences regarding good and bad aspects of the polder system since they were constructed and their lives and livelihoods are depended on the poldered environment. Therefore, it is necessary to involve local people for sharing their experiences, narratives of the problems and suggestions in determining the ways of solutions in order to make the present research work successful. New and appropriate planning and design will be prepared from the suggestions obtained from this workshop. The design and planning based on the knowledge achieved from the research shall be presented to the stakeholders in the polder areas at some time in 2020 and hence he asked for their active participation at the workshop. He said that the suggestions obtained from the workshop will be used in preparing the final plan and design. The detailed presentation is provided in **Appendix-1.**

4.3 Speech by Special Guest:

Mr. Mahmudul Islam, Additional Secretary, Ministry of Water Resources, the People's Republic of Bangladesh.

The Special Guest expressed his good wishes to the participants and said that the Project Director and the Team Leader has already presented the research project elaborately to the audience. He mentioned that there are 139 polders in 47 upazilas in 19 districts in the entire coastal area. He observed that professionals, end users, chairmen of union councils, representatives from Water Management Associations present at the workshop are much knowledgeable and experienced. He expressed his belief that experiences of these people are much instructional, and they all would be able to contribute much through providing their opinions and suggestions in the workshop. He concluded his speech expressing thanks to all participants and urging them for providing thoughtful suggestions in the following technical and subject-oriented group discussion session in order to make the study activities successful.

4.4 Speech by the Chair:

Mr. Khandokar Khalequzzaman, Additional Director General, West Region, Bangladesh Water Development Board.

The Chair, referring to the previous speakers, mentioned that the participants in the workshop had been well informed of the objectives of the study and about the next sessions from the speeches of the previous speakers. He mentioned that 139 polders have been built across 19 coastal districts since decades of sixties and seventies. At the very beginning when the polders were built, the polders could create such environment that people could live and carry out livelihood through crop production inside the poldered areas. However, the polders deteriorated and damages at some parts and the efficiency of the polders decreased due to siltation over the course of time. He said that there have been many issues that the Project Director already mentioned. He expected that those aspects would come out through this workshop and the participants would narrate the problems in light of their everyday experiences and suggest ways to solve these problems. He said that though the report of this study is going to be prepared by some well-reputed organizations, some new aspects of problems and solutions will come from the consultation with the local people since they have more practical experience of the polder environment. For example, the land use and agricultural diversity and intensity have changed drastically which was not accounted for during the polder design. He opined that maintenance of polders is another important aspect since problems are created if polder system is not maintained properly. Sometimes, repair and maintenance works needed required for this region go beyond the capability of BWDB. He said that there are different reasons behind it but financial inadequacy is the main cause.

He said that the coastal area is recognized as a hotspot in the Delta Plan 2100, introduced by the Prime Minister. Therefore, the aspect of coastal region/polder management has been given special importance in the present study. Sustainable development is needed in order to achieve the Strategic Development Goals. Hence, the project should focus on suggesting plan and design for sustainable development. He anticipated that the suggestions from this opinion-sharing workshop would be beneficial for the sustainable development. He also hoped that BWDB shall be able to re-design and build the polders in new shapes and dimensions which will be sustainable. He expressed thanks to all participants at the end of his speech.

4.5 Speech by the Chief Guest

Mr. Zahid Faruk, M. P., Honourable State Minister, Ministry of Water Resources, The People's Republic of Bangladesh.

The honorable State Minister started his speech by saying Salam to all present in the session. Referring to the previous speakers he said that they have mentioned important aspects of the project. He mentioned that the construction work of polders had started in the decade of 1960. He also observed that condition of the people of the polders were very good during the first few years of the polders since the polders ensured agricultural production and protected people and their livelihoods from floods and inundations. However, the conditions changed over the years and Sidr in 2007 and Aila in 2009 revealed that the embankments in those areas are no longer sufficient to protect from storm surges and the changing climate. Since then thoughts have been emerging on developing new projects considering climate change, environmental change, getting loss of navigability etc.; and this study has been formulated. He said that this study team has experienced professionals led by the experienced Team Leader Dr. Ranjit Galappatti.

The honourable state minister, referring to the team leader's words, said that opinions, thoughts, ideas and suggestions from people living in the poldered areas are very important. He opined that it is not wise to accomplish project work considering only theoretical aspects. He said that engineers and scientists involved in the project shall contribute theoretical knowledge and the local people who suffers the problems and have practical experiences of changes occurred over the years will contribute practical suggestions. He observed that combination of the theoretical knowledge and practical experience will help us solving various problems and plan for a sustainable development. Hence, he asked local stakeholders to participate in the subsequent technical session and provide important opinions and suggestions. Referring to the point of insufficiency of fund for repair and maintenance works, he said that proper repairing and maintenance works were not possible due to insufficient fund in past. He called upon the local people to take the responsibility of repair and maintenance along with the government since the government is spending a lot of money for building the polders and their well-being. He added that there are terrible scenarios of river erosion in Bangladesh and there are many occasions that river bank erosion is attributed from unauthorized sand mining. Protecting river is not responsibility of the government only; combined efforts from the people and the government is needed for protecting the rivers. He added that he visited different areas of Bangladesh to experience the practical issues after assuming the responsibility of the

