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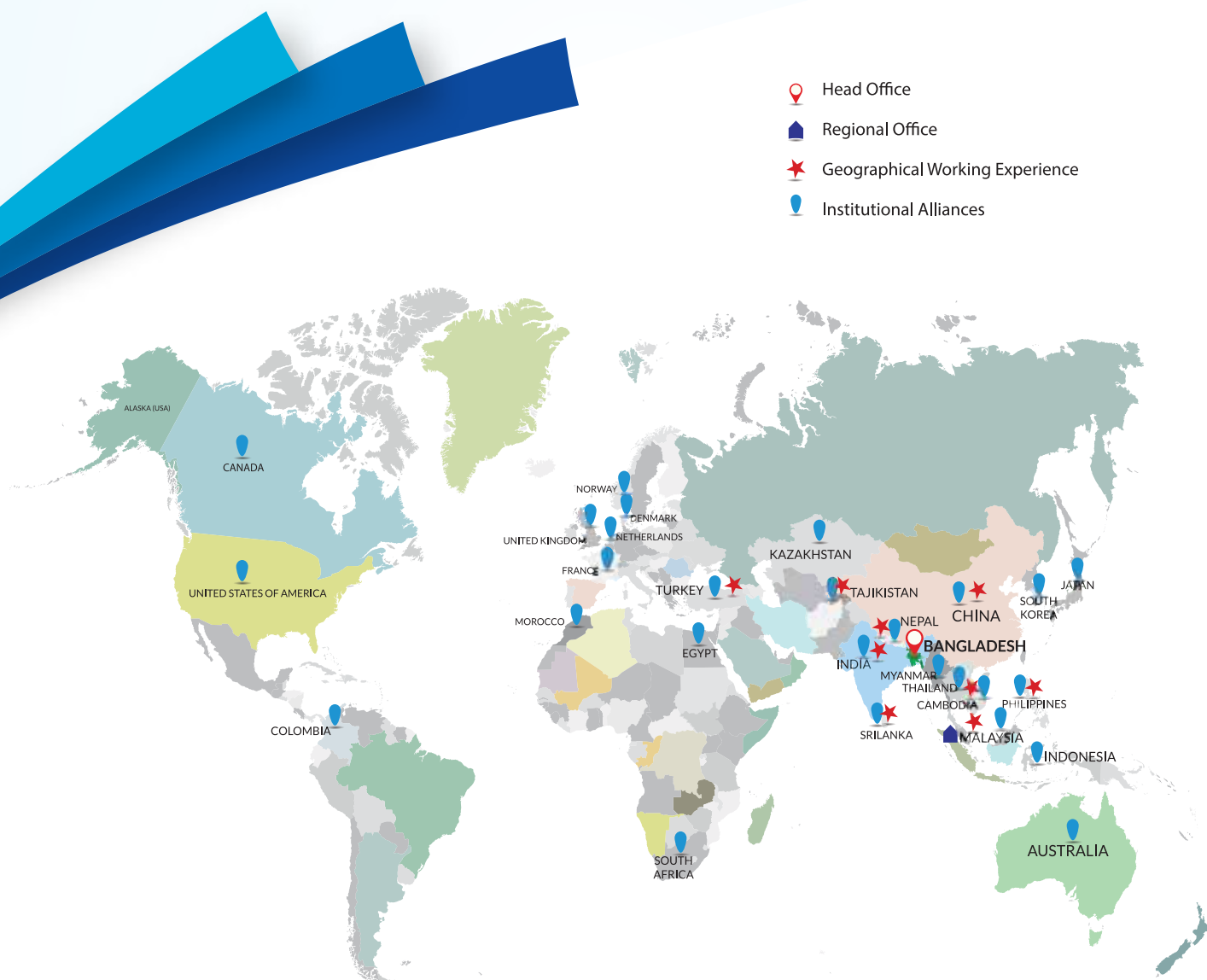
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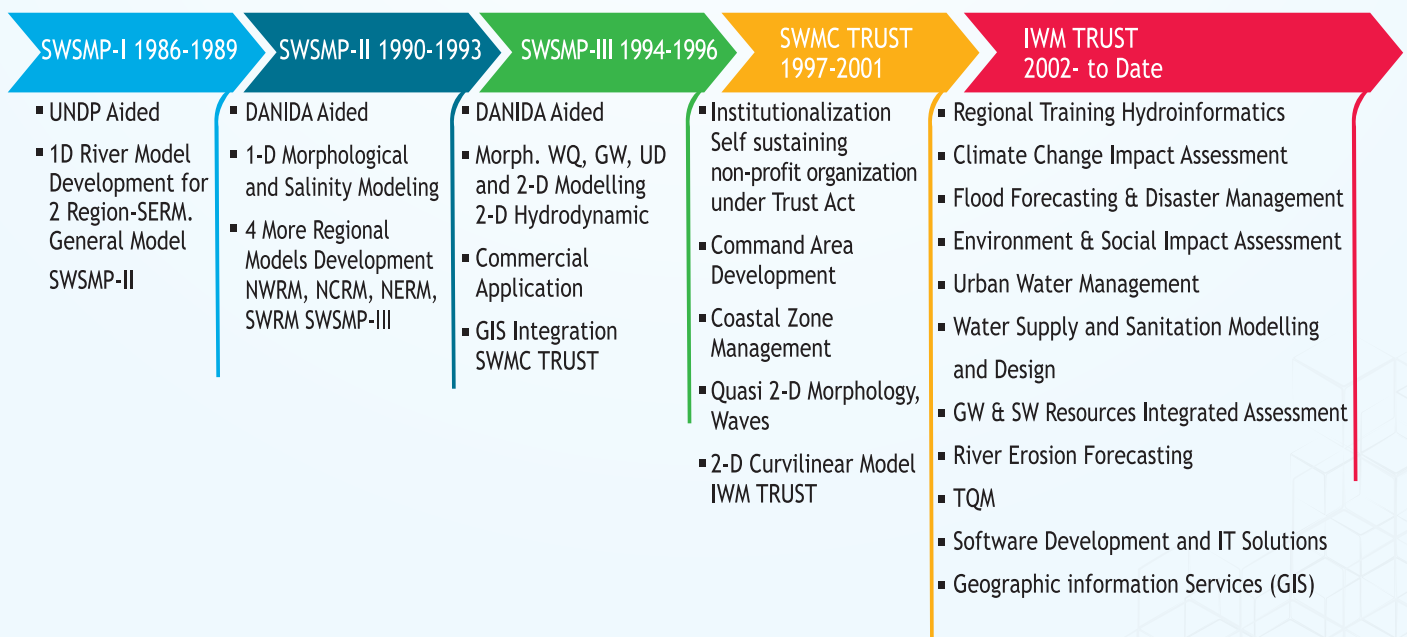
Areas of IWM Services

- Integrated Water Resource Management
- Climate Change Impact Assessment
- Wetland and Lakes Management
- Irrigation Management
- Groundwater Management
- Urban Water Management
- Water Supply and Sanitation
- Water Quality and Ecology
- Fluvial Hydraulics
- River Engineering
- Flood Management
- Integrated Coastal Zone Management
- Coastal Hydraulics and Morphology
- Port and Coastal Structure Management
- Estuary and Marine System Management
- Offshore Structure and Pipelines Design
- Water Quality Investigation
- Software Development and IT Solutions
- Geographic Information Services (GIS)
- Hydrogeological Investigations
- Topographic, Bathymetric & Hydrographic Survey
- Discharge Measurement
- Sediment Transport, Water Quality and Hydrological, Meteorological Field Measurements,
- Sediment and Water Quality Laboratory analysis,
- Data Management and Digital Mapping,
- Master Planning and Infrastructure Design
- Any other field or area which may be conveniently and beneficially done through the facilities of IWM.

ABOUT IWM

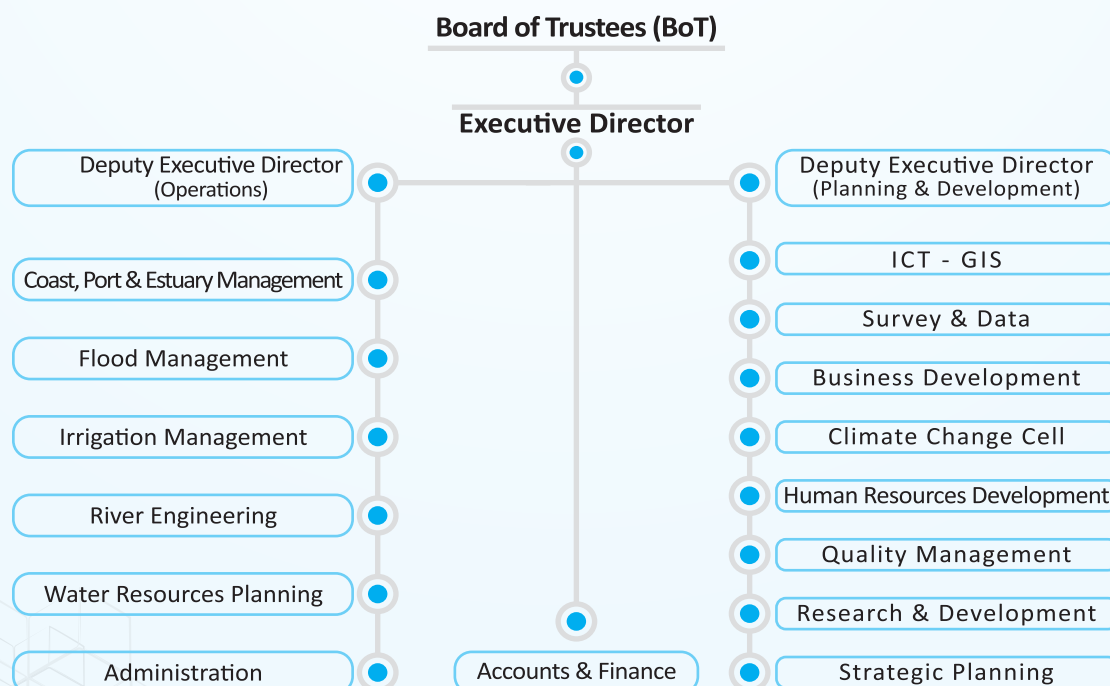
IWM was established as an independent organization under the Trust Act by the Government of the People's Republic of Bangladesh in December 1996 to function as a Centre of Excellence and learning in the field of Computational Hydraulics, Water Modelling and Allied Sciences. IWM owes its genesis to the three phases of UNDP-DANIDA aided Surface Water Simulation Modelling Programme (SWSMP) carried out during 1986-1996. IWM functions as a non-profit organization on cost recovery basis.

Historical Development of IWM



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Messages From Chairperson



Kabir Bin Anwar
Senior Secretary

Ministry of Water Resources
Government of the People's Republic of Bangladesh

It gives me immense pleasure to convey my best wishes to Institute of Water Modelling (IWM) on publication of its Annual Report 2019. I am delighted to observe that IWM has come a long way in establishing itself as a Reference Centre in Asia in the field of water management and modelling.

IWM is contributing in the development of Bangladesh by delivering world class solutions in water resources management, environmental and climate related studies, with its excellent state-of-the-art mathematical modelling skills and technology, computational hydraulics and allied sciences. It is addressing numerous water-related problems of the country and abroad. IWM has become a centre of repute and is venturing into new opportunities with foreign Institutes and Universities. Previously we needed to hire expensive foreign consultant for different studies. But centres like IWM has come forward and successfully reduced the dependency on foreign experts, thus is saving millions of foreign exchanges. This is a success story of Bangladesh.

I am really happy and proud to know that IWM has ventured beyond the territory of Bangladesh by establishing linkages with international consulting houses and research institutions opening new frontiers of collaboration in South and East Asia, North America and Europe. This is indeed a benchmark of success and development of Bangladesh. Thus, IWM has successfully witnessed another year of challenging growth in attaining great heights of accomplishments through dynamic business strategies, technological capabilities and better organizational strength.

I also want to congratulate IWM for organizing a successful "IWM Users' Conference 2019". This has definitely contributed in getting direct feedback from its cliental base on their expectations from IWM. It also provided IWM the opportunity to present its present and future plan of activities and take note of the response from its clients.

Finally, I would like to extend my heartfelt appreciation to the members of the Board of Trustees (BoT) of IWM for their whole-hearted contributions and continuous support over the years. They provided continued support for the development of the Institute as a successful entity in addressing the challenging needs of the country. I also wish to extend my best wishes to the staffs of IWM for their tireless efforts in strengthening the Institute by their commitment and dedications in enhancing the image of the country.

As the Chairperson of the Trust, I wish IWM a prosperous and bright future.

Kabir Bin Anwar
Senior Secretary

Ministry of Water Resources
Government of the People's Republic of Bangladesh
&
Chairperson, IWM Board of Trustees (BoT)



Messages From Executive Director

Abu Saleh Khan, PEng.
Executive Director
Institute of Water Modelling (IWM)

It is my honor to present the year-round activity of IWM in the **Annual Report 2019**. It summarizes an overall status of IWM to our valued clients, well-wishers, stakeholders and other fellow professionals on our activities categorically. The year 2019 has been yet another year of continued success for IWM which has been demonstrated by achieving a number of milestones. This year we have provided our services to around 50 different clients and the number of projects was around 90. I want to provide a summary of activities division wise:

Coast, Port and Estuary Management Division has been involved in several diversified projects in 2019. Some of them are: Surface Water Hydrology Study to select probable sites of Nuclear Power Plant in the Southern Part of Bangladesh for Bangladesh Atomic Energy Commission (**BAEC**), Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone (Sustainable Polders Adapted to Coastal Dynamics) for Bangladesh Water Development Board (**BWDB**), Feasibility Study for Modernization of 12 River Ports for Bangladesh Inland Water Transport Authority (**BIWTA**) & Bangladesh-Netherlands Joint Cooperation Programme etc.

