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INSTITUTE OF WATER MODELLING

Newsletter

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Highlights

IWM has successfully organized IWM Users' Conference 2019 at 'Celebrity Hall' of Bangabandhu International Conference Center (BICC), on 20th November, 2019. The program was chaired by Mr. Kabir Bin Anwar, Hon'ble Senior Secretary, Ministry of Water Resources (MoWR) and Chairperson of IWM BoT (Board of Trustees). Mr. Zaheed Farooque, MP Hon'ble State Minister, MoWR graced the occasion as Chief Guest.

Preparation of a framework for polder design, based on understanding of the long-term and large-scale dynamics of the delta and on sustainable polder concepts.

Using Hydro Economic Modelling, develop a medium-term strategic framework for the World Bank Group to assist Bangladesh achieve enhanced GDP growth and human capital development through effective water sector management.

Feasibility Study, Detailed Design and Tendering Services for Construction of Broad Gauge Rail Line from Madhukhali to Magura via Kamarkhali.

Bangladesh Economic Zone Authority (BEZA) has taken initiative for Construct a Economic Zine and port as well in Feni-Mirasari area. IWM has engaged to support for Techno-Economic Feasibility Study of the proposed port.

Contract Signing Ceremony between Department of Bangladesh Haor and Wetlands Development (DBHWD) and IWM

IWM USERS' CONFERENCE 2019



Institute of Water Modelling (IWM) has successfully organized IWM Users' Conference 2019 at 'Celebrity Hall' of Bangabandhu International Conference Center (BICC), Agargaon, Sher-E-Bangla Nagar, Dhaka on 20th November, 2019. The program was chaired by **Mr. Kabir Bin Anwar**, Hon'ble Senior Secretary, MoWR and Chairperson of IWM Board of Trustees (BoT). **Mr. Zaheed Farooque, MP** Hon'ble State Minister, MoWR graced the occasion as Chief Guest. Designated distinguished guests from different government, non-government organizations and IWM BoT participated and enriched the program by sharing their views and suggestions regarding improvement of IWM services to cater the diversified situation of the deltaic plain of Bangladesh in water, environment and climate related matters.





Hon'ble Senior Secretary and Chairperson of IWM-BoT, Mr. Kabir Bin Anwar, is giving IWM UC2019 Crest to Mr. Zaheed Farooque, MP, Hon'ble State Minister, MoWR.



Distinguished guests from Planning Commission, Ministry of Water Resources, Ministry of Shipping, BWDB, BIWTA, Bangladesh Railway, BBA, BMDA, DBHWD, DPHE, DWASA, JRC, LGED, RRI, RHD, WARPO and others Government & Non-Government sectors participated in the event of IWM UC2019.



Prof Dr. Shamsul Alam, Member (Senior Secretary), GED, Planning Commission coordinated the Technical Session. Mr. Mahmudul Islam, Additional Secretary, MoWR and Mr. Abu Saleh Khan, the then DED (Operations) and present Executive Director, IWM presented their paper. Keynote paper was presented by Prof. Dr. M. Monowar Hossain, the then Executive Director, IWM.

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

The main aim of this study is to create a framework for polder design, based on understanding of the long-term and large-scale dynamics of the delta and on sustainable polder concepts.

The Coastal Embankment Project (CEP) was initiated in the 1950s and 1960s to build polders surrounded by embankments preventing the spilling of saline water onto the land at high tides. The disasters resulting from two major cyclones Sidr (2007) and Aila (2009) and the unexpectedly high value of the damages caused by these, provoked the World Bank and the Government of Bangladesh to initiate the Coastal Embankment Improvement Programme (CEIP-1) which was to redesign and rebuild the entire polder system, in several phases, to resist the long term challenges of climate change and other natural phenomena such as Storm Surges, wind and wave attack, Sea level rise, Land subsidence, Changing tidal hydrodynamics and channel network system, Long term challenges to drainage, Increasing threats from cyclones and storm surges, Maintenance and management failures.