portfolio of the Ministry of Water Resources. He mentioned that the soil in this country is very soft in comparison to other countries and consequently river bank erosion is very severe in Bangladesh. He reminded all of the fact that combined efforts by the people and the government are necessary for sustainability of the big projects the present government are implementing. He mentioned that this workshop in Barishal is being held in the month of March; in this very month Bangobandhu was born; in this very month Bangobandhu delivered his 7th March address; in this very month Bangladesh got its independence; hence he calls upon all to be bounded by promise to build Bangladesh a prosperous country in this month. He also said that Bangladesh has become a developing country and it will turn into a developed country by 2030. He urged all to work together in order to make the hands of the Rime Minister Sheikh Hasina stronger. However, he observed that river erosion is a big challenge of sustainable development. If river erosion can be prevented agricultural land will be increased which will increase crop production and cause more economic progress. He hoped that the participants present in the workshop will understand it and communicate with other people of their area. He ended up his speech expressing thanks to all, and chanting slogan 'Joy Bangla', 'Joy Bangobandhu'.

5. Stakeholder's Consultation Meeting (Technical & Subjective)

5.1 Presentation by Deputy Team Leader

Mr. Zahirul Haque Khan, Deputy Team Leader of Long Term Monitoring Research and Analysis of Bangladesh Coastal Zone, and Director of Coast, Port and Estuary Management Division, Institute of Water Modelling

The Deputy Team Leader welcomed all at the beginning of his speech. He mentioned that there are three main characteristics of the coastal area: tidal water level fluctuations, salinity in river water, and extensive impact of cyclones and storm surges. About 38 million people which is 26% of the national population live in the 19 districts in coastal area with density of 946 people per square kilometer. He mentioned that is predicted that the coastal population will be 68 million by 2050. He also said that embankment/polder is a huge infrastructure in the coastal area and there are 139 polders in the coastal area. He pointed out variation of embankment height by showing a map – they are of 4-5 m high in the area by the coast of south western region; 3-4 m high those lie inside the same south western region; they are of 5-6 m high in the area by the coast in middle of the overall Bangladesh coast (such as Bhola, Hatia). They are about 6 -7 m high in some areas in Noakhali and Chattogram. In the extreme south east they are of 4 - 5 m. It is seen, therefore, that height of the embankment is determined considering the height of the tide and storm surge. He also added that in the past in determining the height of the embankment in an area the highest water level of the river flowing by was considered. However, in the future along with the highest water level other considerations like cyclones and storm surges, climate change, sea level rise, land subsidence etc shall have to be taken under consideration.

He, by showing maps and figures, pointed out locations of districts of Barishal division, names of different rivers and their locations, locations suffering erosion in different rivers (such as the Sugandha, the Payra-Burishwar etc). He pointed out that main problems of the polder system are – siltation in front of the water drainage gate, improper operation of the gates, conflict in water management issues between fishermen and farmers. He presented the purposes of the study which was already referred to in speeches by previous speakers. He also added that the high water level during monsoon was the only consideration selecting the polder height in the past. But other issues like cyclones and storm surges, climate change, sea level rise, land subsidence etc shall have to be taken into consideration. Moreover, in case of preparing design of infrastructures along with of draining of rain water, issues of conservation of environment

and biodiversity, free movements of fish, navigation without hindrance, easy-operations of sluice gates shall have to be considered. For assessment of the sea level rise, not only the global sea level rise based on assumptions made by different international organizations but also the local sea level rise components like subsidence has to be considered. Giving instructions for the following group discussions he thanked all and ended up his presentation.

5.2 Group Discussion

The participants were divided into different groups with different set of questions. Each groups discussed their questionnaire and someone from each group on behalf of his/her own group briefly presented the suggestions of the group. The different sets of questions for groups, the written answers from each group are appended in Appendices 2, 3 and 4 with this report. The summary of suggestions from different groups is appended later in this report.

5.3 Speech by Moderator

Prof. Dr. M. Monowar Hossain, Executive Director of Institute of Water Modelling

Expressing thanks to all he started delivering his speech. He looked with interest into the answers that had come from different groups. He opined that the different groups by spending much deliberations prepared those answers. Each group even though put up their own group's opinion, but there are many concurrences among them. Past problems have been identified well in the replies of some groups. He said that there are some past problems which is only found in the literature and BWDB may have the records. He said that the polders serve well until 1980s, 1990s and many targets were achieved such as increase in crop production, protection of crop land from salinity and so on. However, many changes have occurred in polder areas with time such as changes in tidal levels, changes in river conveyance, decrease of fresh water from upstream, siltation, salinity increase etc. He mentioned that these facts were brought up nicely in the group discussions. The problems that everyone identified are: present condition of the embankments, improper functioning of the infrastructures. But local people are well aware that why the condition of embankments is not good. For instance, embankments get greatly damaged by cyclones; since embankments were not built to protect the area from cyclones.

