

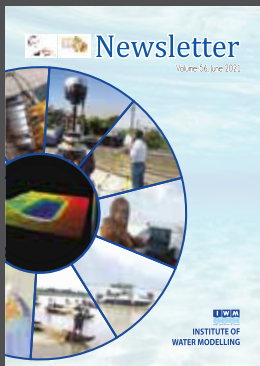


Newsletter

Volume-56, June 2021



**INSTITUTE OF
WATER MODELLING**



Editorial

IWM was established in December 1996 as a Trust through a Cabinet decision by the Honorable Prime Minister Sheikh Hasina to promote water modelling in managing the complex water resources ecosystem. Since then IWM has been rendering services in water and related projects to various government and other national/ international agencies.

Editorial Advisor

Abu Saleh Khan, PEng.

Editors

S M Mahbubur Rahman
Zahirul Haque Khan

Co-Editor

M. Samiun Nabi

Compilation

Mohammad Ruhul Amin
K. M. Ibrahim Khalilullah

- Md. Amirul Islam
- Sarwat Jahan
- Goutam Chandra Mridha
- Md. Humayun Kabir
- Ismat Ara Pervin
- Shaikh Nahiduzzaman
- Liton Chandra Mazumdar
- Bushra Monowar Duti
- Abeer Quddus
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*Bangabandhu Corner at
IWM Bhaban*



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Mujibur Rahman

ADVANCED TECHNOLOGIES AND KNOW-HOW APPLIED FOR SURVEY OF LAND, RIVERS AND SEAS

Survey data is essential for the design, planning, implementation, and maintenance of infrastructure development, especially in the field of water resources. The present-day state of the Art survey equipment has come up to provide additional advantages to make the field survey faster and comprehensive than before. These types of equipment have sophisticated electronic circuits with memory and other gadgets. The operation and maintenance of these types of equipment need specialized skills. IWM has been maintaining a substantial stock of field survey equipment for the last twenty-five years. The eventual procurement of highly specialized equipment like Multibeam Echosounder, Terrestrial Laser Scanner, RTK-GPS, UAV, and Acoustic Doppler Current Profiler has enriched IWM's capacity to a level unmatched by others. We are now capable of almost all types of survey assignments practiced worldwide. Nonetheless, some of the conventional equipment like Auto Level and Conventional Current Meters are still in use for works where those are still suited.

Acoustic Doppler Current Profiler (ADCP)

ADCP measures current and waves in the river and estuaries. IWM has two 2 different types of ADCP. For inland rivers, moving boat measurement is done by mounting the ADCP on a boat. This equipment shows real-time depth, ship tracking, velocity and discharge measured. Models used in IWM are Workhorse Rio Grande 600 KHz and River Ray 600 HZ. For estuary and tidal areas where continuous time series current data at a fixed location is needed, fixed or stationary deployment is necessary. IWM owns 3 Sentinel V ADCPs that can be used for such measurement. This equipment can be mounted on the boat for shorter deployment and where only current data is required. For long time data collection, the ADCP is deployed in the seabed on specially built mounting with the help of the Diving Team. It has an internal battery and data is stored directly inside the ADCP. The equipment has an internal compass, tilt sensor, and pressure sensor to record the orientation and depth of the water column. It also continuously records current and wave data. Data is downloaded from the ADCP by Wi-Fi from time to time and redeployed (if needed).