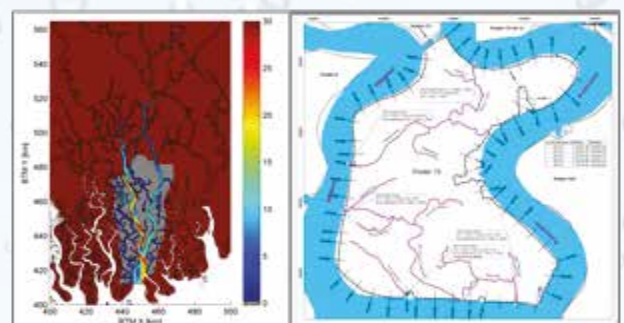
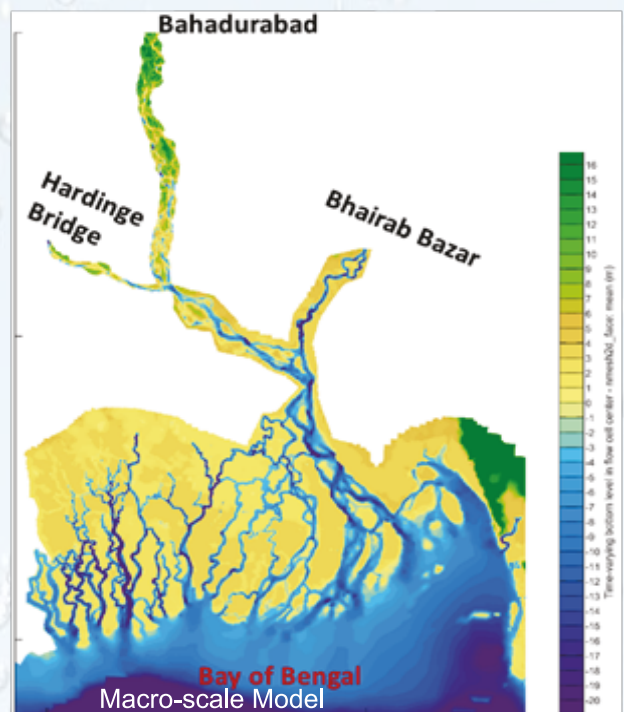
The implementation of the first 17 polders of CEIP-1 brought into stark relief several shortcomings and gaps in our knowledge and understanding of many of the physical phenomena that govern major processes in and the evolution of the Bengal Delta. Recognition of these gaps resulted in the inclusion of this research study as a component project to support the phased Coastal Embankment Improvement program (CEIP) which was to bring in massive investments over many decades. The following activities are being carried out under the Long Term Research Study.

- Research to create an understanding of the long term and large-scale dynamics of the delta including responses to human and climate interventions.
- Apply a more complete understanding of delta processes to devising improved and more sustainable polder designs and management strategies.
- Create a framework for environmentally sustainable polder design
- Develop a long term investment plan for implementation in the Coastal Zone leading to Safety and Integrated Water Resources Management (IWRM)
- Build the analytical foundation and technical capacity of BWDB and other stakeholders including local communities, to deal with future challenges.

The following are the expected outputs from the proposed Research:

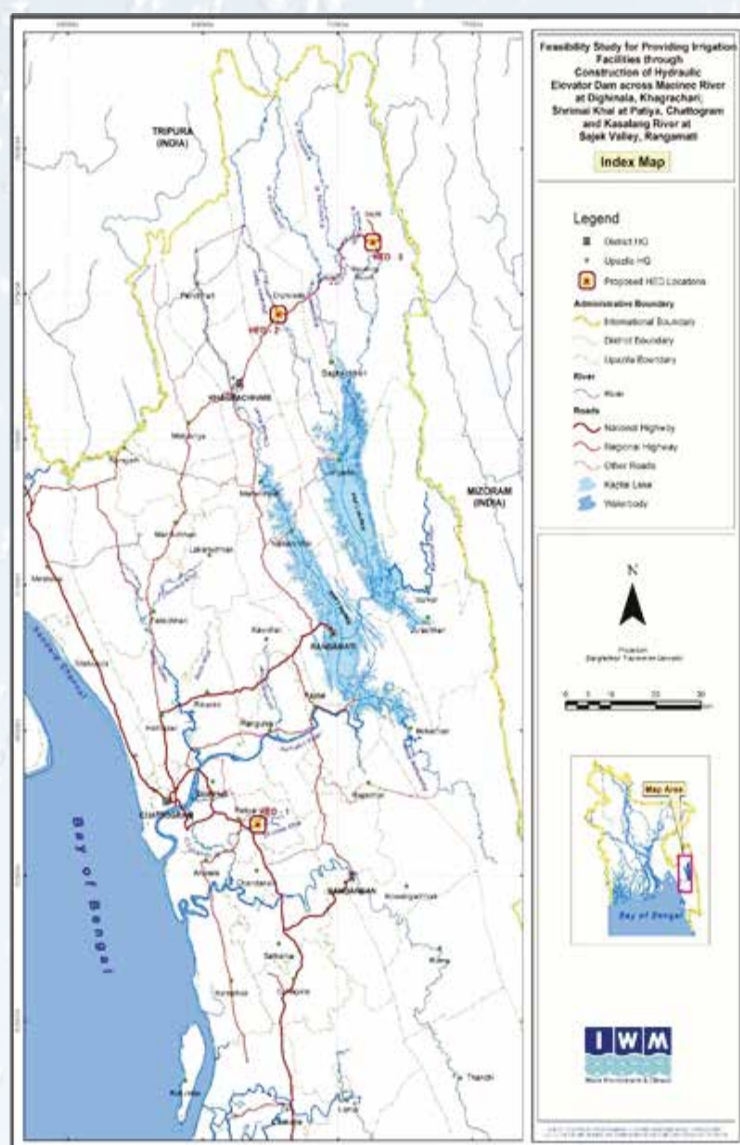
- Bank erosion prediction tools
- Annual sediment load & pathway
- Long-term Morphology
- Subsidence rate & Relative Sea Level Rise
- Polder Development Plan
- Conceptual Polder Design and Management