Flood Management Division has been involved in few projects, Management Support to the Mathematical Modelling Centre (MMC) for Water Resources Research & Development under Water Resources Department, **Government of Bihar, India**, Flash Flood Early Warning System for North Eastern Part of Bangladesh, **BWDB**, Feasibility Study for Providing Irrigation Facilities through Construction of Hydraulic Elevator Dam (HED), **BWDB**.

ICT-GIS Division of IWM carried out several projects such as Developing Disaster and Climate Change Risk Profile of Industry Sector in Bangladesh National Resilience Programme (NRP) for **UNDP**, Consultancy Services for Preparation of GIS Maps (City & Ward) for Chattogram City Corporation (**CCC**) etc. In this year **ESRI Singapore** awarded IWM for Geo-Innovation on Application of GIS in Smart Water Resource Project Monitoring in Bangladesh.

Irrigation Management Division completed the projects on Aquifer Mapping and Groundwater Resource Assessment for Management of Eco-friendly Sustainable Agricultural Development in Bangladesh for Bangladesh Agriculture Development Corporation (**BADC**), Cropping System Intensification in the Salt-affected Coastal Zones of Bangladesh and West Bengal, India, for The Commonwealth Scientific and Industrial Research Organization (**CSIRO**), **Australia**, Study of Interaction between Haor and River Ecosystem including Development of Wetland Inventory under Department of Bangladesh Haor and Wetlands Development (**DBHWD**) etc.

River Engineering Division was involved in many projects during 2019, some notable projects are: Numerical Modelling Study of the Buriganga and Meghna Rivers in connection with the Feasibility Study for Pangaon and Ashuganj Cargo Terminals, **BIWTA**, Hydrological and Hydraulic Mathematical Modelling Study for Bridges along the Nasirnagar R&H-Bholakot Bazar-Chatalpara GC-Aruail Road for Local Government Engineering Department (**LGED**). Hydro-morphological Study, Detailed Design and Tendering Services for Construction of Broad Gauge Rail Line from Madhukhali to Magura via Kamarkhali, **Bangladesh Railway**.

Survey and Data Division always plays a significant role in IWM, some remarkable projects are: Bathymetric Survey of the Kutubdia Channel using Multibeam Echosounder in connection with Magnama CCPP Project, Met Ocean Data Collection for Feasibility Study for New Port on the Sandwip Channel at Sitakunda, Chattogram, Bangladesh. This division provides support in survey activities for all other divisions of IWM.

Water Resources Planning Division provided expert services to the Bangabandhu Sheikh Mujibur Rahman Maritime University (**BSMRMU**) in Master Planning, Design and Construction Supervision of its permanent campus in Chattogram. Water Supply and Sanitation Facilities to the Rohingya camps and host communities in Ukhia and Teknaf Upazila, Cox's bazar for Department of Public Health Engineering (**DPHE**), Water Demand & Water Availability Assessment for Bangabandhu Sheikh Mujib Shilpa Nagar for Bangladesh Economic Zone Authority (**BEZA**) etc.

IWM has been working with climate projections and scenarios for different projects in collaboration with government and international organizations. IWM successfully organized Users' Conference 2019. Distinguished guests from MoWR, Planning Commission, BWDB, BIWTA, Bangladesh Railway, BBA, BMDA, DPHE, DWASA, DBHWD, LGED, RHD, and other sectors participated in the event and enriched the program. In this year, IWM also arranged several workshops, seminars, training programs for staffs as well as its valued clients. All these programs help a lot to disseminate the knowledge of IWM to different stakeholders of national and international arena.

Abu Saleh Khan, PEng.

Executive Director

Institute of Water Modelling (IWM)

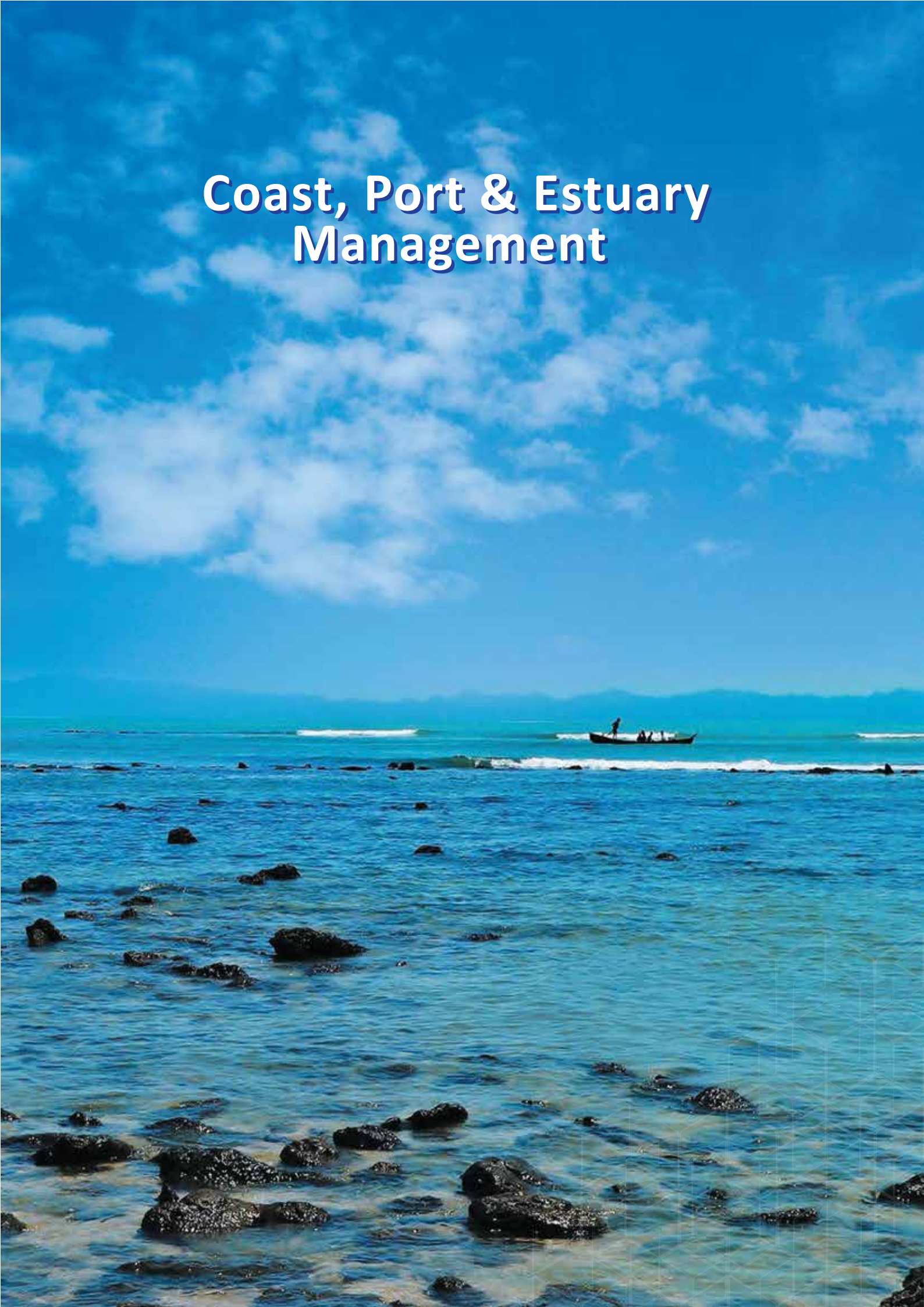
IWM Success 2019: At a glance

We are steadily growing to provide sustainable solutions to the water sector of not only in Bangladesh but also in the neighboring countries which extends up to the region of Asia, Australia, Europe and USA. Since its inception in 1986, IWM continues to thrive in an exceptional manner and grow day by day. In 2019, IWM had taken several challenging projects of great national interest and experienced a steady growth. We have provided our services in around 90 projects and to more than 50 clients. Maintaining our strong pursuit in modelling, we are exploring some relevant sectors to meet the pressing demand of our valued clients. Services of IWM were requested from different international agencies from various countries and thus, IWM is receiving recognition at a global scale.

IWM Major Projects in 2019-20:

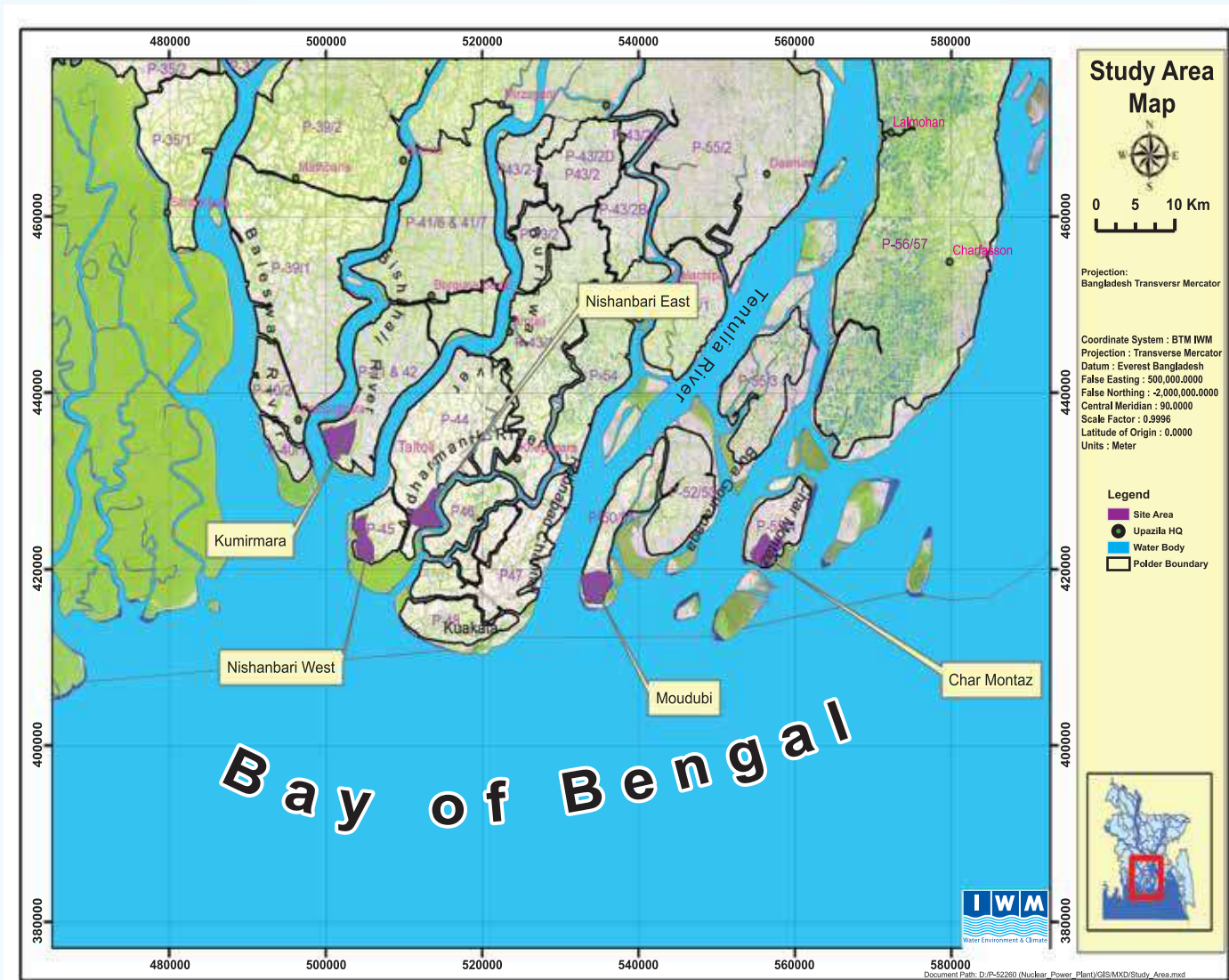
1. Supervision and Monitoring the Performance of Dredging, Morphological and Environmental Impacts, Detailed design and Assessment of Effectiveness of Dredging for Restoration of Dry Season Flow, Improvement of Navigability and Flood Management of Four River Routes including Hydrographic and Bathymetric Survey Services, BIWTA
2. Preparation of Master Plan, Architectural Design, Detailed Design, Drawings, Bill of Quantities (BoQ), Tender Documentation & Construction Supervision of Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) Permanent Campus at Chattogram
3. Consultancy Services for Preparation of GIS Maps (City & Ward) for Chattogram City Corporation (CCC)
4. Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone, BWDB
5. Feasibility Study for Restoration of Sangu and Matamuhuri River Basin, BWDB
6. Feasibility Study for Providing Irrigation facilities through Construction of Hydraulic Elevator DAM (HED) across Maeinee River at Dighinala, Khagrachari, Shrimai Khal at Patiya, Chattogram & Kasalang River at Sajek Valley, Rangamati, BWDB
7. Feasibility Study for the Development and Management of Karnafuli River Basin (with Halda river), BWDB
8. Consultancy Services on Surface Water Hydrology study for "Probable Site Selection for Construction of Nuclear Power Plant in the Southern Part of Bangladesh", BAEC
9. Management Support to the Mathematical Modelling Centre (MMC) for Water Resources Research & Development under Water Resources Department, Government of Bihar
10. Detailed Feasibility Study for Flood Control, Drainage, Irrigation and Dredging of Bakkhali River in Cox's bazar District (Phase-1), BWDB
11. Study on Aquifer and Mapping and Groundwater Resource Assessment for Management of eco-friendly Sustainable Agricultural Development in Bangladesh, BADC
12. Comprehensive Feasibility Study for Sustainable Restoration and Protection of Wetlands (Haor, baor, beel and connected rivers etc.) in different Hydrological Regions of Bangladesh, DBHWD
13. Development of Upazila Land Suitability Assessment and Crop Zoning System of Bangladesh, BARC
14. Detailed Topographic Survey, Hydrological and Morphological Study using Mathematical Model for Proposed Rail Line Construction from Bhanga to Payra Port, Bangladesh Railway.
15. Monitoring of Hydraulic & Morphological Conditions of the Jamuna River for the safety of the River Training Works of the Bangabandhu Bridge during the year 2018 to 2022 (Five Years), BBA
16. Hydrological and Hydraulic Mathematical Modelling Study for Bridges along the Nasirnagar R&H-Bholakot Bazar-Chatalpara GC-Aruail Road, LGED
17. Implementation Support Services in connection with different ongoing projects of BWDB
18. Consulting Services for Project Development Facility (PDF) Consultants (Package No. DWSNIP/PDF/03.5), DWASA
19. Water Network Analysis and Optimization of Chattogram City Water Supply System – Study, Design and Construction Supervision under Chattogram Water Supply Improvement & Sanitation Project (CWSISP), CWASA
20. Feasibility Study for Protection and Development of Cox's Bazar Sea Beach, BWDB
21. Feasibility Study for Protection and Development of Kuakata Sea Beach, BWDB
22. Study of Interaction between Haor and River Ecosystem including Development of Wetland Inventory and Sustainable Wetland Management Framework, DBHWD
23. Hydro-morphological Modelling and Survey of the Jamuna River for the Proposed Bangabandhu Rail Bridge, Bangladesh Railway