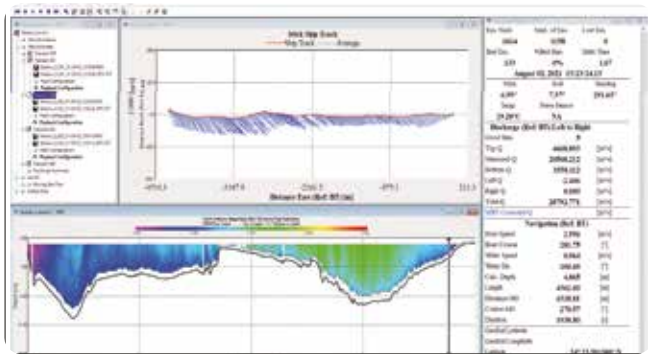
Preparation before ADCP Deployment



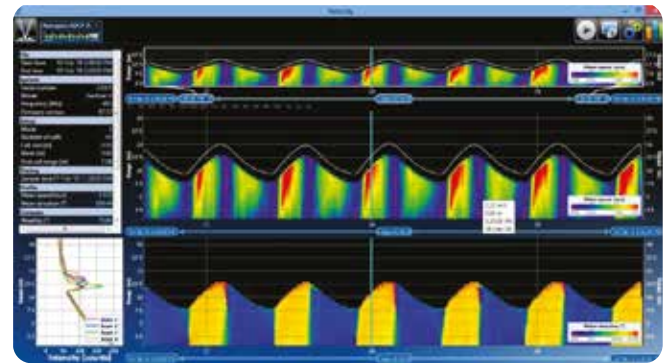
Diving team in action



ADCP being deployed on the seabed



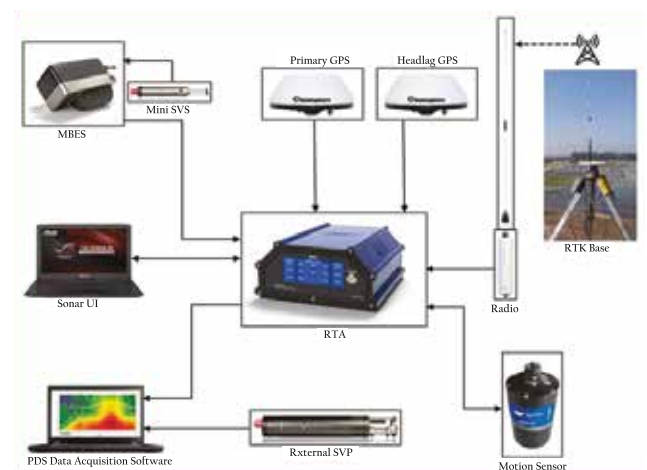
Real time discharge measured by ADCP in the river



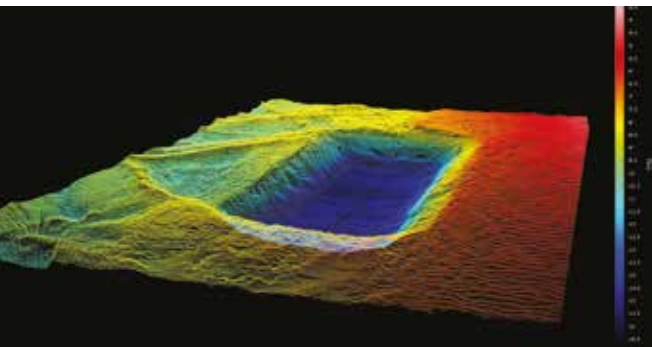
Time series current speed and direction observed by ADCP in the sea

Multibeam Echosounder System

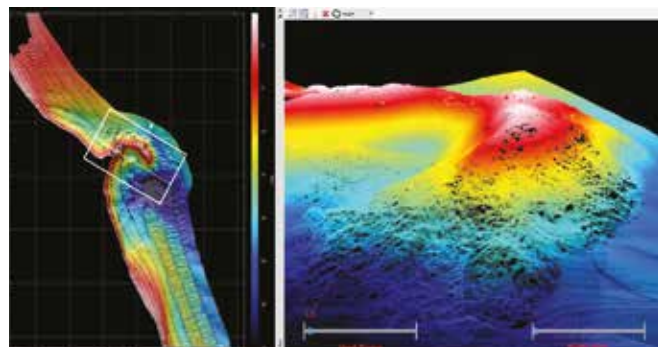
Multibeam Echosounder System is used for bathymetric survey where total coverage of the seabed is required. IWM has acquired 2 sets of Multibeam Systems for survey works namely Teledyne Reason (Model T20R) and Teledyne Odom (Model MB2). Model T20R is capable of measuring river/seabed using 512 beams and up to 165-degree swath width. The output of T20R has high-resolution data and minimum noise. Model MB2 is also a precision instrument capable of measuring river/seabed using 512 beams and up to 140-degree swath width. The instrument is suitable to use in the ports & harbor, dredging monitoring, river training works monitoring, monitoring scour holes around bridge piers and river training work.



Multibeam Echosounder System (MB2 System)



Trial Dredging Pit Monitoring at Kutubdia Channel by MB2



Bathymetric Survey in the Jamuna at Crossbar 3, Sirajganj by Reason T20R System



Fishing Trawler modified for Multibeam Echosounder Boat for Kutubdia Channel

Bathymetric Survey (Single beam)

IWM has been conducting hydrographic survey using state-of-the-art GPS and Digital Echosounder for more than 24 years. We own 3 survey boats for the bathymetric survey. Also, locally available engine boats are used for survey work. Both the devices are mounted on the Survey Boat. The Echosounder measures the depth of water by transmitting sound signals and receiving the echo reflected from the bed of the channel. All our echo sounders are survey grade and transmit signals digitally to the computer during the hydrographic survey. GPS provides an accurate position for both navigation and recording the position

of the echosounder. A Laptop with standard software (Trimble Hydro Pro, Hypack, or PDS) is connected with the equipment. The software displays the real-time location of the boat on the laptop for maneuvering the boat as per the desired location and recording all data in the computer. The raw data is viewed in the office and edited to remove erroneous depths. Cleaned data is then exported for further processing by different software as per project requirements. IWM owns 2 Dual Frequency and 6 Single Frequency Echosounder. It uses DGPS or RTK-GPS receivers mentioned earlier.