He added that the PD already mentioned that there are many-fold problems in coastal area and they are gradually increasing and the causes behind them are understood by the stakeholders. For example, a river or an embankment or a road gets damaged if it is not repaired and maintained. He also referred to maintaining the standard of quality of the design and construction of the infrastructure. He mentioned that longevity of embankments gets decreased, while doing construction if it is not compacted properly, slope not kept sufficiently, protective measure not taken at the point of breakages/damages, i. e., sustainable development is not achievable. He also added that the issue of budget deficit, lack of manpower were cited in the discussions by many speakers. He further added that there are various engineering and technical aspects in constructing infrastructures or embankments. Yet knowledge and experiences of local people will play much valuable role in preparing design of polders. He added that many argued in favour of bringing in change in polder management and in Water Management Associations in case of polder operations. He mentioned the issue of climate change as one of the main agenda to be considered. Many indicated the needs of excavation/dredging of rivers/khals; but he observed that the requirement of dredging should be properly assessed by study and intelligent dredging plan should be designed. Polder projects should be prepared including different facilities into investment plan; for example, providing more communication facilities, rivers siltation etc. He added that considerable changes/improvements shall have to be brought in preparing design considering every issues on the basis of a comprehensive study. Coordination of works between BWDB and all other stakeholders working in agriculture, fisheries and local government institutes is very important in works in the coastal area. He finished his speech by thanking all participants for providing valuable opinions and practical experience driven suggestions at the workshop.

5.4 Speech by the Chair of Technical and Group Discussion Session

Mr. Md. Habibur Rahman, P. Engg., Chief Engineer, and Project Director, Coastal Embankment Improvement Project, Phase-1 (CEIP-1)

He expressed his sincere thanks and gratitude to the esquire present participants those who have been attending the workshop from 11.00 am to 6.00 pm and share their experience. He specifically thanked all consulting institutes organizing this workshop, Team Leader of the study project Dr. Ranjit Galappatti, Deputy Team Leader Er. Zahirul Haque Khan, and all other professionals from IWM who worked to make the workshop successful; particularly he thanked Mohammad Abdus Salam Sikder. He expressed his thanks to stakeholders from different government and nongovernment organizations for participating at the workshop though it was a public holiday and the following day was an election day in some of the Unions. He especially thanked officials of Bangladesh Water Development Board for their participation; he particularly thanked them for their effort to participate in the workshop in spite of having a meeting on the following day.

He observed that the study name itself indicate that it is a long term monitoring of the hydro-morphological processes of the coastal area of Bangladesh. The study will take into considerations all the problems of the coastal area that are faced by the local stakeholders attending the workshop. He said that the problems have different dimensions and extend in the Khulna region than in the Barishal region. The consulting organizations do have name and fame in carrying out this type of study. The consulting organizations shall provide necessary recommendations on identified problems, in light of them projects shall be formulated in the future. He added that hundred percent solution may not be obtained for any sort of problem from the study; however, stakeholders have to proceed towards solutions in an amicable manner. He added that tenure of the study is 30 months. He declared end of the technical and group discussion session hoping a good report and expressing thanks, gratitude and saalam to all.

Summary of the Suggestions on the Problems and Solutions obtained from the Stakeholders in the Group Discussions

Summary that composed basing on the suggestions obtained from the stakeholders are given the following:

Identified problems: Regarding rivers outside of polders

- Decrease in water flow in rivers.
- Rise in river bed level caused by siltation.
- River erosion. One of the reasons of river erosion is river course shifting caused by creation of chars inside the rivers.
- Illegal occupation.
- Unplanned/illegal sand mining.

Suggestions proposed by the stakeholders towards solutions: Regarding rivers outside of polders

- Increasing water flow and workability of rivers through removal of silt, submerged chars, other chars by river dredging.
- Undertaking necessary actions in preventing river erosion.
- Rehabilitating river erosion victims,
- Freeing up rivers from illegal occupation.

Identified problems: Regarding sluices and sluice-like infrastructures

- Getting lost of functionality of sluices due to siltation outside of the sluices (in the outfall canal).
- Nonfunctionality of sluices.
- Inadequate number of sluices, sluice gates. Inadequate shape and size of gates. Lack of proper operations of gates.
- Lack of sufficient number of infrastructures.
- Not having inter-connections between inside and outside of polders suitable for fish movements.
- Lack of repair and maintenance.

Identified problems: Regarding embankments

- Insufficient height, width, and slope of embankment.
- Insufficient barm width of embankment.
- In many places insufficient setback distance from rivers.
- Creation of holes by rats.
- Lack of repair and maintenance.
- Decay/erosion of embankment by wave hit.
- In many places portions of embankment got damaged/broken.
- In many places lack of disaster-resilient embankment.