To achieve this goal, a range of modelling tools and advanced measurement techniques are used to investigate the macro-, meso- and micro-scale behavior of the delta system. Macro-scale Model will provide sediment budget in Ganges-Brahmaputra-Meghna (GBM) delta. Meso-scale Model will give ideas including prediction on river and coastal erosion. Micro-scale Model will deal with Polder management plan, sediment management plan including design parameters for future changes of the coastal polders.



Feasibility Study for Providing Irrigation Facilities through Construction of Hydraulic Elevator Dam across Maeinee River at Dighinala, Khagrachhari, Shrimai Khal at Patiya, Chattogram and Kasalang River at Sajek Valley, Rangamati

Eastern Hilly region of Bangladesh is facing water scarcity for irrigation and domestic uses during some part of the year, especially during the dry season. There is opportunity to conserve and utilize the rainwater, which flows down to the Bay through the rivers, by constructing dams and reservoirs in the hilly rivers and streams. BWDB has constructed a number of rubber dams to facilitate irrigation in different parts of the country including eastern hilly region. Besides, there are some local initiatives for conservation of water in the hilly streams for different uses including irrigation. These local practices could be strengthened further by appropriate structural interventions. Beijing IWHR Corporation (BIC) of China has invented a new technology titled Hydraulic Elevator Dam (HED) which can be used for water retention, flow control, water ecological improvement and similar purposes. Meanwhile BWDB has preliminary selected two sites for HED construction in the Eastern Hilly area. To conduct the Feasibility study of the preliminary sites within the stipulated time, a contract has been signed with IWM on September 5, 2019