Bathymetric Survey Boat deployed in Old Brahmaputra Dredging Work (IWM Survey vessel-1)

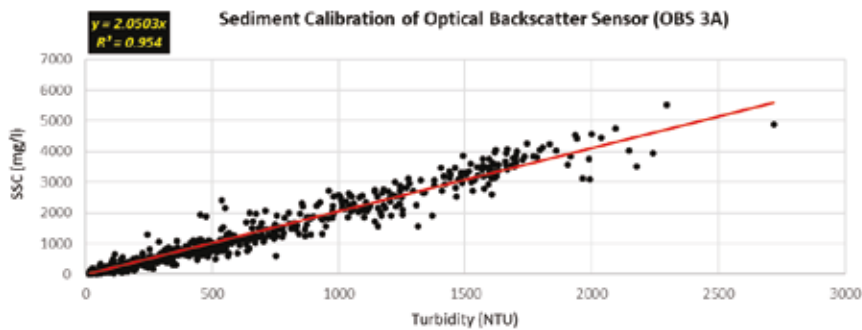


Professionals of IWM conducting Bathymetric Survey work at Jamalpur

Optical Backscatter Sensor

An optical Backscatter Sensor is used to measure turbidity for Met Ocean Survey. The instrument is fitted with temperature, conductivity, turbidity, and pressure sensor and deployed in the seabed for continuous data collection. All sensor data is recorded and stored inside the instrument. Turbidity values are measured in

NTU. Turbidity data is usually correlated with water sample data for determining suspended sediment concentration. IWM owns OBS 3 from Campbell Scientific Instruments and Aquatroll from In Situ Instruments.



Calibration with OBS Data (NTU) with Water Sample Data (SSC mg/l)



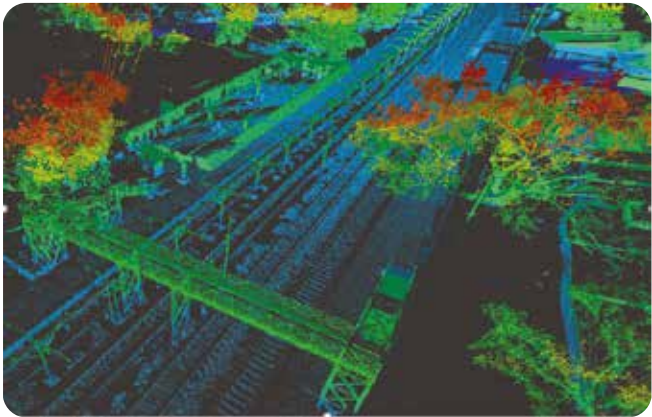
3D Terrestrial Laser Scanner

Terrestrial Laser Scanner is the latest technology to measure the 3D Point cloud by using laser scanning technology. IWM has procured a High Precision Terrestrial Laser Scanner from Teledyne Optech (Model: Polaris LR). The instrument can scan up to 1500m depending on the type of target. The scan speed of the equipment is up to 500,000 pts/sec. It can scan areas covering 360 degrees horizontal and 120-degree vertical angles. Scan area can be customized as per the requirement to reduce time, file size and eliminate unnecessary data. It can collect geo-referenced data directly at the site using the “Backsighting” or “Resection” method like conventional

total station. Atlascan Software is used for postprocessing data at the office. Processed data can be used for feature extraction, generating DTM, X-sections, and volume computation. It has a built-in GPS Sensor and Camera to register location and photographs of the objects. The instrument can be used for measuring stockpile volume, open-pit mines, architectural buildings, inaccessible objects (like an electric tower), road/rail networks, tunnels, and different engineering survey works. Survey-grade data with sub-centimeter accuracy and high angular resolution along with minimum data collection and processing time make this equipment unique for data collection.



Terrestrial Laser Scanner Setup



Terrestrial Laser Data Collected at Chapai Nawabganj

Unmanned Aerial Vehicle (UAV)

IWM executes topographic survey by UAV (Drone) at places where 3D DSM or DTM is needed. We own DJI Phantom 4 Pro Version 2. UAV operates at the site for

a predefined flight path generated using DJI software before data collection. Data is processed in Pix4D and other software for final output.



3D View of Site



DJI Phantom 4 Pro Ver 2

RTK-GPS Receiver

Real-time Kinematic GPS (RTK GPS) surveys are performed with Radio/GPRS data link between the reference receiver and the roving receiver. IWM is using this technology for conducting TBM/Ground Control point Establishment, Satellite Image Geo-referencing and other conventional engineering/hydrographical surveys where high precision is important for both Horizontal & Vertical co-ordinate. Presently IWM owns more than 30 RTK-GPS receivers from Trimble, Hemisphere, EMLID, and Polaris GNSS.



RTK-Base Station Setup on Rooftop



RTK-GPS Data collection at Site



RTK-Base Station Set up on an SoB BM Pillar

Electronic Total Station

The electronic total station is an advanced electronic theodolite. This equipment can measure the coordinate of a target point in digital form. During survey works the measured data can be stored in its internal memory which

may transfer data directly to the computer. During 2016, IWM has procured Robotic Total Station. The instrument is capable of tracking prism automatically at the site. We own more than 12 Total Stations from Trimble, Sokkia, and Leica.