Coast, Port & Estuary Management



Selection of Probable Site for Construction of Nuclear Power Plant in the Southern Part of Bangladesh – Surface Water Hydrology Study

The Government of Bangladesh is planning to establish the second nuclear power plant (NPP) of the country in order to meet future demand of electricity. Bangladesh Atomic Energy Commission (BAEC) has taken initiatives to explore the possibility of a nuclear power plant in the southern region of Bangladesh. In this context, five potential sites have been selected and BAEC entrusted Institute of Water Modelling (IWM) to prioritize the sites on the basis of surface water hydrology and morphological conditions.

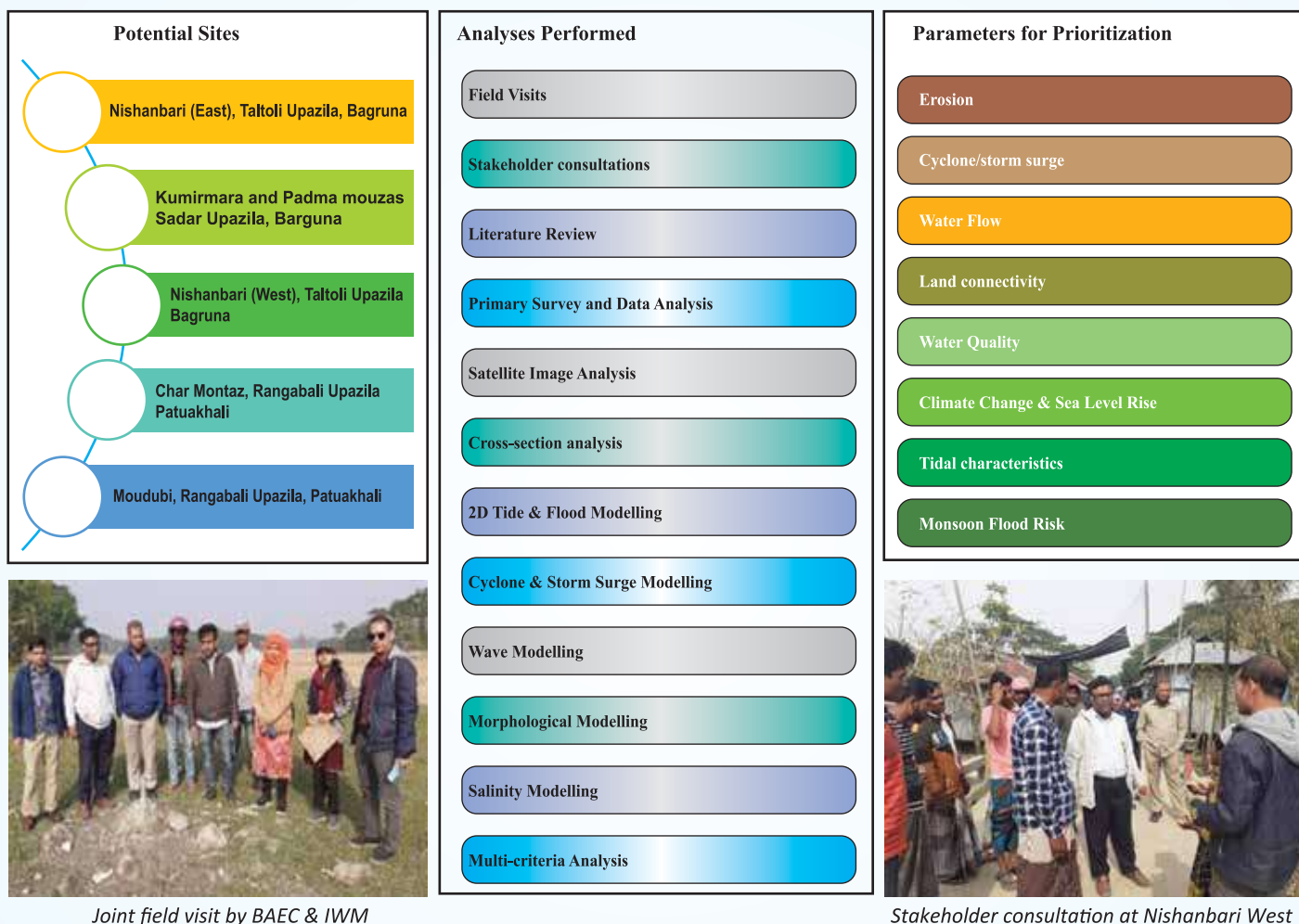


The coastal area is vulnerable to multiple natural uncertainties such as tidal fluctuations, monsoon flood, riverbank erosion and char movement, cyclonic storm surges and sea level rise etc. Considering the surface water hydrological and morphological aspects in the study area, a list of criteria has been selected and a quantitative weighting value has been applied to each criterion depending on its importance for the feasibility of NPP. The weights are determined by comparing the relative importance of the criteria in a pairwise manner.

Several field visits have been conducted in the study area and consultations with BAEC and local people have been performed. Review of literature, especially on IAEA guidelines for establishment of NPP and preliminary site selection report have been reviewed. Updated information of the study area is essential for characterizing surface water hydrology of the area. Bathymetry, water flow, water level, suspended sediment concentration, bed sample and dissolved oxygen have been collected under the study for model development and characterization of the areas. Secondary data, information and reports from different sources has also been collected and reviewed. Planform change and river

bank shifting characteristics are key indicators for understanding dynamics of river morphology and erosion-deposition conditions. In order to assess the present trend of river bankline shifting and erosion-deposition conditions in the study area, LandSat images of the years 2003, 2006, 2013, 2017 and 2019 have been analysed under the present study. Cross-sections surveyed under the study have been compared with the previous cross-section data, surveyed in 2017, for assessment of the morphological conditions and present erosion-accretion trend.

The updated and calibrated Bay of Bengal model was simulated for tide, wave, cyclone, storm surge, flood, morphology and salinity condition with and without climate change impact. Baseline hydrodynamic and morphological condition have been established by data and model result analysis. The results imply that the tidal effect dominates over the effect of upstream flood flow near the potential sites which are located near the coastline of Bangladesh. The climate change and sea level rise will have much significant impact on the water level or flood level of the rivers near the potential sites.



Nishanbari (East) is the most suitable among the five potential sites for a nuclear power plant from the perspectives of river hydraulics and morphology. The site is located on the bank of Andharmanik River and not exposed to the sea. The main advantages of the site are stability, less storm surge inundation risk, no influence of upstream flood, better land connectivity, better water quality, less prone to climate change impact. This site is suggested for detailed analysis in order to assess the feasibility of establishing the second NPP of the country which will comprise hydrological, hydrographic and topographic data collection, assessment of offshore and near-shore wave climate, morphological analysis, detailed design and costing. Moreover, detailed Environment Impact Assessment with a comprehensive Environmental Management Plan is also recommended before implementation of the project.

Flood Management



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

Like other parts of Bangladesh, there is a scarcity of water in the Chattogram hilly region during the dry season. This water shortage significantly hampers the socio-economic development and livelihood improvement of the people of the region. Bearing this in mind, the study on 'Feasibility Study for Providing Irrigation Facilities through Construction of Hydraulic Elevator Dam (HED) across Maeinee River at Dighinala, Khagrachari; Shrimai Khal at Patiya, Chattogram and Kasalang River at Sajek Valley, Rangamati' is undertaken by BWDB with the aim of utilizing the scarce water of three hilly rivers/streams of the study area. The rivers are (i) Shrimai Khal in Patiya Upazila under Chattogram district, (ii) Maeinee river in Dighinala Upazila under Khagrachari district and (iii) Sichok Chhara near Sajek valley under Baghaichhari Upazila in Rangamati District. The present assignment conducted a feasibility study for utilizing the river water by conserving the dry season flow through construction of Hydraulic Elevator Dam (HED) across the rivers. The feasibility study evaluated the proposed development interventions from social, technical, environmental and economic perspectives.



Shrimai Khal near Rajghat bridge, Patiya



Maeinee River near Maeinee Steel bridge, Dighinala

Keeping in mind the main objectives of the study, the task begun with identification of problems and likely remedial measures. It was found that there is a shortage of surface water in the sub-project area of Patiya and Dighinala that hinders agricultural development during the dry season. On the other hand, in Sajek area, there is a serious crisis of domestic and potable water round the year that remarkably hampers the tourism activities in Sajek valley. Field investigation reveals that dry season flow of Shrimai khal, Maeinee river and Sichok Chhara could be conserved by suitable means and used for the intended purposes. In the present study, Hydraulic Elevator Dam, a new water conservation technology, developed in China and progressively used in many other countries, is proposed for water conservation instead of traditional earthen dam or rubber dam. An HED has several advantages over the traditional methods of water conservation. Notable advantages are low cost, wide range of applicability, solid and reliable structure, high- flood carrying capacity, superior hydraulic condition, simple operation, low maintenance cost and long service life, beautiful dam shape and man-made waterfalls etc.

The study commenced with identification of a suitable site for construction of the HEDs and allied structures considering various aspects such as river morphology, reservoir capacity, accessibility to the site etc. Necessary data for the study was collected through engineering survey, questionnaire survey, FGD and KII. Mathematical modelling technology was applied to assess the impact of the HED on reservoir storage capacity, inundation due to the reservoir, monsoon flooding, malfunctioning of the HED gates etc. Besides, agro-socio-economic and environmental aspects of the proposed HEDs were also examined.



Sichok Chhara near Sajek Valley



Picture of an HED, China

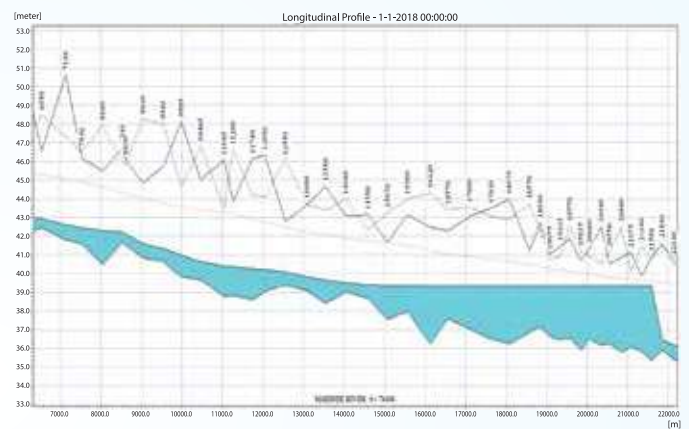


Borom Chhara HED, Anwara, Chattogram

After detailed investigation and analysis, three HEDs, each of 3m height and 84m (Shrimai Khal HED), 90m (Maeinee river HED) and 24m (Sichok Chhara HED) length is proposed for the three sub-project sites. Other required infrastructures e.g. control room cum site office, irrigation canal, inlet structures, bank protective works, sub-station, overhead water tank and water treatment plant have also been identified and recommended.



Inundation map at u/s, Patiya HED (3m height)



Water surface profile at u/s, Maeinee River HED

An economic evaluation of the project indicates that an estimated cost of the three sub-projects is Tk. 27140.25 lakh only with an IRR of 14.66%. It is estimated that with the successful implementation of the project, about 997ha and 2180ha of land could be brought under dry season irrigation in Patiya and Dighinala HED sub-project areas respectively, with an incremental fishery benefit of the project valuing at Tk. 446.84 lakh. In addition to agricultural and fishery benefits, about 2500 individuals population would get domestic water supply in Sajek valley that would help in bolstering tourism development in Sajek Valley.