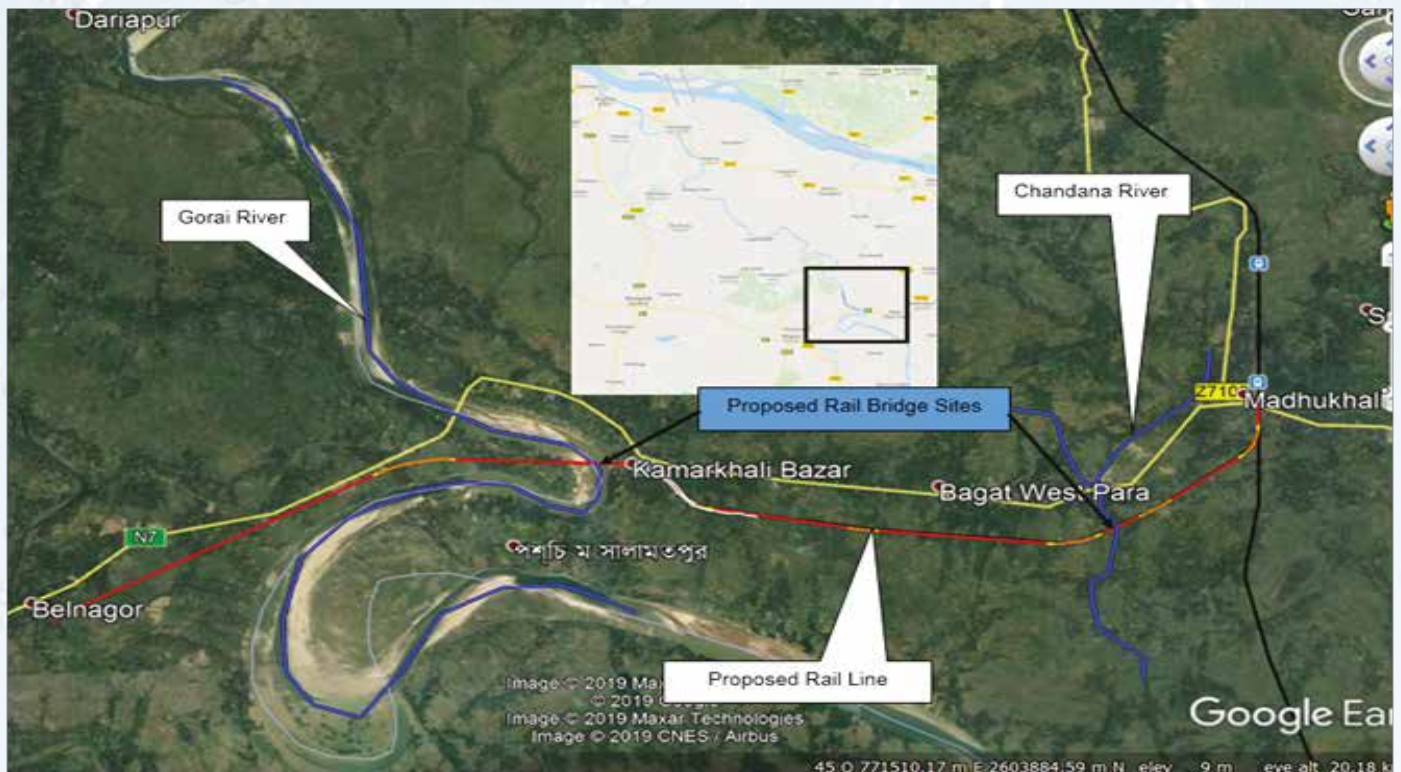
The main objective of the study is to conduct a limited Feasibility study for the construction of Hydraulic Elevator Dams (HED) in three sites namely (i) Maeinee River at Dighinala Upazila of Khagrachhari district, (ii) Shrimai Khal at Patiya Upazila of Chattogram district and (iii) Sajek valley under Rangamati district for conservation of dry season flow for irrigation in site (i) & (ii) and development of tourism in Sajek Valley. The scope of works of the study includes flow assessment in these ungauged sites through development of mathematical model, field survey and data collection for facilitating model development, planning of HED and associated structures, appropriate site selection, preliminary design preparation, consultation with local beneficiaries, pre and post project agricultural, fisheries, socio-economic and environmental impact assessment and economic analysis. It is expected that the study will come up with recommendations and guidelines for constructions and operations of the HEDs by BWDB in the selected sites in the Eastern Hilly region.

Hydrographic Survey and Mathematical Modelling for Hydrological and Morphological Studies in connection with Feasibility Study, Detailed Design and Tendering Services for Construction of Broad Gauge Rail Line from Madhukhali to Magura via Kamarkhali

The South-West region of Bangladesh is crisscrossed with many large/ small rivers, which are connected to the Bay of Bengal, located at the south. The communication system of the South-West region is mainly based on road transport with rail tracks covering few parts of the region - mostly on the western part covering Kushtia, Chuadanga, Jessore and Khulna districts. At the northern part, some areas of Faridpur, Rajbari and Gopalganj districts have rail tracks whereas Barisal Division has no rail transport system. Between Faridpur and Jessore, there is also a large gap around Magura and Jhenaidaha districts.

Under the circumstances, Bangladesh Railway (BR) has planned to construct a broadgauge rail line from Modhukhali to Magura via Kamarkhali. The Joint Venture (JV) consortium of DDC-DPM has been contracted by BR for Feasibility Study, Detailed Design and Tendering Services for Construction of the Broad Gauge Rail Line. As the proposed rail line would have couple of major river crossings on its way, provision of a morphological study including numerical morphodynamic modelling was there in the Feasibility Study. The JV Consortium (the Main Consultants) contracted IWM to carry out the Hydrological & Morphological Mathematical Modelling Study.

To connect Magura district with Modhukhali Upazila of Faridpur, two rail bridges are required to be constructed over the Chandana and Gorai-Modhumati rivers.



The major items of tasks of the assignment are:

- Collection of satellite images and any sort of data/ information (primary and secondary) required to complete the study;
- Statistical analysis of water levels and discharges of the proposed bridge sites to determine the highest and lowest water levels and discharges for different return periods;
- Development of 2D hydrodynamic, hydrological and morphological models using physically based fully dynamic modelling system MIKE 21C;
- Assessment of suitable bridge locations from hydro-morphological point of view;
- Assessment of impacts on the bridges due to hydro-morphological processes of the rivers including river bed and bank erosion;
- Prediction of morphological changes of the rivers in the vicinity of the bridges.