Robotic Total Station Setup



360 Degree Prism used for Data collection

Motion Sensors

Motion sensors are used to measure the pitch, roll, and heave of the vessel during Multibeam Bathymetric Survey. IWM owns two very sophisticated Motion Sensors manufactured by Teledyne TSS, UK (Model: DMS 05)

Monitor CTD Profiler

CTD is a device that records Conductivity, Temperature, and Depth instantly when lowered in the water and stores in the memory. These data are useful for monitoring layer-wise water quality/salinity. Conductivity

and Temperature are also used to compute the sound speed in the water, and it can be used as SVP during Multibeam Echosounder Survey. IWM owns one Monitor CTD manufactured by Valeport Ltd, UK.



Valeport Monitor CTD Profiler

Sound Velocity Sensor (SVS)

Sound velocity sensors (SVS) are used during Multibeam Bathymetric Survey. SVS is integrated with Multibeam Transducer and deployed in the water. SVS provides continuous time series sound velocity data input to multibeam sonar during survey allowing continuous updating of sound speed to be used in in-depth calculation by multibeam echosounder. IWM owns 2 sound velocity sensors manufactured by Valeport Limited, UK (Model: Mini SVS)

Sound Velocity Profiler (SVP)

Sound Velocity Profiler (SVP) is used to measure the full water column profile of sound speed. It is a self-recording device. When lowered in the water, it records the sound speed at a fixed interval in the river/estuary. Thus changes in sound speed in the water with depth are available. IWM owns 2 Sound Velocity Profiler from Valeport Ltd, UK (Model: Mini SVP and Model: SWIFT SVP).



DMS 05 Motion Sensor (Left), Valeport Minisvs (Middle) and Valeport SWIFT SVP (Right)

Pressure Sensor

IWM uses pressure sensors for continuous water level monitoring, especially in the tidal zone. These are self-recording sensors storing temperature and pressure. Generally, these are configured to collect data at 10 to 15 minutes intervals. Staff gauges are also installed to manually record data. Sensors are time to time downloaded and processed in the computer from computing water level time series.



Water level Hydrograph observed using pressure sensor of the Sandwip Channel

IWM has Developed an integrated holistic plan for development and management of Karnafuli river basin including Halda river

Karnafuli is the largest and most important river in Chattogram and the Chattogram hill tracts region of Bangladesh. The total area of the Karnafuli river basin is about 14008 sq. km. out of which about 10163 sq. km. is situated in Bangladesh. At the upstream of the Kaptai dam, the major tributaries of the Karnafuli river are Kasalong, Maini, Chengi, Cholok and Rainkhiang rivers. At the downstream of Kaptai Dam, the main tributaries at its left bank are Kaptai, Shilok, Chondaria, Raikhali, Boalkhali and Shikalbaha and its right bank are the Ichamati and Halda river along with the Chaktai Khal and Mohesh Khal. Bangladesh Water Development Board (BWDB) entrusted the Institute of Water Modelling (IWM) to devise an integrated holistic plan for the development and management of the Karnafuli river basin including the Halda River. The major problems of the river basin are deforestation, river sedimentation, navigability during the dry season in the rivers situated upstream of the Kaptai dam. Moreover, riverbank erosion, flooding, the impact of natural and manmade causes on fisheries resources of the river are major reasons of concern in the basin, including the Halda River. Halda River which is famous as the only tidal river in the world that houses the breeding of pure Indian carps. As such Halda river is designated as 'Bangabandhu Fisheries Heritage'.



Kornafuli River Basin

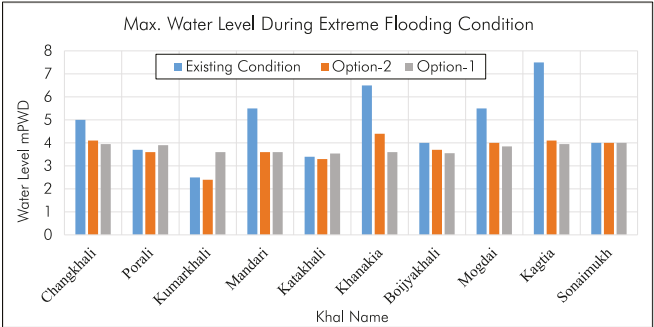


Karnafuli Hilly River and Evergreen forest near Boro Horina, Borkal, Rangamati

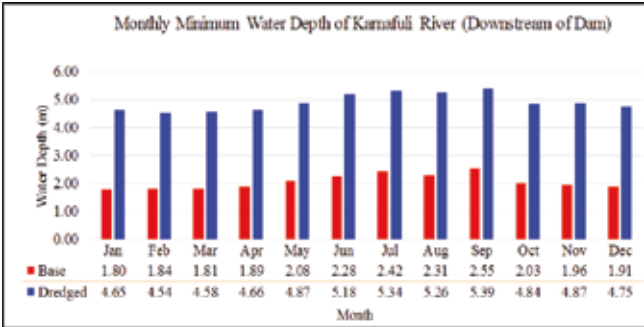
The main interventions recommended for development and management of the Karnafuli river basin are dredging/excavation of rivers/khals , riverbank erosion protection, dismantling of regulators and weir and replacing them with Hydraulic Elevator Dams (HED), fish-friendly regulators, construction of embankment/flood wall, tourism development, development of fish sanctuary in the connecting khals/loop of Halda river and implementation of creek aquaculture at the upstream of Kaptai dam, afforestation along the bank of Chengi, Maini, Karnafuli, Halda, Kasalong, Rainkhiang, and Cholok rivers.