Field Workshops

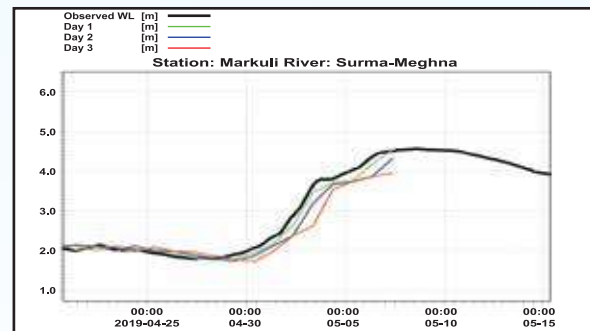
Flash Flood Early Warning System for North-Eastern Part of Bangladesh

In Bangladesh, usually flash flood occurs within 6 to 12 hours followed by incessant rainfall events in the Indian territory and happens especially, during pre-monsoon season in the northeast “Haor” region of Bangladesh. Flood Forecasting and Warning Center (FFWC) of Bangladesh Water Development Board (BWDB) have been officially responsible for flood forecasting in Bangladesh and successfully providing nation-wide water level forecast over the last decades. The success in monsoon flood forecasting has encouraged FFWC to replicate for flash flood forecasting system for North-Eastern Bangladesh through a study titled “Flash Flood Early Warning System (FFEWS)” supported by the Local Government Engineering Department (LGED) and funded by International Fund for Agriculture Development (IFAD) during 2016-2019 where IWM provided mathematical modelling support.

The overall objective of the study was to develop a dedicated early warning system of flash flood in the NE region of Bangladesh for saving Boro crops. The hydrological model (MIKE11 NAM) and One-dimensional River Model (MIKE 11 HD) for North-East Region, Bangladesh and Barak Basin coupled with flood forecast module (MIKE 11 FF) have been



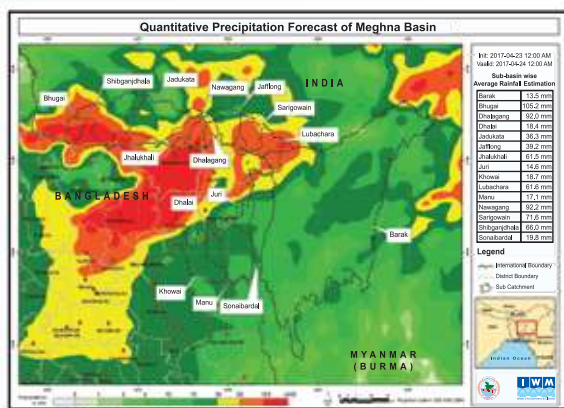
25 nos. Flash Flood Forecast Stations



Flash Flood Forecast during Cyclone “Fani”

applied in this study. The study has come up with an operational flash flood forecasting system having major achievements which are as follows:

- * Increased forecast stations up to 25 nos. and expanded forecast coverage area in Brahmanbaria, Sherpur, Netrokona, Kishoreganj along with Sylhet, Sunamganj, Habiganj and Moulvibazar in the North-Eastern Bangladesh;
- * Fixation and implementation of pre-monsoon danger level at 25 nos. forecast stations;
- * Flash flood forecast warning through: hydrograph, summary bulletin, observed and forecast bulletin embankment based forecast, quantitative precipitation forecast and dissemination through dedicated website and mobile apps;



Quantitative Precipitation Forecast (QPF)



Flash Flood Forecast Webpage



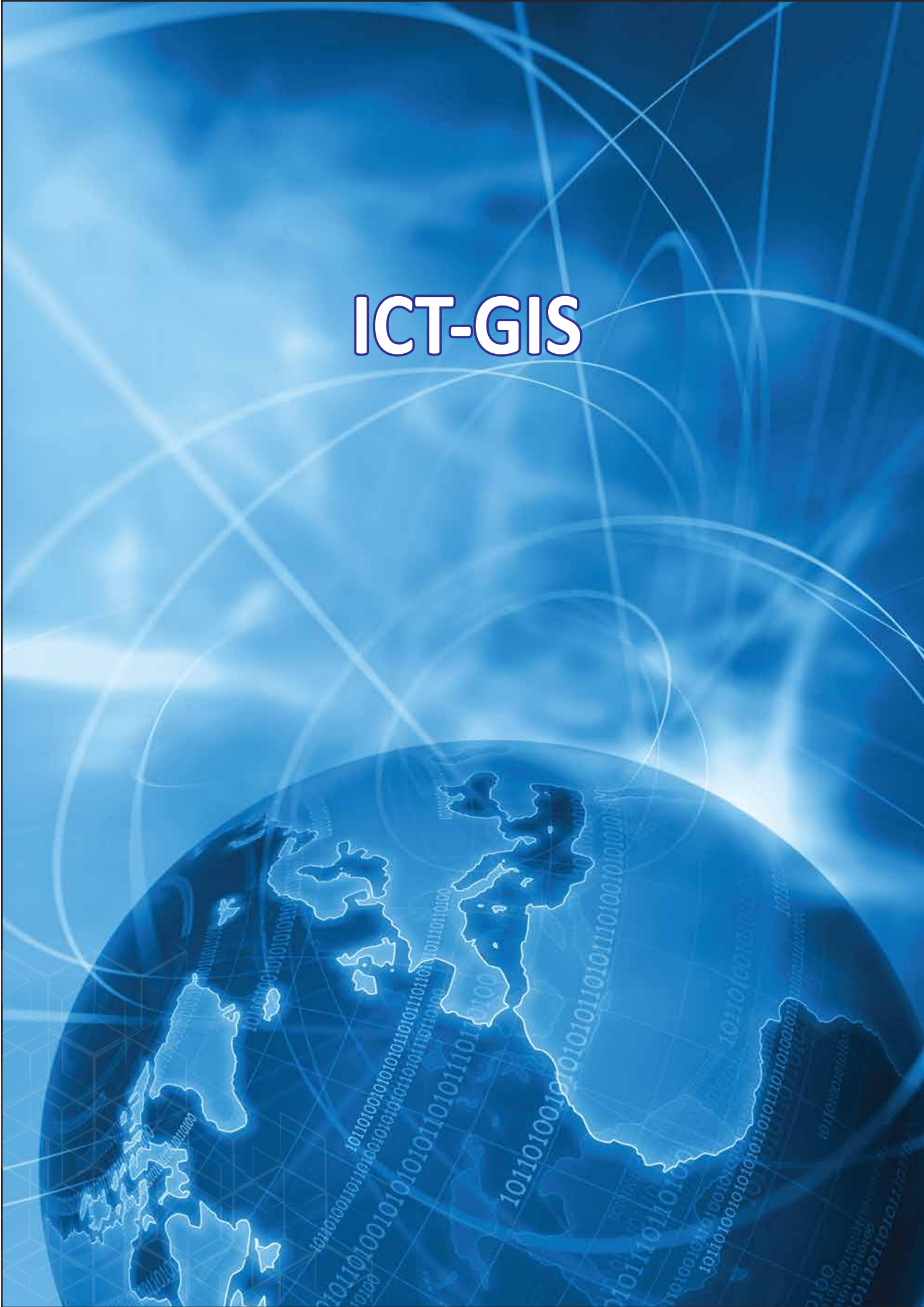
Stakeholder Consultation Workshop
in 2018 at DC Office, Sunamganj

- * Updated flash flood forecast model, generation and dissemination of forecast warning and verification of model performance through evaluation for 2017, 2018 and 2019 flash flood events;

- * Supplement of real-time data collection through automatic gauges, software based data processing system, stakeholder consultation workshops;

One can access this system using FFWC website (www.ffwc.gov.bd) and then clicking on flash flood forecast page.

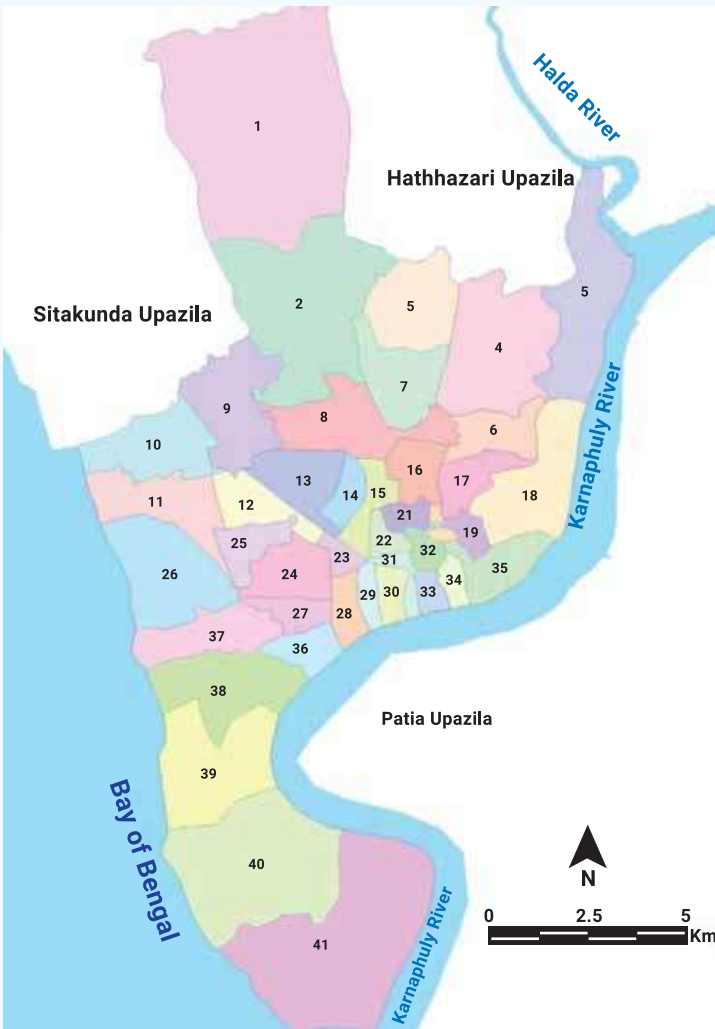
ICT-GIS



Preparation of GIS Maps (City & Ward) for Chattogram City Corporation (CCC)

A step forward for building Chattogram Smart-City

Chattogram is the second largest city in Bangladesh having principal port, commercial and economic lifeline and scenic beauty surrounded by green hilly landscape with several important streams flowing inside the city area. Around 90% of the import and export activities of Bangladesh are being handled by the Chattogram Port at present. In this respect, Chattogram has got a huge economic potential to be developed as the “Commercial Hub” of the South and Southeast Asian region through its port. The commercial activities in connection with the tourism industry has added significant in pattern to incoming development of the region.



Chattogram City Corporation (Ward Area)



Chattogram City Water Logging



Chattogram Fly Over



Chattogram Port Area

The city is suffering from many problems: water logging especially in the low-lying areas of the city, throughout the last one and a half decades, unplanned development activities in the hilly areas often cause land slides, traffic congestion, unplanned and irregular road construction, solid waste management (SWM) etc. Protection and preservation of open spaces are negatively intervened by the rapid and unplanned urbanization of the city area. The city area is also vulnerable to natural disasters such as tidal surge, cyclone, earthquake etc.

To make the city and human settlement safe, inclusive, resilient and sustainable, it requires better planning and management which has been strongly emphasized in the United Nation's Conference on Housing and Sustainable Urban Development in Quito summit held in Ecuador from October 17-20, 2016, commonly known as HABITAT III. Member States of the UN, including Bangladesh adopted a “New Urban Agenda” during this conference for re-establishing stronger commitments towards healthier, more functional and environmentally sound urban spaces.

In this connection, Chattogram City Corporation (CCC) authority intends to establish a Smart City which would be the first its kind in Bangladesh.

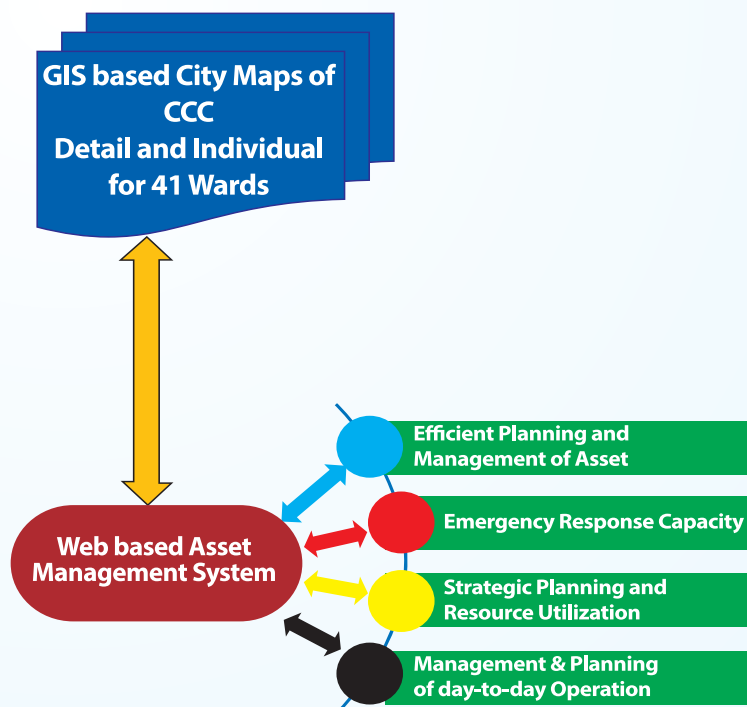


Contract signing between Chattogram City Corporation and IWM-Synesis IT JV

Considering the above themes, the authority of Chattogram City Corporation (CCC) has under taken a project to prepare a GIS based interactive City Map of the Chattogram City consisting 41 Wards of the city. To conduct the project, an agreement has been signed between Chattogram City Corporation Authority and the IWM-Synesis IT joint venture consortium on 15th January, 2020 at Chattogram City Corporation (CCC) office in presence of Mr. Abu Jahed Mohammed Nasir Uddin, Honorable Mayor and other high officials of CCC. A. K. M Rezaul Karim, Chief City Planner as Project Director signed the contract on behalf of CCC. In favor of the Joint Venture of IWM and Synesis-IT, the Executive Director of IWM, Mr. Abu Saleh Khan signed the contract.