Suggestions proposed by the stakeholders towards solutions: Regarding embankments

- Increasing height, width, slopes on both sides of embankment; increasing width of barm. For example, preparing design keeping 1:5 slope in the river/coast side.
- Increasing setback distance from rivers to make the embankments safe from river erosion. For example, this distance for a minimum needs to be 250 to 300 m.
- Undertaking necessary monitoring and preventive actions against rats so that they cannot dig holes.
- Repairing damaged/broken portions of embankments as soon as possible.
- It is necessary to prepare plan and designs in order for making disaster-resilient embankment.
- Regular repair and maintenance are necessary.
- Forestation by plan.

Identified problems: Regarding aspects inside polders

- Creation of water logging caused by inadequate drainage.
- Illegal occupation of rivers/khals, building illegal establishments etc.
- Decrease in water flow in rivers caused by siltation inside rivers/khals, decrease in workability of rivers, dying of rivers etc.
- Owing to water logging cultivable land became uncultivable, for example it happened after Sidr.
- Navigation decreased extensively or entirely lost.
- Want of required water for agricultural activities.
- Natural environment got damaged, such as Polder 47/2.

Suggestions proposed by the stakeholders towards solutions: Regarding aspects inside polders

- Making drainage network and infrastructures in order to solve water logging problem.
- Removal of silt from rivers/khals inside polders.
- Making arrangement for rain water preservation.

Identified problems: Regarding polder management

- Water management organization are not properly effective.
- Lack of proper operations of gate. No or lack of manpower for proper gate operations.
- Water management getting controlled in some places by some influential persons.
- Lack of required funds for repair and maintenance.

Suggestions proposed by the stakeholders towards solutions: Regarding polder management

- Sluice gate operations need to be done by joint management comprised of controlling government authority and local people/people's representatives.
- Motivating concerned people so that all relating to polder use can demonstrate good behavior.
- Resolving conflict caused between rice cultivators and fish farmers.
- Seeking suggestions from BWDB in case of making roads, culvert, bridges etc in coastal area by other organizations.

- Providing financial support to water management organizations.
- Preparing design of embankment upon considering extent of cyclone, storm surge (speed of cyclone, height of storm surge etc), fish movements, drainage of water, ecosystem services etc.
- Improving polder infrastructures having considered preparing of disaster resilient design.
- Establishing interlinks of khals and rivers with crop land, beels and other marshy land by excavation/dredging efforts.

Regarding investment plan

- Reclaiming land and creating new polders.
- Creating forests by plan, creating green forest in a planned manner around polders.
- Constructing cyclone shelters.
- Developing projects required for excavation/dredging of rivers/khals.
- Developing projects required for providing compensation to river-erosion-victims and rehabilitation.
- Allocating funds for regular repair and maintenance works of older polders.
- Phase-wise improvement of existing polders with a view to meeting present and future needs.
- Developing projects for constructing new embankments/polders.
- Strengthening extension programmes of BWDB.
- Providing necessary training to farmers.
- Developing planned road communication system.

Appendices

Appendix 1: Photographs of Stakeholder's Consultation Workshop, Barishal

Photo: Mr. Zahir Faruk, honourable state minister of ministry of water resources and the chief guest of the workshop, is getting in.

Photo: Honourable state minister of ministry of water resources exchanging greetings with invited participants in the workshop.

Photo: Sitting on dais (from right to left) 1. Mr. Md. Habibur Rahman, Project Director and Chief Engineer, CEIP-1, Bangladesh Water Development Board, 2. Dr. Ranjit Galappatti, Team Leader, Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone, 3. Mr. Mantu Kumar Biswas, Joint Chief, Planning Cell, Ministry of Water Resources, 4. Mr. Mahbubul Islam, Additional Secretary, Development Cell, Ministry of Water Resources, 5. Mr. Zaheed Farooque, M. P., Honourable State Minister, Ministry of Water Resources, 6. Khondaker Khalequzzaman, Additional Director General (West Region), Bangladesh Water Development Board, 7. Mr. Zulfikar Ali Howladar, Chief Engineer (South Region), Bangladesh Water Development Board, 8. Prof. Dr. M. Monowar Hossain, Executive Director, Institute of Water Modelling.


Photo: Recitation from the holy Quran at the start of the workshop.

Photo: Project Director and Chief Engineer, CEIP-1, BWDB, Mr. Md. Habibur Rahman delivers welcome address.

Photo: Team leader of the study, Dr. Ranjit Galappatti, presents introduction, aims and objectives of the study.

Photo: Mr. Mahmudul Islam, Additional Secretary, Ministry of Water Resources, delivers speech as Special Guest.

Photo: Mr. Zaheed Farooque, M. P., honourable State Minister of the Ministry of Water Resources, People's Republic of Bangladesh, delivers speech as the Chief Guest.

Photo: Mr. Khandokar Khalequzzaman, Additional Director General (West Region), BWDB, delivers speech as the Chair of the Plenary Session.

Photo: A section of invited participants in the programme.

Photo: A section of invited participants in the programme.