The effectiveness of different options has been assessed considering the issues of improvement of fisheries resources and enhancement of irrigation facility, drainage, and navigability improvement.

The study also carried out a detailed Environmental Impact Assessment (EIA) with a comprehensive Environmental Management Plan (EMP), social consultations as well as economic and financial analysis to recommend the option that is technically feasible, socially acceptable, environment friendly, and economically viable.



Drainage improvement in different khals of Halda river



Comparison of least available depth of Karnafuli River



Fish egg collection in Halda River (Bangabandhu Fisheries Heritage)

A long-awaited solution to rejuvenate and protect Shuvadya Khal is planned

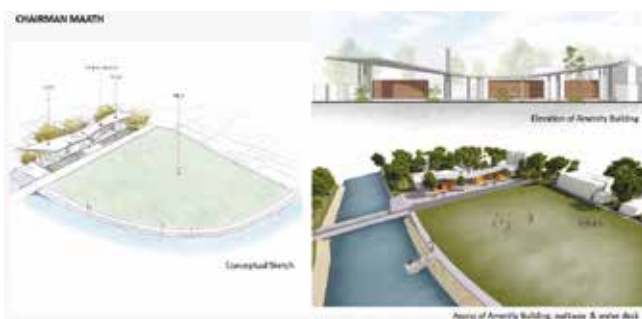
Shuvadya Khal connects Buriganga River to Dhaleshwari River. This very important khal passes through large commercial/industrial areas as well as settlements of Keraniganj Upazila of Dhaka District. Shuvadya had long lost its water quality, carrying capacity, and width due to indiscriminate dumping of wastes and sewage by local people and factories. Bangladesh Water Development Board (BWDB) assigned IWM to carry out a feasibility study for "Re-Excavation of Shuvadya Khal along with Development and Protection of its Both Banks.

The main objective of the study is to assess the feasibility of the re-excavation of Shuvadya Khal from a technical point of view and find out suitable options for the development and protection of both banks. Improvement of navigability in the study area

considering technical, economic, social, and environmental aspects is also a matter of concern. Both primary & secondary data collection program has been conducted which includes field visits, hydro-meteorological data collection, geo-spatial data collection, topographical data collection, etc. Collected data has been analyzed for consistency checking, statistical analysis for the design year selection and water availability, etc. detailed level hydrological model, hydrodynamic model, and water quality model has been developed for the study. The developed model has been applied to assess water retention capacity and availability of surface water resources of the Khal, improvement of drainage situation and navigability, to determine hydraulic design parameters and design of re-excavation of the Shuvadya khal.