The project will develop a web GIS based Asset Management System for Chattogram City Corporation (CCC) as a platform for efficient planning and management of the City Corporation Assets and to support the Emergency Response Capacity of the same as well. The digital asset Geo-database will eventually facilitate the City Corporation in strategic planning and resource utilization, their management and planning of day to day operation. The specific objectives are:

- To develop an Arc-GIS Enterprise Geo-database consisting of CCC-managed structural assets such as roads, bridges, drainages, electric power supply, building structure, land parcels, shopping complexes, bazar, open spaces, education centers, health facilities and many more;
- To establish a web application to allow sharing and visualization of city features and assets in GIS environment with the user's access privileges;
- To build capacity of the relevant city corporation officials for adopting the geospatial technology in their regular activities;



After completion, the project will produce (a) a Digital Geo-database, (b) city base maps in different scales and units, (c) 3D visualization of a pilot area, (d) web GIS application containing the details of spatial and non-spatial features, (e) mobile app for field level data collection, (f) inventories of critical facilities, (g) training and technology transfer, (h) operation manuals and finally, (i) project reports.

The project outputs will be the baselines to develop Chattogram Smart-City.

Developing Disaster and Climate Change Risk Profile of Industry Sector in Bangladesh

Bangladesh is one of the world's most climate vulnerable country including geo-physical hazards. The impacts of these natural disasters are well understood in Bangladesh in the context of agricultural production and rural livelihoods. But climate change and natural disasters are also disrupting industry sector in Bangladesh and will continue to do in the future as well which is not yet understood using systematic approach. Hence, the investors are not clearly aware of the risk of their investments regarding natural hazards.

For the first time in Bangladesh, UNDP took initiative to develop Disaster and Climate Change Risk Profile of Industry Sector in Bangladesh which would be implemented by the Ministry of Planning, Bangladesh under National Resilience Programme (NRP). Institute of Water Modelling (IWM) has been assigned to conduct the study. The inception workshop was held in Chattogram.

EPZ areas are better planned and managed for industrial facilities, but there are many other industrial areas which are built with no holistic plans. These two types of industries are exposed differently to same natural disaster. Hence, two areas are taken for the study in Chattogram: (1) Karnafuli EPZ, (2) Kalurghat industrial area. The study will consider several hazards which are flood, cyclone, tidal surge, earthquake, salinity, landslides, water logging and fire incidents. In addition, the study would also continue health hazards from the infectious outbreak of epidemic diseases such as outbreak of Coronavirus.



Mr. Md. Nurul Amin, Secretary, Planning Division (5th person from left) and Dr. Nurun Nahar (Deputy Chief & Project Director, National Resilience Project -NRP, 7th person from left) Mr. Arif Abullah Khan, Programme Specialist, UNDP (fourth from left) were present during the inception workshop at World Trade Center, Agrabad, Chattogram

The intended risk profile will provide a comprehensive view of hazard, risk and uncertainties for selected disasters- flood, tidal surge, salinity, water logging, cyclone, earthquake, landslides, fire incident and infectious disease outbreak in a changing climate, with projections for the period of 2030 and 2050. With this risk profile, the investors/ businessmen will know the amount of risk involved way before investing into these industrial zones. In short, activities under this study includes but not limited to :

- Review of existing studies plans and maps to identify disasters and climate change related risks in industry sector located in the study areas (KEPZ and Kalurghat industrial area);
- Develop a novel methodology for assessing disasters and climate risks across business and industry sectors;
- Assess the risks and vulnerability of industry sector and estimate potential loss and damage due to climate change and disasters;
- Generate risk profile of industry sector to be used for developing strategies to address identified disaster and climate related risks including investment opportunities;

The data sources used for this study are BWDB, BMD, WARPO, IWM, DDM, SoB, CDA, CCC, Health Ministry and other relevant studies. The primary survey includes questionnaire survey and land survey. The industry specific information is being collected by the UNDP approved questionnaire embedded into Open Data Kit (ODK) mobile application. The other type of primary data collection is digital land survey to collect land elevation.

The first task is to develop a baseline map of industries showing types/categories located in the study area and land use along with relevant features and information. High resolution Satellite Image World View-3, having resolution of 31cm is used to digitize features of Karnaphuli EPZ and Kalurghat Industrial Area.

High-resolution Digital Elevation Model (DEM) maps will be generated using data collected by Terrestrial Laser Scanner (TLS). The hazards will be estimated for different events and magnitudes for the Chattogram area. The exposure (industries and other ancillary facilities) map of the study areas will be prepared in GIS. Risk of different hazards will be calculated through synthesize of vulnerability and hazards. Finally, the Risk Profile will be presented in the form of matrices, maps and charts for relevant time frame through detailed guidance on how the climate change and disasters data projections and information will be interpreted and applied to informed investment decision - making.

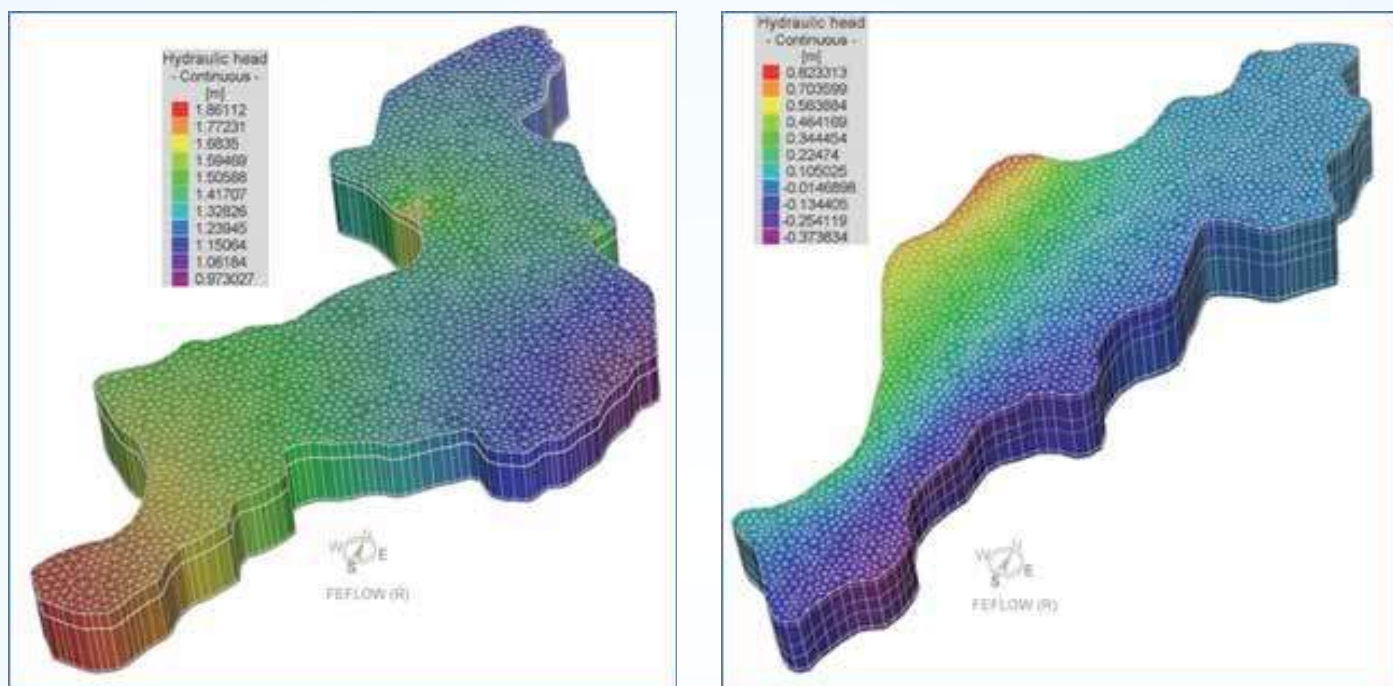
The investors and planners from both government and private sectors would be able to use the Risk Profiles for their investments to make safer and feasible decisions.

Irrigation Management



Cropping System Intensification in the Salt-affected Coastal Zones of Bangladesh and West Bengal, India

Australian Centre for International Agricultural Research (ACIAR) launched the project for the coastal region of the Ganges Delta which aims to lift agricultural productivity and hence, rural welfare by increasing cropping intensification. Commonwealth Scientific and Industrial Research Organization (CSIRO) led the project with one university from Australia (Murdoch University), four government organizations and one university from Bangladesh (Bangladesh Agricultural Research Institute, Bangladesh Rice Research Institute, Institute of Water Modelling (IWM) and Khulna University) and one government research institution (Central Soil Salinity Research Institute), one university (Bidhan Chandra Krishi Viswavidyalaya) and one NGO (Tagore Society for Rural Development) from West Bengal, India. Under this project, IWM worked for surface water, groundwater and salinity interaction modelling.



Map showing the two polders (Polder 31 & Polder 43/1) with finite element mesh

In the project, a mathematical model has been developed for two selective polders, showing the dynamism of groundwater. The models will allow for simulation of both groundwater flow and the migration of salt water in the subsurface. The models will help in understanding and assessment of the salinity intrusion process for present conditions and to evaluate the availability of low saline groundwater for irrigation. It will also be possible to predict the changes of salinity in groundwater due to pre-monsoon and post-monsoon groundwater abstraction and the effect on groundwater quality as well as quantity for different future scenarios.

The study is selected for two polders in the coastal region of Bangladesh to assessing the salt and water dynamics of the polders. Polder 31 spreads over Dacope and Batiaghata upazila of Khulna district in Bangladesh. The area is of about 103 km². The other polder 43/1 lies within Amtali upazilla of Barguna district and Kalapara upazilla of Patuakhali district in Bangladesh. This area is near about 205 km². During the study period, different types of data have been collected which includes hydro-meteorological, hydrogeological, water quality etc. The data has been collected from both the primary as well as secondary sources such as, BWDB, BMD, JICA, BADC, DPHE etc. the data has been collected, encoded, checked for consistency and then finally processed using the standard procedure for modelling purposes. Surface water, groundwater and salinity interaction models for the polders have been developed and used

to simulate scenarios such as, saline groundwater pumping for drainage, and impact of climate change.

The study has been analyzed using FEFLOW density dependent groundwater modelling tool to understand the salinity dynamics in the coastal aquifer. The groundwater model of two types 3D and 2D were developed and calibrated to achieve the study objectives. Due to limited availability of groundwater level and salinity data, there were a lot of uncertainties in the model development, that may be explored in future studies. The following conclusions are drawn from this study:

- Groundwater salinity for shallow aquifer varies from 3500 mg/l to 800 mg/l.
- South-western part of Polder 31, is more saline - prone than the north-eastern part. Central and western part of Polder 43/1, part is less saline - prone than other parts of the polder.
- Shallow aquifer is more saline than deep aquifer with exception of southern part for polder 31, where shallow aquifer is relatively less saline. In major cases, salinity of shallow aquifer exceeded allowable limit of 1000 mg/l.
- Shallow aquifer is more saline than deep aquifer in general in Polder 43/1.
- It is seen from river salinity data that in March and April, the variation of salinity concentration is maximum for all river systems within the project area.
- Scenario analysis considering groundwater abstraction from near the river indicated that high rates of pumping would trigger propagation of salinity from river to aquifer.
- The climate change scenario indicated that the groundwater level may increase slightly due to climate change. The salinity profile propagates into the deeper region adjacent to river due to the increased salinity of the river, caused by sea level rise that accompanies climate change.
- Salinity of shallow water increases rapidly due to brackish water aquaculture.
- It can also be concluded that major sources of the salinity concentration are not only the rivers but also could be from other sources such as, local depression during different geological formation year, soil salinity due to leaching problem and flood inundation which also reflects the findings of the 2010 study of the World Bank.

Actions to be Carried out in Future

- The study has been carried out mostly using data from secondary sources which needs to be verified with primary data. For future improvement, following recommendations are made:
- For better lithological information, more numbers of exploratory boring shall be done for both shallow and deep aquifer.
- For time series data of surface water quality, more number of stations shall be installed.
- For time series data of both groundwater level and quality, more number of stations shall be installed.
- For the understanding of the source of saline water Isotope analysis shall be done.
- Simulation of the impacts of climate change for deep aquifer shall be done in future to analyze the salinity propagation.
- The salinity data of brackish water aquaculture shall be collected for better understanding.
- Simulation of model incorporating the tidal surge (inundation period, salinity concentration) during different cyclones like AILA, SIDR, AMPHAN shall be done in future.

River Engineering



Hydrological and Hydraulic Mathematical Modelling Study for Bridges along the Nasirnagar R&H-Bholakot Bazar-Chatalpara GC-Aruail Road

Government of Bangladesh (GoB) has taken an initiative for constructing bridges in Brahmanbaria district that will be implemented by the Local Government Engineering Department (LGED) under Local Government Division (LGD), the Ministry of Local Government, Rural Development and Co-operatives (MLGRD&C). The bridges will be constructed on the road: Nasirnagar R&H-Bholakot Bazar-Chatalpara GC-Aruail. These bridges will help to enhance rural transport network and improve the livelihood of the people ensuring uninterrupted access to growth centers, community health clinics, educational and other service providing institutions. There would be nine such bridges to be constructed on the roads mentioned.

Prior to construction works for these bridges, LGED planned to carry out a Hydrological and Hydraulic Mathematical Modelling Study to evaluate the hydraulic design parameters of these bridges and to assess the impact of the bridges in the vicinity. In this regard, IWM has been entrusted by the LGED to conduct this study. Therefore, a Contract Agreement was signed between LGED and IWM, on 11th December, 2019 for this study. The study is needed to facilitate the required bridge openings with hydraulic design variables and to formulate necessary protection work on the river banks and along the approach roads at all the bridge vicinities. The tentative locations of these bridges are shown in Figure 1.