Photo: A section of invited participants in the programme.

Photo: Presentation being given by Deputy Team Leader of the study describing characteristics of coastal area, problems involving polders, expected design, questions for group discussion at the start of the technical and subject-oriented group discussion session.

Photo: Subject-oriented group discussion.

Photo: Subject-oriented group discussion.

Photo: Subject-oriented group discussion.

Photo: Subject-oriented group discussion.

Photo: Subject-oriented group discussion.

Photo:- Group 2: Presentation of Group Leader: Mr. Abdul Wadud Mia, Chairman, Mujibnagar Union Council, Charfassion, Bhola

Photo: - Group 3: Presentation of Group Leader: Mr. S. M. Ataur Rahman, Executive Engineer, BWDB, Jhalokathi

Photo: - Group 4: Presentation of Group Leader: Mr. A. H. M. Rashed, Assistant Director, Depart of Environment, Barishal

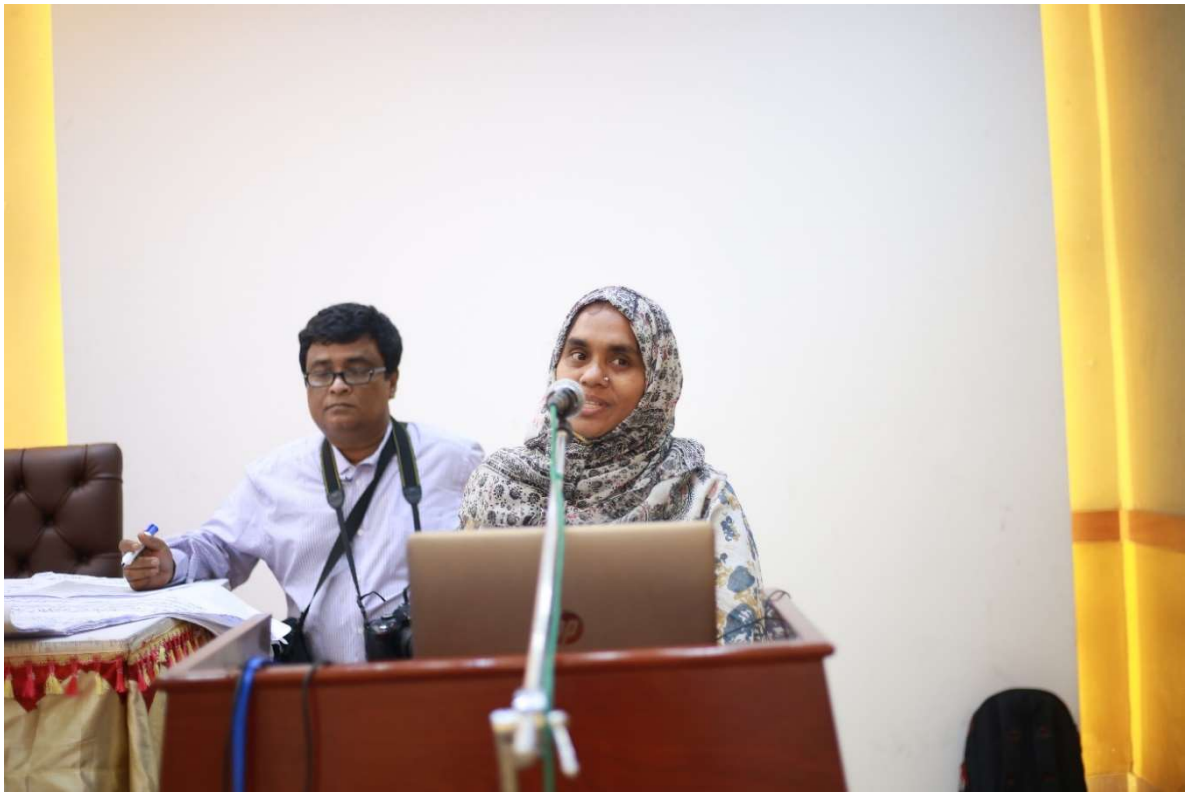

Photo: - Group 5: Presentation of Group Leader: Maminjan Akter Mani, Joint Secretary, WMA, Polder-43/2f

Photo: Chair and moderator of the technical session, Mr. Md. Habibur Rahman, [Project Director and Chief Engineer, CEIP-1, BWDB], delivers closing speech.

Appendix 2: Questions of Different Groups

Group-1

- What are the various problems occurred within the polder in the past and being faced presently? What kinds of planning are necessary to be taken up to address these problems for the development of polders?
- Are the peripheral rivers around the polders experiencing bank erosions? What are the reasons behind the bank erosions? What are the bad impacts of the riverbank erosion? What kind of defense mechanism should be taken to attain sustainable bank protection? What offset distance of the poldered dyke should be kept away from the river bank?
- What kind of investment project is necessary for the integrated development of the whole coastal area?