Met Ocean Data Collection for Feasibility Study for New Port on the Sandwip Channel at Sitakunda, Chattogram, Bangladesh

Bangladesh has planned to construct an Economic Zone in the Feni-Mirasarai area, some 60-80 km north of Chattogram. In order to improve the supply chain efficiency for production, distribution and trade it is considered important that a Port/Terminal is established with adequate port facilities near the Economic Zone. The proposed location of this new Sitakunda Port is in the Sandwip Channel, in and around Sitakunda Upazila near Mirasarai, and opposite of the Sandwip Island.

Institute of Water Modelling (IWM) was engaged to support the Main Consultant, Techno-Economic Feasibility Study of the proposed Port. The study area is morphologically very dynamic with high tidal range that exceeds 6m during spring tide, strong current and very high sediment concentration. A comprehensive data collection program has been carried out to collect bathymetry, topography, sediment concentration, water level, current and wave data of the Sandwip Channel. Major Instruments deployed for the work are RD Instruments Workhorse Sentinel, Sentinel V50 & Sentinel V20 ADCP, Teledyne Odom CV100, CV200 and Hydrotrac Echo Sounder, Trimble SPS855 RTK-GPS and Valeport SVP. The survey team successfully completed a large amount of data collection which has been used by the Consultant to establish the baseline hydrodynamic and morphological condition, identify erosion vulnerable area and for design work. These data has also been used to develop and update the existing Bay of Bengal, Storm surge model, wave model and for model calibration.



Figure 1: Project area have been surveyed for Proposed Sitakunda Port

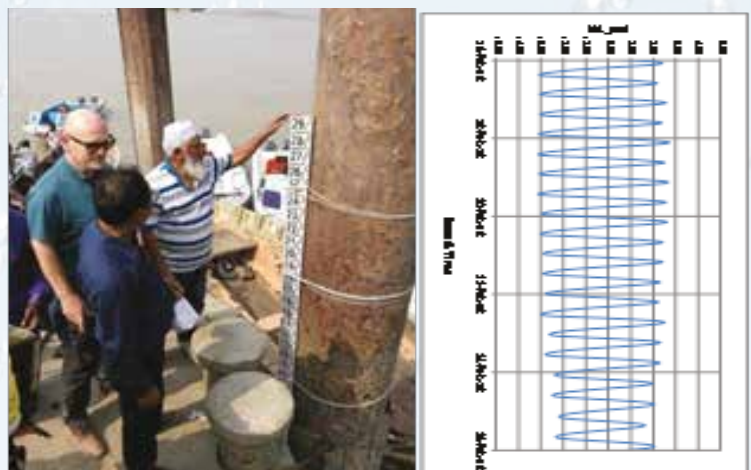


Figure 2: Inspecting Tide gauge (Left) and sample water level data at Kumira Ghat (Right)



Figure 3: Downloading data from the ADCP after recovery and Observed current speed at Proposed Port Site

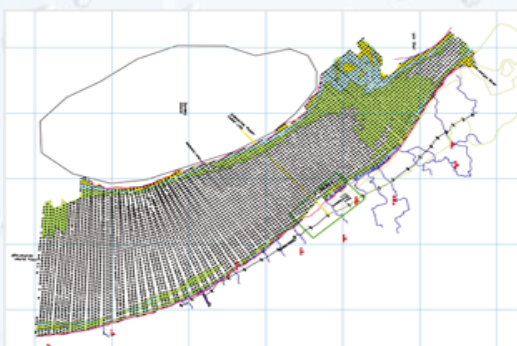
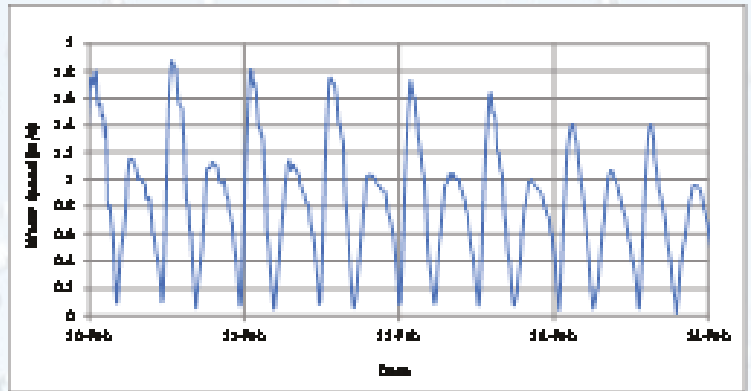