Proposed plan of Shuvadya Khal



Landscape view of Chairman math, Shuvadya Khal



Present scenario of Shuvadya Khal in Bird's eye view



3D view of Eco Landscaping in Ghat Area



3D view of the walkway

Interactive Geodatabase for Coastal Zone (IGDCZ) of Bangladesh

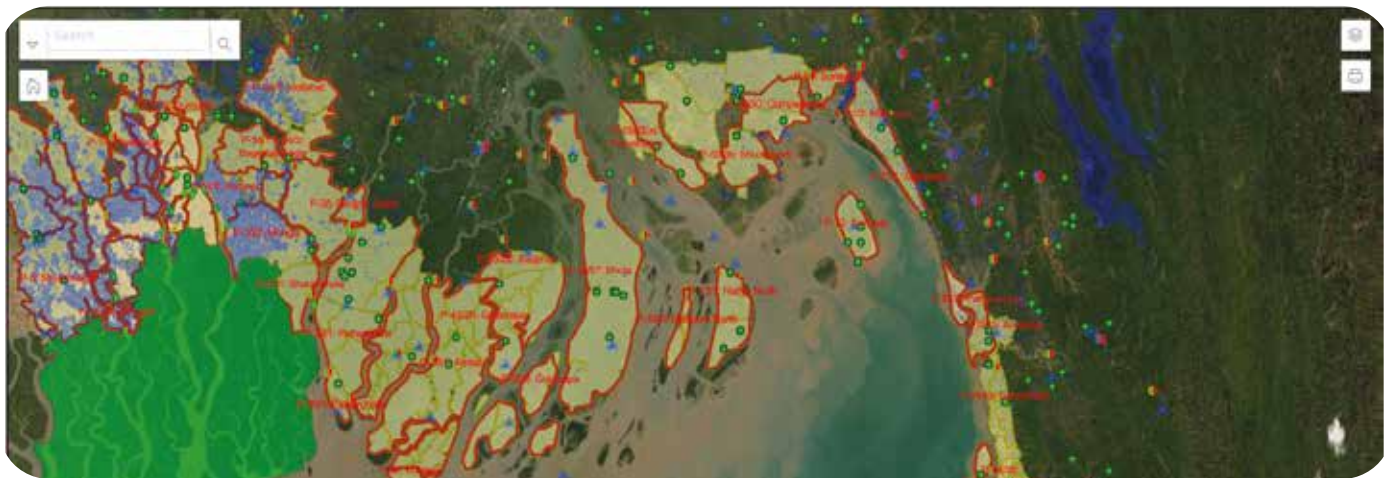
A web GIS-based Interactive Geodatabase for Coastal Zone (IGDCZ) has been developed under the Long-Term Monitoring, Research, and Analysis of CEIP-I project of BWDB titled “Research, Monitoring, and Analysis of Bangladesh Coastal Zone Towards Long Term Sustainable Polder Development and Management with attention to Physical, Economic and Social Dynamics” with a view to model the physical process of the coastal zone. The database will support BWDB and its stakeholders for effective decisions on planning, designing of any new investment (e.g., new polder), or improvement, maintenance, or rehabilitation of any existing development to improve the livelihood of coastal people and protect them from natural disasters like cyclone and flood.

The coastal area covers 148 Upazilas of the country. This area is protected by 139 numbers of Polders along 710 Km coastline; where 62% of land are below 3m elevation and 83% of the land area is within 5m elevation. Coastal area is 32 % of the land of the country and

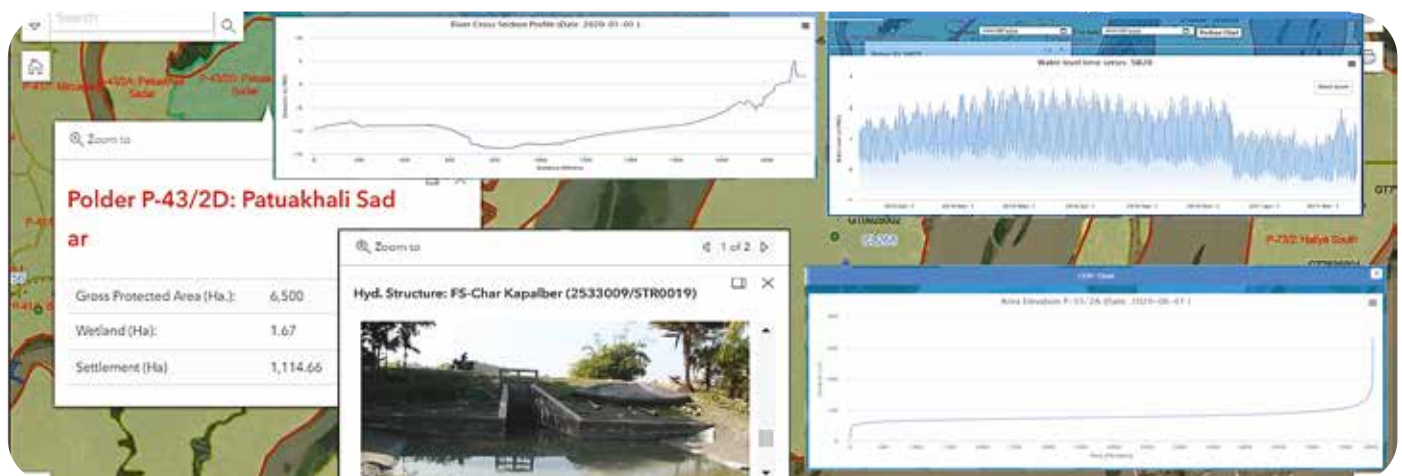
hosts 28% of the country's population (42 million).

The database application has been developed using web GIS technologies having more than 50 numbers of spatial and non-spatial layers and datasets which can be broadly categorized by Physical, Socio-Economic, hydrometeorological, and Environmental data for polders areas in the coastal region. The contents of this database are the status of physical features such as polders, embankments, protective works, hydraulic structures, hydro-meteorological data, hydro-morphological data, land-use change, settlement, coastal erosion and accretion, and cyclone events, etc., and the socio-economic data such as agricultural production, crop intensity, population, etc.

After full development, the database will be deployed at BWDB Server. In the future, the database will gradually be enriched and maintained by BWDB. The IGDCZ application was developed with ArcGIS Enterprise and Oracle Database System.



Web GIS based IGDCZ GIS Core Module (<https://gis.iwmbd.com/ceip/>)



Hydrograph and river cross-section charts and photograph of hydraulic structure and other features stored in Database.