Group-2

- What are the various problems occurred within the polder in the past and being faced presently? What kinds of planning are necessary to be taken up to address these problems for the development of polders?
- Do you have the problems prevailing in your polder like waterlogging, filling up and grabbing of the drainage canals, conflicts between growing rice and fishery and dykes with low height? What are the ways to get rid of the problems and what kind of participatory water management practice needs to be planned to attain sustainable solution?
- What are the O&M (Operation and Maintenance) problems of the Sluice Gates/ Regulators existing in the polders? What kind of measures or techniques should be taken to address the problems? Is there any necessity for the movement of fish and boat through Sluice gates?
- What kind of investment project is necessary for the integrated development of the whole coastal area?

Group-3

- What are the various problems occurred within the polder in the past and being faced presently? What kinds of planning are necessary to be taken up to address these problems for the development of polders?
- Is there any problem of siltation in the peripheral river of the polders? If the rivers are silted up than what are the reasons behind it? What consequences had occurred due to the river siltation? Compared to the past, are the tide levels in these rivers increasing or decreasing? What are the necessary measures to be taken for managing river siltation and the rise in tide levels?
- Identify the problems of irrigation management during the dry season. In solving irrigation problems and in the development of the polder, what are your suggestions?
- What kind of investment project is necessary for the integrated development of the whole coastal area?

Group-4

- What are the various problems occurred within the polder in the past and being faced presently? What kinds of planning are necessary to be taken up to address these problems for the development of polders?
- What is the present salinity concentration level in the peripheral rivers of your polder? Compared to the past are the salinity increased? Is the salinity in peripheral rivers expected to be increased in future? If the salinity is increased, what kind of adverse impact will influence on paddy, fish and coastal area? To overcome the bad influences, what are the necessary measures do you think to be taken up?
- What kind of investment project is necessary for the integrated development of the whole coastal area?

Group-5

- What are the various problems occurred within the polder in the past and being faced presently? What kinds of planning are necessary to be taken up to address these problems for the development of polders?
- What kind of problems in the coastal area and within the polders are likely to occur in future due to climate change, storm surge, declining upstream water flow in dry season, urbanization, and changing in land use? In this changing environment, what innovative idea/technology needs to be devised in Planning the development of polders, so that implementation of a sustainable, secured, acceptable to the local public and environment friendly polder development project can be possible?
- What kind of investment project is necessary for the integrated development of the whole coastal area?

Appendix 3: Views of the Stakeholders

Venue: Barishal Club Auditorium
Date: Saturday 30 Mar 2019
Exchanging views among stakeholders

Group 1

Name of team leader: Md. Golam Rahman, General Secretary

Question 1
Polder: 47/3, Water Management Associaiton, Kalapara

Problems: Polder 47/3, 47/4, 56, 57, 43/2B

1. Non-functioning of sluice gates,
2. Crop production is hampered owing to salinity in water and soil,
3. Interior khals getting silted up
4. Drainage being hampered and water logging being created
5. Cultivable land remains uncultivable due to water logging (as happened after Sidr),
6. Breakage of different parts of polders,
7. Illegal encroachment of khals.

Suggestions to Solution:

1. Repairing/rebuilding the sluice gates,
2. Excavating of silted up khals,
3. Repairing of embankments, increasing height thereof,
4. Removal of illegal occupation/structures from embankments.

Question 2
Answers: There are erosion problems in the rivers surrounding the polders.
Causes of erosion:

1. Due of occurrence of Cyclones and storm surges,
2. Due to changes of water courses caused by developing chars in the rivers,
3. Due to cutting of soil from rivers to be used as raw materials for making of bricks,
4. Due to illegal sand mining in rivers.

Lose and Damage:

1. Life and property get lost/damaged,
2. All establishments lying by the river like hat, bazar, educational institutions, mosques, temples etc get lost in the rivers,
3. All properties and belongings get lost due to river erosion (such as houses, land producing crops),

Sustainable remedial measures against river erosion:

1. Placing CC blocks, dumping of geo-bags,
2. Dredging of chars risen inside rivers,
3. Forestation along the banks of rivers,
4. Dredging of sub-merged chars,
5. Creating new polders,

Note: Embankment should lie apart from the river bank in terms of 250-300 m.

Question 3

Answers:

1. Undertaking sustainable projects incorporating people,
2. Undertaking projects on forestation, pisciculture, animal husbandry,
3. Rehabilitating victims of river erosion,
4. Constructing cyclone shelters,
5. Protecting river banks and dredging of submerged chars in order to protect river erosion,
6. Creating new polders through land reclamation,
7. Bringing improvement of existing polders by phase, and maintaining continuation of it
8. Making self-dependent financially through creation of water management organization,
9. Strengthening extension programmes undertaken by BWDB.