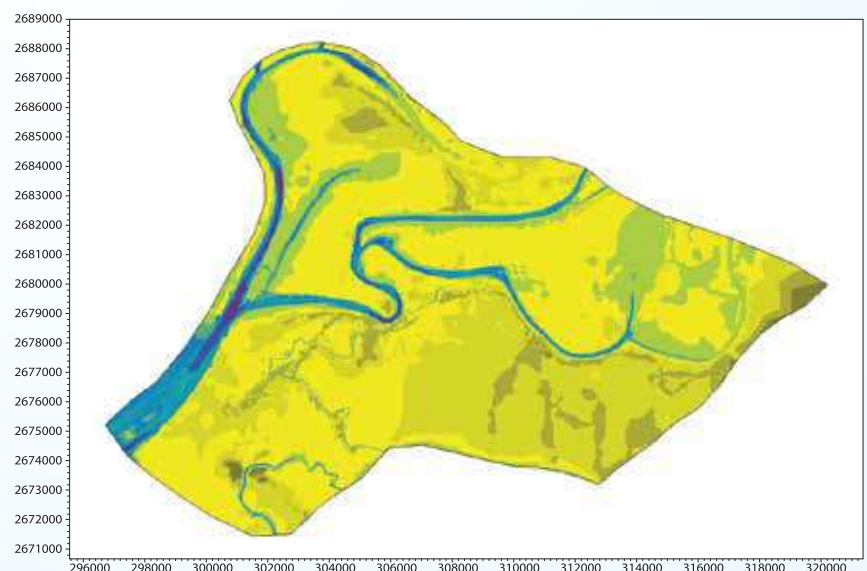
Figure 1: Locations of the Proposed Bridges

The study area is situated in the North East region of Bangladesh. The area is in between Bhairab-Kishoreganj and Bhairab-Habiganj-Sylhet roads and near the confluence of Kalni-Kushiyara and Surma-Baulai river systems at Bhairab.

The catchment areas around the river-floodplain system concerned, near the proposed bridge locations, lie in the floodplain of the Baulai-Ghorautra and Kalni - Dhaleswari - Titas - Upper Meghna river system, thus experience overland flow, interflow and base flow of varying degrees. Moreover, during the monsoon period, there exists heavy wave action in the haor areas. Therefore, special consideration was required for hydraulic design of bridge abutments as well as approach roads. Moreover, river - floodplain dynamics and channel changes can cause uncertainties in planning future water resources developments.

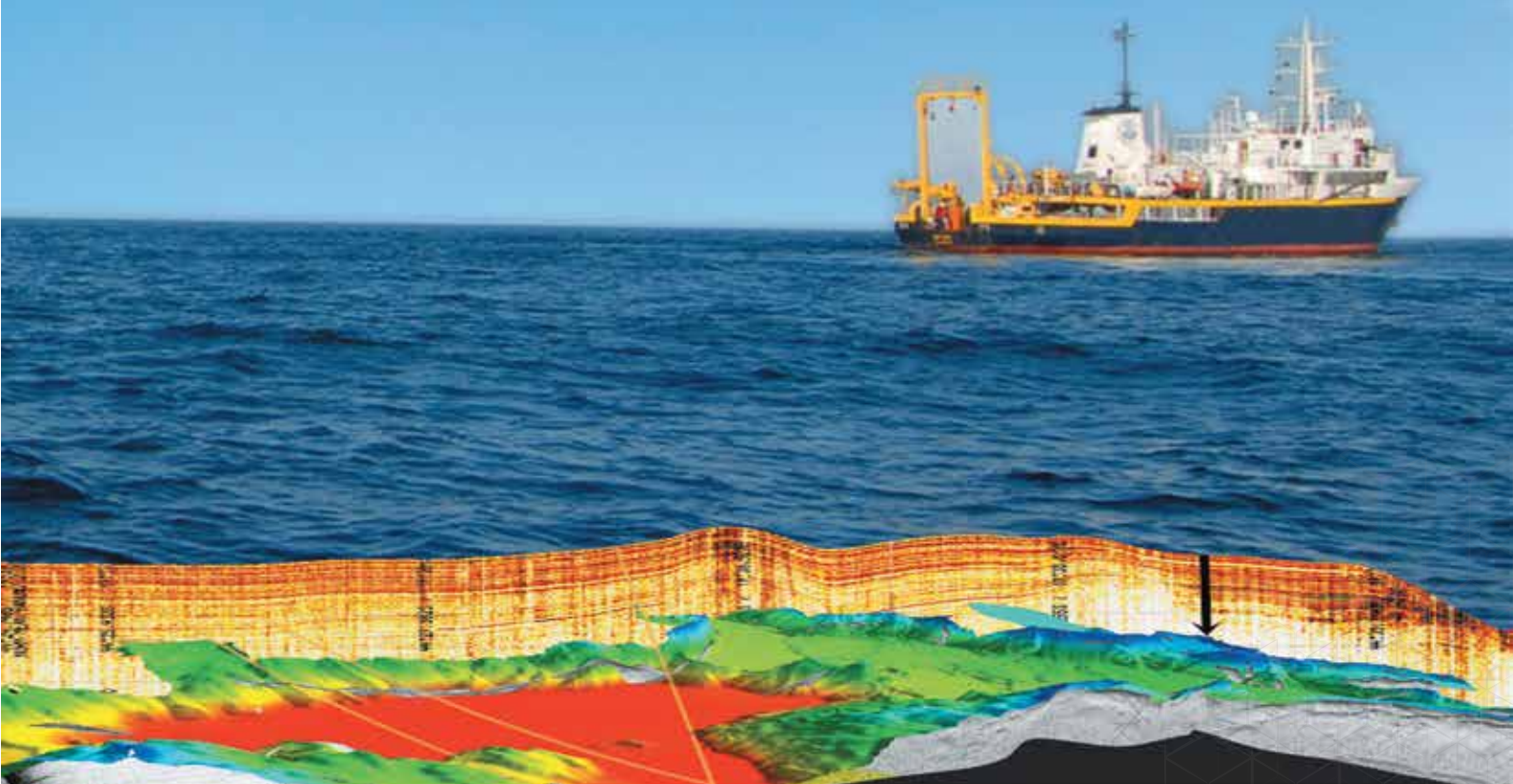
The objective of this study was to investigate the detailed hydrological and hydraulic phenomena of the study area, using mathematical modelling technology and to evaluate suitable locations and type of the bridges on the 'Nasirnagar R&H-Bholakot Bazar-Chatalpara GC-Aruail' road, their economic openings, and hydraulic design variables of the bridges.

The developed 2D model suggested that the hydraulic and morphological condition do not get affected significantly due to the construction of these nine bridges. Furthermore, the existing formation level needs to be increased by different magnitudes at different places.



Generated Bathymetry of the Study Area

Survey & Data Management



IWM Conducted Topographic Survey in the Hilly Area using State of the Art Terrestrials LiDAR Technology

Terrestrial LiDAR is used for survey and mapping at difficult places. IWM owns Terrestrial Laser Scanner model Polaris LR, manufactured by Teledyne Optech is being used in Topographic Mapping of Urban area. The equipment uses LiDAR (Light Detection and Ranging), a Remote Sensing method that, according to NOAA, uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth.

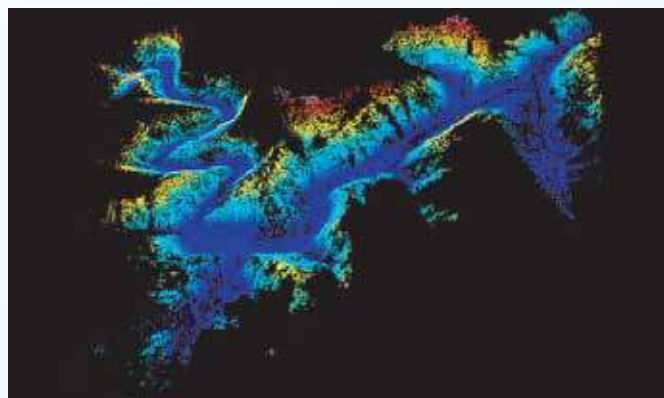


The terrain of the survey area

The equipment is integrated with high-resolution camera, inclinometer from tilt compensation, compass and GPS receiver that produces survey grade sub-centimeter accurate point cloud data. It captures wide area in a single scan by 360°×120° field of view. It is capable of remotely acquiring data more than 1km range. IWM is conducting a comprehensive study titled “Monitoring and Supervision of Water Supply and Sanitation Schemes Including review, update of existing drawing and design, EIA and SIA under Emergency Multi-Sector Rohingya Crisis Response Project (EMCRP)”. As a part of the study, topographic survey was required to assess the water storage capacity of proposed reservoir area. Survey was also required for selection of the DAM sites and design. IWM mobilized the Polaris for topographic survey of the hilly terrain of the proposed reservoir and dam area of Teknaf Upazila in Cox’s Bazar District. AtlaScan Software was used to edit, process and export raw data for using in GIS Software. Scanning being performed by IWM expert during survey, processed point cloud data and the terrain are shown in pictures. The area is not accessible and hence it is quite difficult to do the survey using conventional total station and RTK-GPS. The instrument helped in collecting data conveniently within minimum time.



IWM Expert setting the Polaris at Teknaf, Cox’s Bazar



Processed point cloud data of the reservoir area

Water Resources Planning



IWM providing expert services to the Bangabandhu Sheikh Mujibur Rahman Maritime University in master planning, design and construction supervision of its permanent campus in Chattogram



Bird's Eye View of Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU)

To keep pace with the development in the field of maritime higher studies and research, Bangabandhu Sheikh Mujibur Rahman Maritime University, Bangladesh, was established by the BSMRMU, Act No. 47 of 2013.

The university is currently at its formative stage. It is being gradually planned to develop this university as the highest seat of learning in Bangladesh for the students who would aspire to explore the maritime world for the greater interest of the country.

To establish a modern university campus, the Government of Bangladesh has allocated 106.66 acres of land at Char Rangamatia and Bakolia Mouja under Bandar Thana in the district of Chattogram. BSMRMU has appointed IWM to prepare the master plan, architectural design, detail design, drawings, Bill of Quantities (BoQ), tender documents and construction supervision of all works under Phase I of the university.

The Bangabandhu Sheikh Mujibur Rahman Maritime The University (BSMRMU) Permanent Campus is being implemented in three phases considering the overall environmental sustainability issues. As per the Master Plan, many iconic structures will be established with state-of-the-art designs and facilities.

Water supply to the Rohingya camps and host communities in Ukhiya and Teknaf Upazila, Cox's bazar

The predicaments of the forcibly displaced people of the Rohingya community of the Myanmar are well recognized by Bangladesh and the international communities. The Honourable Prime Minister Sheikh Hasina reiterated time and again about Bangladesh's commitment to support these distressed people by providing required food, shelter, health care, water supply, sanitation etc. Many local and international development partners and aid agencies have also come forward to extend their support.

One of the major challenges is to provide sustainable water supply and sanitation facilities to not only the camp dwellers, but also the local host communities. Technical as well as social and environmental issues are important to be addressed. As the groundwater resource is limited in many parts of the Ukhiya and Teknaf areas, there is an urgent need to find ways to harness the surface water



Rohingya women collecting supply water from safe source near Kutupalong Camp in Ukhiya

resources so that pressure on the groundwater resources can be lessened.

Department of Public Health Engineering (DPHE) is executing the Emergency Multi-Sector Rohingya Crisis Response Project (EMRCP), financed by the World Bank and the Government of Bangladesh. DPHE has engaged IWM to carry out the following:

1. Review and updating of the design of water and sanitation services;
2. Supervise construction;
3. Provide project management support and quality control in assisting and supervising the implementation of environmental and social management Plan (ESMP) of water supply and sanitation related activities to be undertaken by the project;

Water Demand & Water Availability Assessment for Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN)

Bangladesh Economic Zones Authority (BEZA) aims to establish about 100 economic zones in the country for rapid economic development with diversification of industry, employment, production and export. Bangabandhu Sheikh Mujib Shilpa Nagar (BSMSN) will be the first and largest economic zone comprising an area of around 30,000 acres. BEZA made a comprehensive development plan the implementation program to transform it into a world competitive Industrial City.

IWM has been engaged by BEZA to prepare a Water Supply Master Plan to fulfill water demand for BSMSN in the context of water availability. Works involved in the master plan include but not limited to resources assessment of surface water and groundwater, water demand estimation of the economic zone, water zoning and phasing plans and preparation of a water management plan. IWM will also carry out detail design of all structures and transmission and distribution mains prepare bill of quantities (BoQ) and tender documents for the priority works.



Field Visit at Bangabandhu Sheikh Mujib Shilpa Nagar area

The Launching of Climate Change Cell in 2019

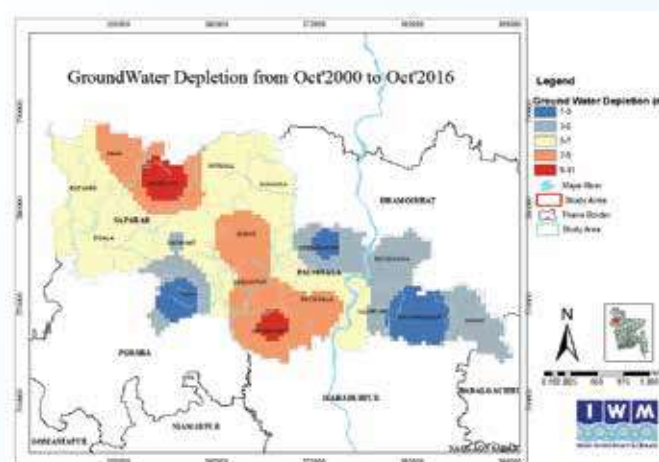


Workshop attended by Climate Cell in ICIMOD Kathmandu, Nepal

Climate Change Cell started its journey in February, 2019 by Mr. Tarikul Islam, Senior Specialist, IWM. The cell has already achieved significant progress in partnering with different climate services organizations and research institutes. The cell joined the Gobeshona Steering Committee of ICCAAD (International Centre for Climate Change and Development) to be part of climate research and policy level engagement. It has also attended seminars in ICIMOD (International Center for Integrated Mountain Development), Nepal and IITM (Indian Institute of Tropical Meteorology), Pune, regarding state-of-the-art technology and best practices of climate science for capacity building of the cell. Apart from the role as a climate service provider to IWM, it has explored joint ventures and partnership in research with UK Met Office, DoE (Department of Environment) and IITB (IIT Bombay).