Supporting WARPO in Operationalizing IWRM in Barind area as per the Bangladesh Water Rules, 2018 by baseline survey

WARPO conceived a project to put the Bangladesh Water Act 2013 into practice and to understand local economics and social dynamics related to water management in line with the IWRM concept, named 'Operationalizing Integrated Water Resources Management (IWRM) in Compliance with the Bangladesh Water Rules, 2018' partnered with the Swiss Development and Cooperation Agency. The main objective of the project is to pilot operationalizing of the Bangladesh Water Rules, 2018 through integrated water resources management in the Barind region to protect water sources and aquifers and develop sustainable water resources management.

The major activities to accomplish the study objectives are;

- (a) perform the baseline study, identify the water sources, present water use scenario and sectoral water demand up to mouza level through participatory rural appraisal (PRA) process;
- (b) conduct focus group discussion (FGD) at mouza level,
- (c) identify the current location and status of monitoring wells and irrigation borehole logs for each mouza of the Barind region,
- (d) establish baseline conditions concerning population, natural resources, land use and farming system, agricultural practices and their constraints and opportunities,
- (e) incorporate people's needs, views, and preferences regarding water availability, water demand, and water use in the study area through people's participation,
- (f) prepare all physical features of land use inventory using GIS application and satellite image processing,
- (g) validate the PRA report at upazila level for each upazila in the Barind region,
- (h) prepare a detailed PRA report with comprehensive maps for water availability, water use, water demand, water-scarce areas, water zoning, aquifer formation and location and status of monitoring wells in the Barind region.

Institute of Water Modelling (IWM) in a joint venture with Bangladesh Centre for Advanced Studies (BCAS), IWM being the lead firm, was awarded for this study in the month of February 2021. Following the agreement, IWM mobilized the study team for preparatory works and necessary primary and secondary data collection.



Contract signing ceremony (left) and FGD at Baghmara upazila of Rajshahi (right)

Hydrological and Hydraulic study on nine proposed bridges between Nasirnagar and Aruail Upazilas of Brahmanbaria District

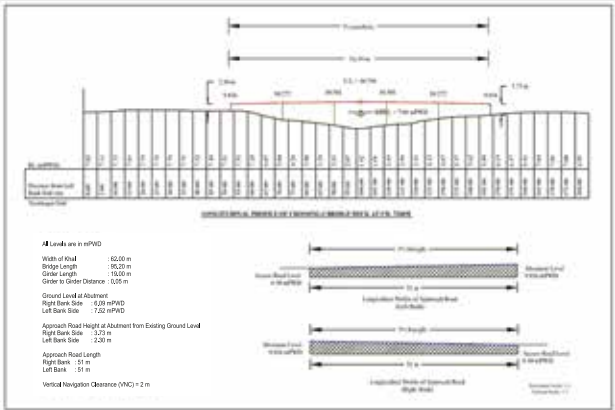
As a part of Rural Transport Improvement Project-II (RTIP-II), the Local Government Engineering Department (LGED) planned to improve the road communication at remote areas of Nasirnagar Upazilla of Brahmanbaria District. Nine bridges will be constructed in the existing road between Nasirnagar and Aruail Upazilas over different drainage routes, natural channels, and the haor areas for smooth passage of water. Institute of Water Modelling (IWM) was entrusted to conduct a detailed topographic survey and hydro-morphological study with the application of mathematical modelling to provide hydraulic design parameters of the proposed bridges and river training works in connection with the bridges.

IWM conducted the study using modelling tool of MIKE and developed a two-dimensional flexible mesh model which was based on the primary and secondary data. The study area is located at the downstream reach of the Kalni-Kushiyara river system and also near the confluence of the Baulai-Dhaleshwari rivers. It is basically a depression of different haor areas under Brahmanbaria District where a large volume of upstream floodwater passes during monsoon. The road network in this area requires efficient flood water passage through adequate cross drainage structures like culverts and bridges. IWM developed a model that simulated different flood scenarios to suggest optimized bridge openings and design hydraulic parameters of the proposed nine bridges. Finally, tentative bridge layouts, as well as topographic maps for all nine bridges, were provided to LGED officials.

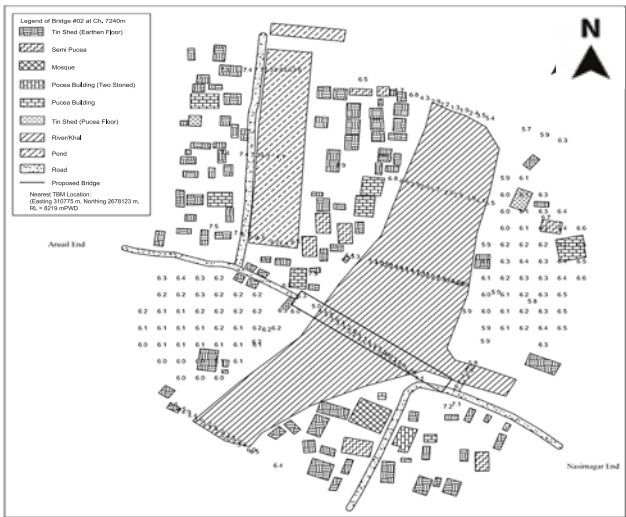
Along with layout. IWM also assessed the impact of the proposed bridges on the hydrology and morphological condition of the drainage channels and khals simulating the 2D models for “with bridge” conditions. Besides, IWM also suggested the layout of riverbank protection structures at vulnerable river banks identified from the 2D model. Outline design of the bank protections works and also slope protection works for approach roads of the proposed bridges were provided by IWM for the safety of the bridges against design flood events. Moreover, as a part of the study outputs set by LGED, IWM also checked the high flood levels in the study area against the formation level of the existing road from Nasirnagar to Aruail Upazilas.