Participants:

1. Mr. Md. Golam Rahman Milon,
2. Mr. Iqbal Hossain Likhon,
3. Mst. Minara Begum,
4. Mr. Md. Shahidul Islam,
5. Mr. Abdul Karim,
6. Mr. Md. Mahbubur Rahman,
7. Mr. Md. Iqbal Hossain,
8. Mr. Bipul Chandra Mridha

Venue: Barishal Club Auditorium
Date: 30 Mar 2019
Exchanging views among stakeholders

Group 2

Group Leader: Mr. Abdul Wadud Mian, Chairman, Mujibnagar Union Council, Char Fasion, Bhola

Answers on Problems:

1. River erosion,
2. Inadequate height of existing polders,
3. Outside slope,
4. Insufficient sluice gates,
5. Inadequate barm width,
6. Insufficient drainage system,
7. Increase in water level each year,
8. No regulator to entry saline/fresh water,
9. Forestation at right places at right times,
10. Water management using sluice gates is done at personal will,
11. Water logging,
12. Rats dig holes,
13. Illegal occupation,
14. Inadequate breadth of sluice gates,
15. Keeping provision of a representative from directorate of fisheries in water management committee,

Solutions:

1. Improving navigability, dredging of river bed and chars, dumping/placing blocks eroding area,
2. Increasing height of embankment proportionately to the increase of tides and sorm surge,
3. Increasing river side slope (in the amount of 1:5),
4. Arranging adequate number of sluice gates, and employing operators,
5. Increasing barm width and creating forest thereon,
6. Constructing sluice gates, culverts (with gates), dredging of khals inside polders,
7. Increase height of polder,
8. Constructing regulators keeping right distances in between,
9. Forestation at right times, identifying beneficiaries, keeping watching system,
10. Controlling of water management using regulators in coordination between administration and public representatives,
11. Creating resistance by monitoring activities of rats and illegal occupation,

Answer 2:

- Excavation of khals inside polders,
- Dredging of rivers,
- Coordination between rice cultivators and fish farmers,
- Increasing height of embankment,
- Improving infrastructures for intake and drainage of water,
- Making arrangement for monitoring and evaluation in monsoon,
- Undertaking/adopting environment friendly arrangements/systems,
- Promoting consciousness of the people,
- Setting up inter-connections among khals, rivers and beels.

Answer 3:

- Controlling regulators by selective persons, so it should be controlled by administration and public representatives,
- Lack of coordination between crop producer and fish farmers, so water management by committees,
- Fish movement necessary, so making fish-friendly structures so that fish can move freely,
- Communication by boats not necessary.

Answer 4:

- Providing training to farmers,
- Arranging meetings/sessions for promoting consciousness,
- Improvement of infrastructures including polders,
- Forestation on coastal polders,
- Land reclamation,
- Removing dwelling houses from embankments,
- Removing of illegal occupation,
- Transfer of appropriate technology suitable for the local environment,
- Developing new chars,
- Constructing new embankment, improving phase-wise the existing embankments,
- Making alternative arrangements for people adjacent to embankments.

Participants:

1. Mr. Abdul Wadud Mian, Chairman, Mujibnagar Union Council, Char Fassion, Bhola.
2. Shamima Nasreen, Project Coordinator, S. D. A, Patuakhali,
3. Mr. Humayun Kabir, Director, GJUS, Bhola.
4. Sarder Mohiuddin, DFO (Fisheries), Barguna.
5. Mr. Debdas Mukharjee, ACF, Patuakhali.
6. Mr. Md. Jamal Uddin Bhuiyan, ACF, Bhola.
7. Mr. Tapash Kumar Sarker, ACF, Barishal.
8. Mr. Md. Kamrul Islam, DPD, SCMF, DOF, Barishal.
9. Mr. Abul Kashem, Social Worker, Char Fassion, Bhola.

Venue: Barishal Club Auditorium
Date: 30 Mar 2019
Session on Exchanging Views among Stakeholders

Group 3

Group Leader: Mr. S. M. Ataur Rahman, Executive Engineer, Jhalokathi.
Group Members:

1. Mr. Md. Kaisar Alam, Executive Engineer, Bhola-2, BWDB.
2. Mr. Shakil Mahmuc, Sub-divisional Engineer, Patuakhali.
3. Mr. Mohammad Salauddin.

Answer 1:
Past Problems:

- Less height of embankments,
- Less width of embankments,
- Inadequate number of infrastructures.

Present Problems:

- Inadequate allocation of continued funding for maintenance,
- Lack of manpower,
- Erosion by wave action,
- Encroachment.

Solutions to Problems:

1. Necessary to increase cross-section of embankments,
2. Taking necessary steps in protecting river erosion (bank protection/ slope protection/dredging)
3. Constructing necessary and timely water regulatory infrastructures,
4. Employing necessary manpower,
5. Allocating funds/compensations in rehabilitations and land acquisitions,
6. Rehabilitating victims of river erosion.

Answer 2:

- There are problems of siltation inside rivers,
- Water flow got decreased,
- Resistance to flow owing to encroachment,
- Less opening in water regulatory structures, and operations are insufficient,
- Navigation getting hampered,
- Scarcity of water necessary for agricultural activities,
- Erosion near the banks due to deep water caused by chars inside rivers,
- Occurrence of natural disasters,
- Increase of high tide levels and low tide levels,
- Removal of sand by dredging,
- Increasing size of gate opening,
- Operations need to be adequate.