With IITB the ongoing project is called GRACERS (Groundwater Rejuvenation as Climate change resilience for marginalized and Gender sensitive Ganges). The main objective of this project is to detect the hotspots for decentralized groundwater recharge system for marginalized people in the catchment of Ganges River.

The cell is involved presently in national level projects such as Joint Co-operation Program Bangladesh-The Netherlands, Bangladesh Delta Plan 2100 and its strategic implementation as well as long - term sustainable polder management research in coastal dynamics. In 2019, Climate Change Cell took part in the IWM Users' Conference. The Cell also presented a conference paper in 6th Annual Gobeshona Conference held January, 2020.



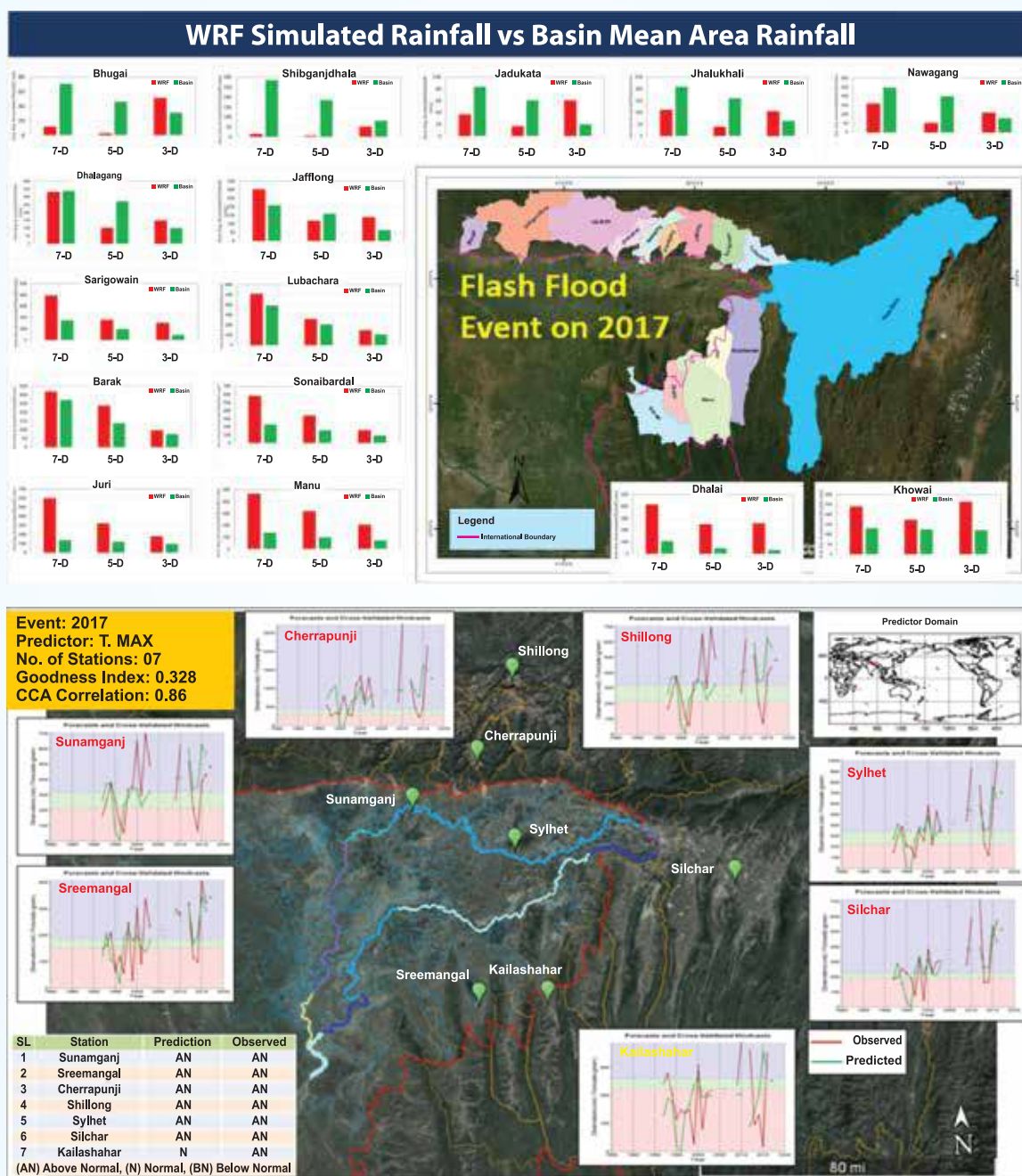
Finding groundwater depletion condition (from year 2000 to 2016) in Sapahar – Patnola in wet season; this is done under the project GRACERS done in collaboration with IIT Bombay.



Training attended by Climate Change Cell in IWFM, BUET

Research on two-stage hydro-meteorological pre-monsoon flash flood forecasting 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 disasters 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) with 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 prediction 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-day lead time over the haor region to reduce the vulnerability of the people in terms of livelihood, poverty and food security.

Training & Capacity Development

Training and Technology Transfer Programmes in 2019

Training and Technology Transfer is a regular activity of IWM for updating its resources with the new knowledge and technology to cope with the new challenges in water sector. Following is a brief on the HRD programmes conducted in 2019



Mr. Md. Zahid Hasan Siddiquee, Associate GIS & RS Specialist, ICT-GIS Division of IWM attended the 10th Annual International Conference on "Applied Geoinformatics for Society and Environment: Digital Landscapes, Chances for Development" from 11 to 14 September, 2019. The Program was held at University of Applied Science, Stuttgart, Germany, and HFT ICA-OSGeo-lab.

JAN

- Workshop on Budget preparation at Ministry of Finance
- Training on Topographical, Morphological & Hydrometric Data Collection

FEB

- Workshop on "Strengthening Capacity for Monitoring Environment Emissions under the Paris Agreement"
- Training Course on 'Oceanography: Principles and Applications'
- Training on DMA Management, Production Well Construction Procedure And Development Techniques, And Installation Procedure of HDPE Pipes for DWASA
- Bangladesh Blue Economy Dialogue on Fisheries and Mariculture

MAR

- Training Program on Survey & Documentation for the Water Supply Network Improvement of the Selected District Metered Areas under MODS Zone 02 of DWASA
- International Training on Faecal Sludge Management (FSM)
- Workshop on "Safe and Sustainable Cities: Human Securities, Migration and Well-being"
- Workshop on Geo Hazard Risk Management in Transport Sector in Bangladesh

APR

- Training on Storm Surge Wave Modelling
 - Workshop on Land Reconstitution/ Land Readjustment
 - Training on Morphological and Hydrometric Data Collection
- MIKE 11+NAM

MAY

- Training Course on Business English Proposal writing, report writing and presentation skill
- Short Course on 'Weather Forecasting, Basin Hydrological modeling and River Hydrodynamic Modeling for Flash Flood Forecasting

JUN

- Annual research meeting of project 'cropping system intensification in the salt-affected coastal zone of Bangladesh and West Bengal
- Short Course on "Climate Input Data Processing and Analysis"



Training on Water Quality for IWM Professionals Conducted by Prof. Henrik Garsdal, Senior Hydraulic Specialist, DHI Denmark



Certificate Awarding Session of the Training on Storm Surge Modelling at IWM.

IWM Provided International Training



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

JUL	AUG	SEP	OCT	NOV	DEC
<ul style="list-style-type: none"> ■ Training of trainer (ToT) ■ UN ESCAP's methodology on Systems Thinking and Stakeholder Engagement Planning 	<ul style="list-style-type: none"> ■ Training on Polder Water Management ■ Monitoring of Hydraulic & Morphological Conditions of Jamuan River for Safety of River Training Works of the Bangabandhu Bridge during the year 2019-2022 	<ul style="list-style-type: none"> ■ Training on Google Earth Engine 	<ul style="list-style-type: none"> ■ Workshop of the research on "Evaluation of adaptation trials for coastal livelihoods in GBM delta" ■ Training on Inclusive Urban Sanitation 	<ul style="list-style-type: none"> ■ Training on Water Quality Modelling with Surface Water 	<ul style="list-style-type: none"> ■ Groundwater Modelling using MIKE SHE

Training Organized on Adaptive Delta Management

Managing complex adaptive systems like Deltas in this context needs continuous monitoring and evaluation (M&E) of external influences on the systems, internal changes and impacts of different interventions. Continuous data acquisition is an essential part of these M&E activities.

Participants of the training learned to share practical information on such decentralized data acquisition techniques that offer a mix of interactive presentations, discussions and hands-on training packaged workshop. Following are the objectives of this workshop:



Training Program on "Decentralized Data Acquisition Techniques (DDAT) for Adaptive Delta Management" conducted by Dr. Assela Pathirana and Dr. William Veerbeek – IHE-Delft

1. Discuss the broader context of M&E for adaptive delta management and how DDAT fits into it;
2. Share the experiences of using UAV for geographical and object data acquisition together with hands-on training;
3. Explore the opportunities of using low-cost sensor networks for environmental data acquisition with case studies;
4. Share experience and expertise on citizen-science applications in relation to adaptive delta management;
5. Discover appropriate applications for these methods and technologies in the context of Bangladesh Delta Plan 2100;

IWM USERS' CONFERENCE 2019

IWM Successfully Organized Users' Conference 2019

Theme : 'Challenges of Bangladesh Delta Plan 2100: Role of IWM'



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 programme was chaired by Mr. Kabir Bin Anwar, Honorable Senior Secretary, MoWR and Chairperson of IWM BoT (Board of trustees). Mr. Zaheed Farooque, MP, Honorable State Minister, MoWR graced the programme as the Chief Guest. Designated distinguished guests, members of IWM BoT, senior officials from different government and non-government organizations 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.



In his welcoming speech, **Mr. Abu Saleh Khan**, the then DED (Operations) and present Executive Director, IWM welcomed the Chief Guest, the Chair of the conference, Director General of BWDB, Executive Director of IWM and all distinguished guests, delegates, discussants and participants to the IWM Users' Conference 2019. He said that UC2019 aims to share IWM's progress, development and vision as a center of excellence and IWM's role to support the Government to accomplish SDG2030 and BDP2100. Mr. Khan then quoted: "The road to dignity by 2030, ending poverty by 2030, road to knowledge by 2030, decent life for all and prioritizing the planet's need"- and considering that the BDP2100 has also been formulated. He then thanked deeply all dignitaries and participants for being present in the conference and accepting the

invitation as this inspires IWM to carry out research work and further studies to better understand water management. He expressed his heartfelt gratitude to the government for utilizing IWM's services in crucial national projects like Padma Bridge, Bangabandhu Railway Bridge, Bangabandhu Bridge, Gorai River Restoration Project, Capital Pilot Dredging of rivers etc. He then thanked the Government of Denmark and the Netherlands as they have always supported IWM in regards of capacity building and technological advancement. Last but not the least, he thanked various departments and agencies who work in water sector of Bangladesh and utilizes IWM's technical services like planning, design and research outcomes.

Prof. Dr. M. Monowar Hossain, the former Executive Director, Institute of Water Modeling (IWM) briefly introduced the topic of the User Conference Bangladesh Delta Plan 2100. In his keynote speech, he explained how IWM has been working towards making this plan successful. Bangladesh Delta Plan 2100 is a vision of our Prime Minister Sheikh Hasina prepared and approved in a Cabinet meeting in September, 2018. He explained the challenges and activities ahead of us regarding water safety. The overall objective of Bangladesh Delta Plan 2100 is to realize the sustainable and commonly agreed-upon strategy for an optimum level of water safety and security, food security, sustainable economic growth, the framework for governance and its implementation. He covered the activity of different divisions within IWM and how the divisions are supporting implementation of BDP2100.





Distinguished guests from Planning Commission, BWDB, BIWTA, Bangladesh Railway, BBA, BMDA, DPHE, DWASA, DBHWD, LGED, RHD and other sectors participated in the event of IWM UC 2019.

The Chief Guest, **Mr. Zaheed Farooque, MP**, Honorable State Minister, Ministry of Water Resources, Government of the People's Republic of Bangladesh said that the Institute of Water Modeling (IWM) is an excellent institute. Today IWM's models are applied not only in Bangladesh but also outside of the country. He also praised the choice of conference theme as BDP2100 and role of IWM, as a timely choice for discussion. He further added that the Bangladesh Delta Plan 2100 is not a one-time plan and experts are working on the delta plan. He emphasized on finding solutions for the problems and working on it. Finally, he recommended that we need collaboration for bringing the solutions.



The Chairperson of the program, **Mr. Kabir Bin Anwar**, Honorable Senior Secretary MoWR recalled that in 1970 before the election, Bangabandhu gave a great speech. Quoting Bangabandhu Sheikh Mujibur Rahman, he said: "I think our biggest problem is good water management and flood control. I also think we should have an international standard water institute". The Chairperson and Honorable Senior Secretary then thanked Prime Minister Sheikh Hasina to establish IWM (Institute of Water Modelling) in 1996. He mentioned that in 2013, the Prime Minister formulated the Water Act and in 2018, the Water Act based rules were developed: erosion mitigation, flood management, cyclone preparedness, climate change, sediment management were all detailed under the Act, including life under water. Meanwhile, Delta Coalition HQ is being planned in Dhaka, Bangladesh. Coalition and coordination are needed among institutes and ministries and at field level to act upon all these advancements and work together for further development.