Figure 4: Hydrographic Chart of the Sandwip Channel



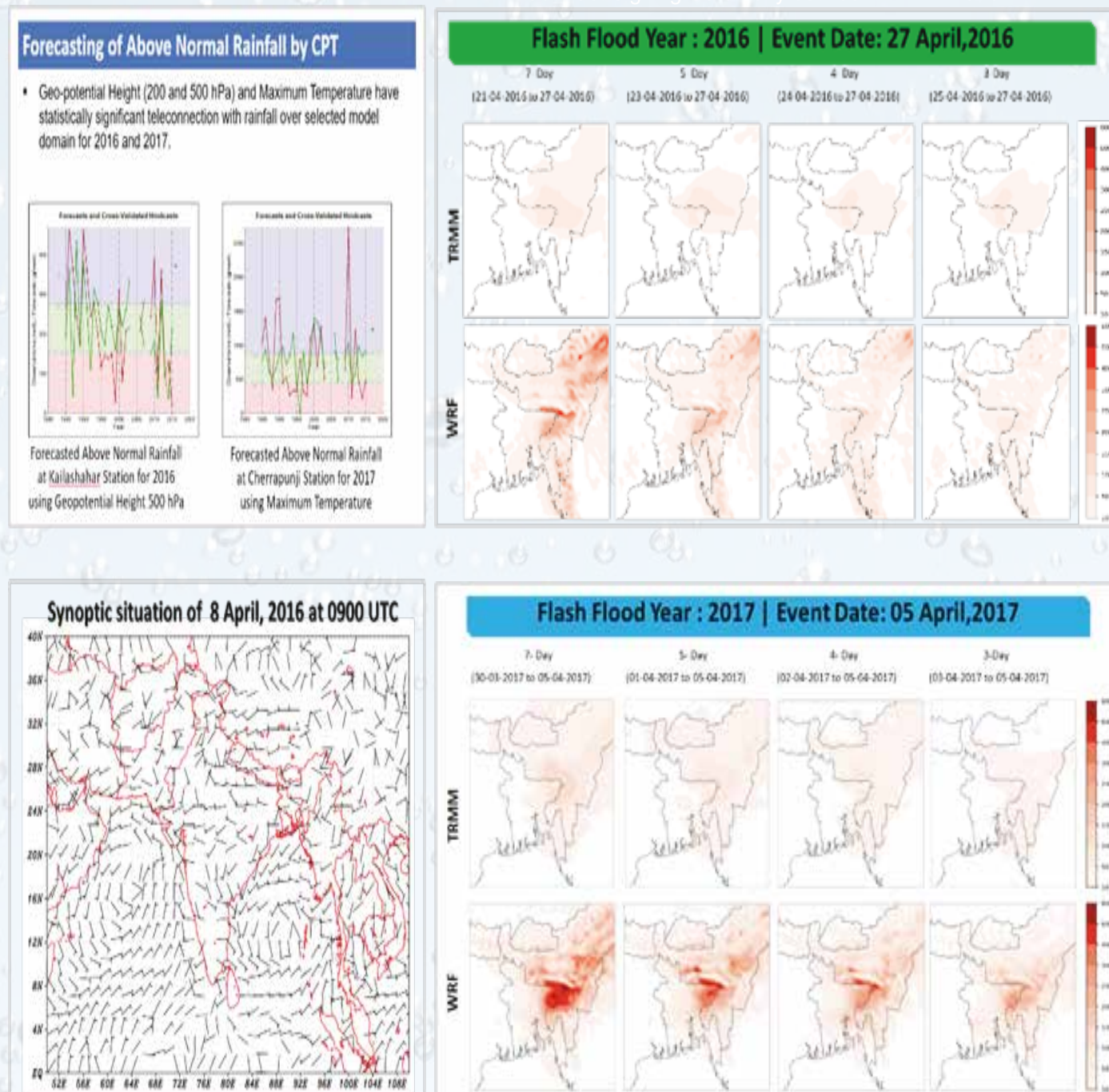
Figure 5: Discussion with Project Director regarding alignment

Research on two-stage hydro-meteorological pre-monsoon flash flood forecast over North-East haor region of Bangladesh

The physical setting and hydrology of the haor region have created innumerable opportunities as well as constraints for the inhabitants of the haor. The region has distinctive hydrological characteristics. Annual rainfall ranges from 2200 mm along the western boundary to 5800 mm in its northeast corner and is as high as 12000 mm in the headwaters of some catchments extending to India. The region receives water from the catchment slopes of the Shillong Plateau across the borders in India to the north and the Tripura Hills in India to the southeast. Flash flood is the one of major disaster in the haor area, which engulfs the primary production sector of agriculture and thus threatens the lives and livelihoods of the people. The main objective of this study is to develop two-stage hydro-meteorological pre-monsoon flash flood forecasting for the north-east haor region of Bangladesh.