Answer 3:

- Increasing water holding capacity of reservoirs,

- Improving water management,
- Protecting erosion,
- Removing silt,
- Coordinated water management,
- Ensuring planned communication systems,
- Seeking suggestions/advice from BWDB in constructing internal roads, bridges, sluice vents including development activities in the coastal region.

Venue: Barishal Club Auditorium
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Group 4

Group Leader: Mr. A. H. M. Rashed and Mr. Aminul Islam Shohag.

Question 1:

Present and past problems:

- Problems in entry and exiting water,
- Non-functioning of sluice gates,
- Rising up of river bed due to siltation, however land inside polders remain at low level,
- Water management organization are not functioning properly (in most cases),
- Embankments are not disaster resilient,
- Gate operations not being done properly,
- Inadequate vent size and sluices,
- Destroying natural environment (47/2),

Solutions to the problems:

1. Construction and repair of infrastructures, re-excavation of khals and rivers, freeing up from illegal occupation,
2. Dredging,
3. Reforming of WMO afresh incorporating different sectors,
4. Disaster resilient design and implementation,
5. Providing training to sluice committees,
6. Constructing sluices having sufficient numbers of vents with adequate sizes,
7. Intensive monitoring, analysis and research (over long term).

Question 2:

Problems:

- Salinity existed,
- Salinity increased than before,
- There are possibilities,
- Crop and fish production shall decrease following on the increase of salinity,

Ways to solution:

- Dredging aimed to increased flow,
- Innovation of salinity-resilient variety of crops,
- Making provision for holding rain water inside polders.

Investment Plan:

1. Developing green belts,
2. Renovation of existing polders,
3. Promoting consciousness of local people,
4. Taking up long-term renovation and follow up activities and management.

Venue: Barishal Club Auditorium
Date: 30 Mar 2019
Session on Exchanging Views among Stakeholders

Group 5

1. Problems in polders in the past/present:

Past Problems	Present Problems
• 90% of embankment of polders was damaged/broken, • No organization existed in the past for operations and maintenance, • 80% of sluice gates were non-functioning, and no gates, • Khals of small sizes inside polders were silted up, • Khals were not under occupation, • No river erosion was seen in Polder 55/2C, • Much erosion was seen in Polder 43/2F.	• Currently 40% of embankment are damaged/broken, • Currently there are registered organizations (WMG/WMA). Though these organizations could identify problems, but cannot solve them, • 50% of sluices even now non-functioning, • Currently main khals either got silted up or being silted up, • Currently khals have already been occupied or being occupied. Due to such occupation water logging is created and crops get damaged, • Outside of regulators outfall-khals are getting silted up, due to this problem farmers do not get water for irrigation at times of requirement, and at times of no-requirement water logging is created, • Currently river erosion is seen, • Though currently less, but erosion is existed, • Unplanned plantation was done on and outside polders, • There are illegal establishments at sluices, on slope of embankments.

Question 1: Polder development plan

- Freeing up land in khals and khas land,
- Removal of illegal establishments from sluices and slopes of embankments,
- Re-excavation of silted-up khals,
- Excavating outfall-canal regularly,
- Strengthening WMG/WMA organizationally and financially,
- Renovating sluice gates,
- Reinforcing overseeing activities by concerned government organizations,
- Renovating embankments.

Question 2

What could be the problems resulted from climate change, storm surges, decrease in water flow in dry season, urbanization, and land-use changes?

Answers:

- Water logging is created by untimely rainfall, crops and agricultural produce get damaged,
- Embankments may be damaged,
- Siltation may be occurred in khals,
- Crop patterns may be changed,
- Production of vegetables will get decreased,
- Salinity may increase,
- Occurrence of untimely excessive rainfall is seen which creates water logging and crops get damaged.

Question 3
Polder development plan:

Answers:

- Making certain of a system for draining water out of each beel,
- Setting up adequate numbers of drainage infrastructures on roads built unplanned,
- Repairing outlet and inlet, and ensuring water flow,
- Freeing up khas land from illegitimate occupation,
- Cultivating water-resilient and rapid-growing crops,
- Planned forestation is needed outside polders.

Question 4

What type of investment plan is necessary for coordinated development in the entire coastal area?

Answers:

- Projects involving sustainable development of all infrastructures of polders and their continued maintenance,
- Planning for forestation outside embankments,
- Adopting regular monitoring strategy for infrastructures of polders,
- Coordinated investment needed involving all stakeholders,
- Project is needed in order to prepare maps by which coordinated activities will become visible,
- Projects are needed for animal husbandry and fish culture,
- Investment is required for irrigation system as required.

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Appendix 4: List of Registered Participants

Attendance Sheet

Regional Stakeholders Consultation Workshop

Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone (Sustainable Polders Adapted to Coastal Dynamics)

Date: 30 March 2019 **Venue: Barishal Club Auditorium, Barishal**

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