Mr. Abu Saleh Khan, at the concluding, the then Deputy Executive Director (Operations), IWM and present Executive Director, IWM gave a technical presentation on "State of the Art Mathematical Modelling, Survey & ICT-GIS in Water Resources Development of Bangladesh". He mentioned that the hydrodynamic model developed in IWM is used by FFWC (Flood Forecasting and Warning Centre), BWDB and IWM continuously provides support in maintaining the website and updating the forecast. He revealed that the development of 2-stage flash flood forecasting (pre-monsoon) over the North-East region is being studied now and the Haor forecast is expected to have 15 - day lead time (deterministic) and 1-month lead time (probabilistic) so that IWM can provide better support to Haor Board. Mr. Saleh confidently mentioned about IWM strength regarding high quality of survey data. He mentioned that IWM survey division continually gathers new data on hydrology, bathymetry, morphology in project areas with latest technology. Finally, Mr. Saleh put light on IWM's commitment into research and capacity development, as part of supporting the overall work and as a part of the cycle of sustainable human resources development. Mr. Saleh also mentioned that in Bihar (India), IWM has major projects on flood forecasting and IWM is helping the Bihar government to build a similar institute like IWM in Patna (Bihar). In Malaysia as well, IWM has done several modelling and water resources management projects.

IWM Pays Homage to Bangabandhu Mausoleum at Tungipara



The newly appointed Executive Director, Mr. Abu Saleh Khan and Deputy Executive Director (Operations), Mr. Zahirul Haque Khan and Deputy Executive Director (Planning & Development) Mr. S. M. Mahbubur Rahman of IWM paid homage to the Father of the Nation Bangabandhu Sheikh Mujibur Rahman at the Mausoleum in Tungipara, Gopalganj

IWM Participation in the National & International Days



IWM paid homages on the Victory Day, 16 December, 2019



IWM participated in National Mourning Day, 15 August, 2019

IWM Celebrates Birth Centenary of Bangabandhu Sheikh Mujibur Rahman



IWM greets Senior Secretary of Ministry of Water Resources



Executive Director IWM, Abu Saleh Khan greets Chairperson of IWM BoT, Mr. Kabir Bin Anwar on the eve of his promotion as Senior Secretary of Ministry of Water Resources.

IWM Field Visits

During the year 2019, IWM Senior Professionals made a number of field visits in connection with different ongoing important projects.



Naria, at the bank of Padma River was facing severe erosion problem. For this BWDB took an urgent project and IWM was entrusted for providing a solution. IWM & BWDB expert professionals, visit the status of bank protective works.



IWM Professional Field Visit with Executive Engineer, Bagerhat, BWDB in Connection with Hydro-morphological Mathematical Modelling Study for Re-excavation of 83 Rivers/khals and Increase Navigation of Mongla-Ghasiakhal Channel in Bagerhat district



Project Meeting with Superintending Engineer (Civil), Khulna O&M Circle, BWDB in connection with Hydro-morphological Mathematical Modelling Study for Re-excavation of 83 Rivers/khals and Increase Navigation of Mongla-Ghasiakhal Channel in Bagerhat district



IWM Professional Field Visit for Re-excavation of Shuvadya Khal along with Development and Protection of its both Banks at Keraniganj Upazila in Dhaka District



Monitoring of Installation of Groundwater Observation Well in the Presence of Project Director of Department of Bangladesh Haor & Wetland Development (DBHWD)

IWM Organizes the Annual Workshop of Delta Alliance Bangladesh Wing (DABW)



On 13 November 2019, a workshop on “Sediment and Salinity in the Coastal Areas of Bangladesh” was arranged under Delta Wings Activity Fund 2019, organized by Institute of Water Modelling (IWM) on behalf of the Delta Alliance Bangladesh Wing. Mr. Kabir Bin Anwar, Honorable 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 (IWM) 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 recent 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.

Chief Guest, Mr. Kabir Bin Anwar, Honorable Senior Secretary, Ministry of Water Resources of Bangladesh shared some initiatives of the 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.



Dr. Khondaker Azharul Haq, Regional Chair of GWP-South Asia & Mr. Abu Saleh Khan, the then Deputy Executive Director (Operations) and present Executive Director, IWM were present in the Workshop.



The professionals of different organizations with key note presenter, Prof. Dr. Umme Kulsum Navera, Department of Water Resources Engineering, BUET

Dhaka Water Knowledge Days 2019



An expert panel discussion on Dhaka Water Knowledge Days 2019

Dhaka Water Knowledge Days 2019 was held at Lakeshore Hotel, Gulshan, Dhaka from 27-31 October 2019. The event focused on the exchange of experiences, knowledge, development strategies, and good practices in the water sector. The then Deputy Executive Director (Operations) and Present Executive Director, Mr. Abu Saleh Khan welcomed all distinguished guests and participants to the program.

The event was organized in the capacity of the Joint Cooperation programme: Bangladesh-The Netherlands. The event included workshops and presentations by Bangladeshi and International experts, while simultaneously offering opportunities of training in various open-source software alongside non-open source software packages. It aimed to attract practitioners, scientists, M. Sc. and Ph.D. students, as well as young professionals from the broad spectrum of organizations and individuals working in the water sector of Bangladesh and The Netherlands.



Mr. Abu Saleh Khan, the then Deputy Executive Director (Operations) and present Executive Director of IWM giving his welcome speech in the opening ceremony of Dhaka Water Knowledge Day 2019

MOOC Launching Event Under DELTACAP Project, 2019

The Delta Cap, a Netherlands Initiative for Capacity development in Higher Education (NICHE) project, aims to help the Bangladesh Delta Plan 2100 to meet the demand for skilled water professionals. It works to strengthen the capacities of various government and non-government organizations in Bangladesh linked to adaptive delta management. After successful completion of year 3 of DeltaCap Project, an App-based learning technology named MOOC (Missive Open Online Course) was launched on 12th September, 2019 at WARPO Conference Room.

By the help of this App 'Bangladeshi Water Professionals' one can get access to news on water management, get informed of upcoming trainings on water management and get notified of any updates on the industry.



Prof. Dr. M. Monowar Hossain, the then Executive Director, IWM, Md. Mahmudul Hasan, Director General, Water Resources Planning Organization (WARPO), Mr. Dr. Md. Mashiur Rahman, Joint Chief from GED, Prof. Chris Zevenbergen, Project Director, Delta Cap, IHE Delft, Mr. Abu Saleh Khan, Executive Director, IWM the then DED, (Operations)) of IWM External Advisory Board (EAB) Members of Delta Cap, Management Team of Delta Cap and other senior officials were also present in the event.

IWM Participated in the Blue Economy Workshop



Mr. Kabir Bin Anwar, Senior Secretary, Ministry of Water Resources, presided over the event by the 'Blue Economy: Data-Driven Management of Water Resources and Waste' workshop. Many experts on water resources and the environment were present at the workshop organized by WARPO. Mr. Abu Saleh Khan, Executive Director of IWM, Dr. Atiq Rahman, Executive Director of BCAS, Dr. Mansur Rahman, Professor of IWFM, BUET, Prof. Rezaur Rahman and others took part in the discussion.

IWM participation in Annual workshops of JCP



IWM participated in the Annual Workshops of Joint Cooperation Programme (JCP) Bangladesh – The Netherlands at BRAC CDM, Gazipur



IWM Participated in the National Level Training Workshop on "Climate Change, Water & Health"



Contract Signing Ceremony between Bangladesh Atomic Energy Commission (BAEC) and IWM

IWM Contract Signing Ceremony with 25th Engineer Construction Battalion of Bangladesh Army

Under the chairmanship of Mr. Kabir Bin Anwar, Senior Secretary of Ministry of Water Resources, a Memorandum of Understanding (MoU) was signed at the conference room of MoWR between 25th Engineer Construction Battalion and Institute of Water Modelling (IWM) for the project titled “Mathematical Modelling Study for Dredging of the Padma River at the upstream of the Padma Bridge under Dohar Upazila”.



Mr. Abu Saleh Khan, Executive Director, IWM and Lieutenant Colonel Md. Sadeque Mahmood, psc, Commanding Officer, 25th Engineer Construction Battalion signed the MoU. Chairman, IWM Board of Trustees (BoT) and Senior Secretary, MoWR Mr. Kabir Bin Anwar, Additional Secretary (Development) Mr. Mahmudul Islam, Additional Secretary (Admin) Md. Rokon ud-doula, Director General of BWDB, Mir Mostafa Kamal, Director, REN and some other high officials from MoWR, BWDB, IWM and 25th Engineer Construction Battalion were present in the signing ceremony

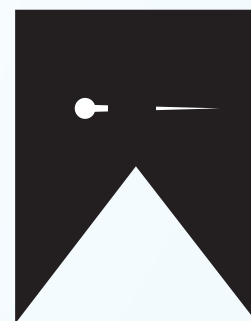
STAFF NEWS -IN MEMORIAM



Condolences Keep Pouring In

Mir Mostafa Kamal, PEng.

20th January, 1966 - 8th August, 2020



Mr. Mir Mostafa Kamal, PEng., Director, River Engineering Division (REN), IWM passed away on 8th August, 2020 at his residence at around 02:30 AM after a massive heart attack. It is a great loss for IWM. He was serving as Director of River Engineering Division (REN) since November, 2009. He completed his B.Sc. in Civil Engineering from BUET in 1989 and M. Sc. in the same discipline in 1996. He was an extraordinary brilliant student and that was reflected in his professional career at IWM. Mr. Kamal served IWM for 29 years.

Since joining IWM, Mr. Kamal had been extensively trained in Mathematical Modelling at home and abroad and developed himself as a key resource of the Institute with high level of expertise in the field of mathematical modelling and computational hydraulics. He was a Member of the Institution of Engineers, Bangladesh (IEB) and a registered Professional Engineer (PEng.) from Bangladesh Professional Engineers Registration Board (BPERB). He managed and supervised a significant number of nationally important projects in water resource management, river engineering and morphological studies.

He was wise beyond his education and age. People of all ages and stations benefited from his counsel mainly in his field of expertise. He will be remembered for his unfailing work ethics, honesty and integrity.

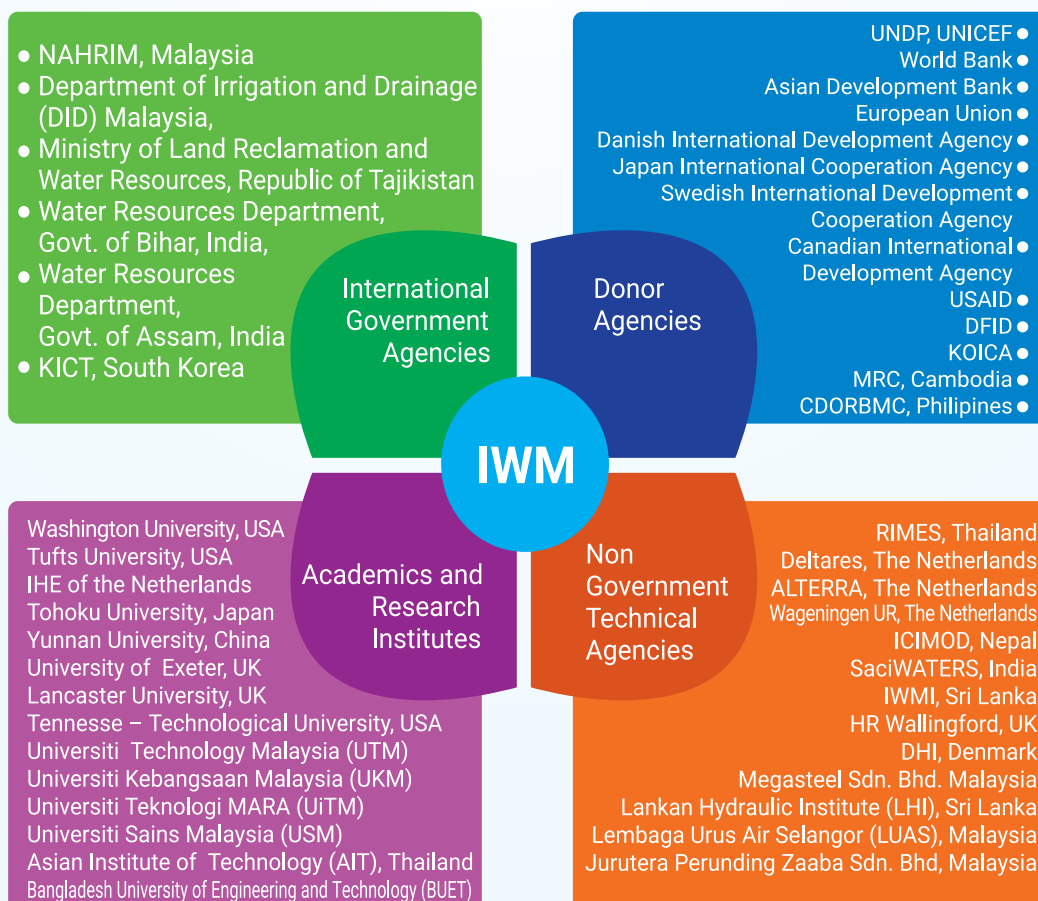
At the time of his death, Mr. Kamal left behind a lovely family, his wife, a daughter and two sons. His death is not only an irreparable loss for the Institute (IWM), but also for the Engineering community in Bangladesh.

Training and Capacity Building

IWM Provides Training on following Technologies



OUR STRATEGIC PARTNERS



ANNUAL REPORT 2019



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