The probabilistic flash flood prediction has been developed using Climate Predictability Tool (CPT) for one-month lead time. Monthly rainfall has been predicted on observed station for a suitable predictor from GCM model output that provides good correlation with the predictand. And the later part of the development of the flash flood forecasting has been done with the application of GFS and WRF numerical modelling technique for seven-days lead time over the haor region to reduce the vulnerability of the people in terms of livelihood, poverty and food security.

Contract Signing Ceremony between SBHWD and IWM



Climate Change Cell, IWM

IWM has been working with climate projections and scenarios for different flood and drought management project, drainage modelling, storm surge and sea level rise related research and studies in collaboration with BUET, DOE, BWDB, World Bank, UK-Met, IITB and other national and international organizations.

After initiation of its journey, the Climate Change Cell (CCC) are conducting a number of projects. Some ongoing project are:

1. Groundwater Rejuvenation As Climate change Resilience for marginalized and gender sensitive Ganges (GRACERS) in collaboration with Indian Institute of Technology Bombay (IITB)
2. Groundwater Resource Assessment and Impact of Climate Change in Coastal area
3. Joint Cooperation Program (JCP)-Bangladesh-the Netherlands", "Support to the Implementation of BDP2100"

In addition to the active projects, the cell is continuously looking for new opportunities to build relation with potential research institutes and clients. Some projects are in the proposal development phase with potential clients such as UK-Hadley Met Centre and DOE.

Recently IWM User Conference was held in November 2019, and the CCC had a stall which included four posters, two related to ongoing projects and two related to the basics of climate change science and facts. The stall also had prepared a wall paper that showcased how climate change related research can be linked to impact assessment of climate hazards, formulation of adaptation options for the country and finally having a policy change/formulation for implementation.



Mr. Md. Tarikul Islam, head of CCC, attended a workshop in IITM (Indian Institute of Tropical Meteorology), Pune, India under Asia Regional Resilience to a Changing Climate (ARRCC) Programme of Met Office, UK from 11 to 13 February 2020-titled as: "Sixth International Conference on Climate Services (ICCS6)". The aim of the workshop was to share skills, experience and expertise with an active international climate services network. In that workshop, Mr. Islam presented a paper on "Climate Resilient and Sustainable Water Resources Management in North-West Region of Bangladesh: A Case Study in Barind Area".

The Climate Change Cell also attended the Gobeshona6 conference in Independent University organized by ICCAAD (International Centre for Climate Change and Development) during 20-24 January 2020. Gobeshona6, brought together a distinguished and multidisciplinary group of scholars and practitioners from around the world to share their knowledge, research and practical experience on climate change issues in Bangladesh. In that conference, Bushra Monowar Duti, Associate Specialist of CCC, presented a paper, "Impact assessment of Climate Change on Water Availability and Extreme flows of Jamuneshwari River Basin in Bangladesh". Recently, Ms. Bushra completed a short course on Coastal Systems in IHE-Delft, Netherlands during 10-28 February, 2020. This will enable the cell to further develop the understanding of coastal hydrodynamics and coastal morphology-and related understanding of future coastal climate risks in changing climate.

Workshop on Sediment and Salinity in the Coastal Areas of Bangladesh

On 13 November 2019, a workshop on “Sediment and Salinity in the Coastal Areas of Bangladesh” has been arranged under Delta Wings Activity Fund 2019, organized by Institute of Water Modelling on behalf of the Delta Alliance Bangladesh Wing. Mr. Kabir Bin Anwar, Hon’ble Senior Secretary, Ministry of Water Resources of Bangladesh and Chairperson, IWM Board of Trustees (BoT) graced the occasion as the Chief Guest. The workshop was chaired by Prof. Dr. M Monowar Hossain, the then Executive Director, Institute of Water Modelling and Coordinator Delta Alliance Bangladesh Wing. Prof. Dr. Umme Kulsum Navera, Department of Water Resources Engineering (WRE) of Bangladesh University of Engineering and Technology (BUET) presented the Keynote paper on ‘Sediment and Salinity in the Coastal Areas of Bangladesh’. She discussed the present delta condition with the pros and cons of delta management in Bangladesh. She presented her speech considering most recently researches carried out by different researchers all over the world on Bangladesh Delta. She mainly focused on the climate change impact on sediment movement, scarcity of fresh drinking water, salinity intrusion and the sufferings and resilience of people at the coastal area. She concluded with the urge of conducting funding projects on delta should be integrated and well planned with an emphasis on sufferings of coastal people due to scarcity of drinking water.

After the keynote speech, Mr. Malik Fida A Khan, Executive Director (in-charge), CEGIS; Dr. Ansarul Karim, Managing Director, ECOMAC; Md. Majibur Rahman, DG (Additional Secretary), DBHWD, Dr. Khandakar Azharul Haq, Regional Chair, GWP South Asia shared their insights on delta plan Bangladesh in light of the keynote. Discussion by the designated discussants were followed by a lively open discussion moderated by the Chair.

Chief Guest Mr. Kabir Bin Anwar, Hon’ble Senior Secretary, Ministry of Water Resources of Bangladesh shared some initiatives of ministry regarding the delta like plantation of Babla tree, excavation of 25 large ponds in coastal Upazila as a remedy of drinking water scarcity, rejuvenation of local canals in all districts as for the navigation and source of surface water. He encouraged all the researches to carry out intensive study with co-ordination to alleviate estuary and floodplain management in face of climate change.

Special Guest Md. Mahmudul Hasan, Director General, WARPO and Engr. Md. Mahfuzur Rahman, the then Director General, BWDB shared their institutional involvement and initiatives regarding the delta issues. In his speech of the Chairperson, Professor Dr. Monowar Hossain briefed about the Delta Alliance, delta opportunities and sustainability of Bangladesh. He mentioned that sustainability of Bangladesh depends on the delta management as being a delta country. He presented a summary of the involvement of IWM in delta, sediment and climate change research. In the end, Mr. Abu Saleh Khan, the then DED (Operations) and present Executive Director of IWM concluded the workshop by delivering his vote of thanks for participating and sharing valuable perceptions regarding the “Sediment and Salinity in the Coastal Areas of Bangladesh”.



Mr Kabir Bin Anwar, Senior Secretary, Ministry of Water Resources speaking as Chief Guest of the Workshop



Prof. Dr. Umme Kulsum Navera presenting the keynote paper in the Workshop



Participants in the Workshop



Prof. Dr. M Monowar Hossain, the then Executive Director, IWM and Coordinator, DABW speaking as Chairperson of the Workshop.

Contract Signing Ceremony between DBHWD and IWM

Department of Bangladesh Haor and Wetlands Development (DBHWD) and Institute of Water Modelling (IWM) signed a contract agreement on November 04, 2019 to carry out the study entitled "Comprehensive Feasibility Study for Sustainable Restoration and Protection of Wetlands (Haor, baor, beel and connected rivers etc.) in Different Hydrological Regions of Bangladesh". K M Abdul Wadud, Director (Admin and Finance), DBHWD and Prof. Dr. M. Monowar Hossain, the then Executive Director, IWM signed the contract on behalf of DBHWD and IWM, respectively. Dr. Md. Ruhul Amin, Director (Agriculture, Water and Environment), (Additional Secretary), DBHWD and Dr. Ali Muhammad Omar Faruque, Deputy Director (Agriculture, Water & Environment) were present on behalf of DBHWD. Abu Saleh Khan, the then DED (Operations) and present Executive Director, Goutam Chandra Mridha, Senior Specialist and Mohammad Salah Uddin, Senior Specialist from IWM were also present in the contract signing ceremony.



Contract Signing Ceremony between BAEC and IWM

A contract agreement has been signed between Bangladesh Atomic Energy Commission (BAEC) and Institute of Water Modelling (IWM) on December 31, 2019 to carry out the study entitled "Hydrogeological Investigation in Connection with the Probable Site Selection for Construction of Nuclear Power Plant in the Southern Part of Bangladesh". Dr. A F M Mizanur Rahman, Project Director, BAEC and Prof. Dr. M. Monowar Hossain, the then Executive Director, IWM signed the contract on behalf of BAEC and IWM, respectively. Abu Saleh Khan, Deputy Executive Director (Operations), Goutam Chandra Mridha, Senior Specialist, Md. Saidur Rahman, Junior Engineer and Abdul Hannan Imran, Junior Engineer from IWM were also present in the contract signing ceremony.



IWM has provided training on "Basin Model development using MIKE Hydro Basin" to different Professionals of University of Kabul, American University of Central Asia and Institute of Water Problems, Hydropower and Ecology, Tajikistan, at Computer Laboratory, AUCA, Kyrgyzstan (20-23 June, 2019).



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Initially started as a TA Project in 1986, Institute of Water Modeling (IWM) is an independent TRUST established by the GoB to promote water modelling in managing the complex water resources ecosystem. Since services in the water and water related environment to various govt. and other national/international agencies.

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