Google Map Showing the Study Area with Proposed Nine Bridge Locations on Existing Road



Proposed Layout of One Bridge at Bholakot with Different Hydraulic Parameters

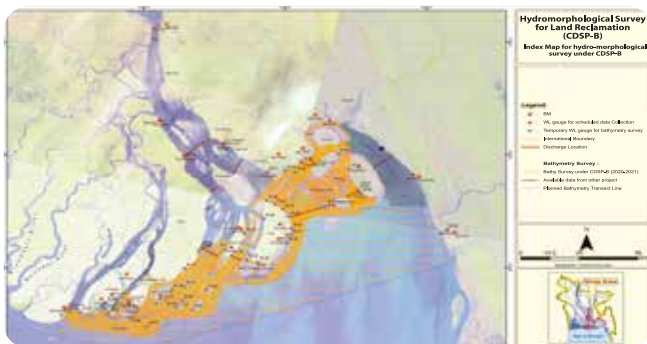


IWM Prepared Topographic Map of Proposed Bridge Site at Bholakot

Hydro morphological Survey in the Meghna Estuary

The hydro morphological survey under Char Development and Settlement Project (CDSP) is jointly financed by the International Fund for Agricultural Development (IFAD) and the government of Bangladesh. The government of the Netherlands is providing technical assistance to CDSP-B. Mott MacDonald and Euroconsult have been appointed by The Embassy of the Kingdom of The Netherlands in Dhaka as the technical advisor for the Project. CDSP had previously selected sites for development relying on the assumption of prevailing patterns of erosion and accretion during earlier studies, and these patterns have now changed in many dimensions. To ensure that future investments are made by the Government of Bangladesh, international partners and by the people living and working in this area; it is essential to have reliable predictions of how the morphology of the Meghna estuary region is behaving now and is likely to change in the coming decades. IWM conducted a survey/study in part of the Meghna Estuary Area during recent years. These data will be useful for planned

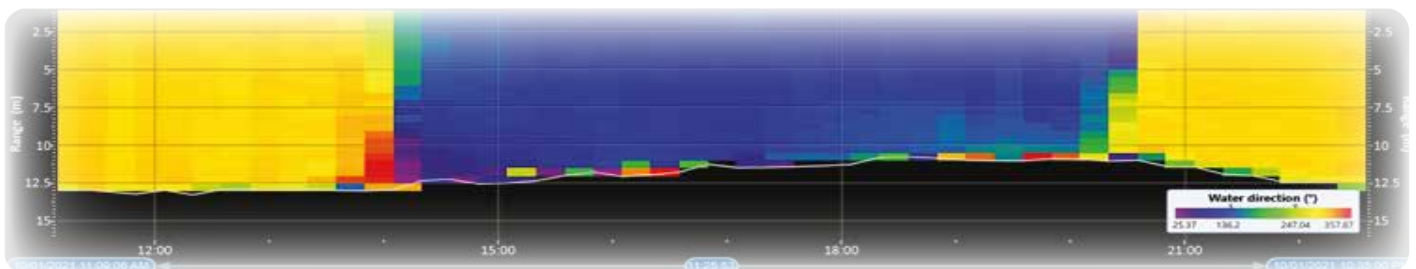
modelling study but not adequate for the proposed modelling study (contract under process). Mott MacDonald entrusted the Institute of Water Modelling (IWM) to carry out the survey needed for modelling study during 2020-21. Major works include around 6,000km-transect bathymetry in the Meghna Estuary, water level observation at 26 locations, 40 Tidal Discharge observations in the Meghna Estuary (Meghna River, Shahbazpur Channel, East & West), Tentulia Channel, Hatiya Channel, Sandwip Channel, and other locations (shown in the Figure below) suspend sediment sampling for the total sediment concentration and Riverbed Material Sampling and analysis. IWM mobilized the survey team during August 2020 and completed the fieldwork successfully during February 2021. Survey team has made a tremendous effort to work in the difficult areas during monsoon and during the dry season. Final Report on the data collection has been submitted during June 2021 which is now being used for modelling study and will also be used for planning process by the Client.



Data Collection Area



Conducting Bathymetric Survey near Monpura Island



Current Speed Measurement from Stationery Boat in the East Shahbazpur Channel



Discharge observation in the Sandwip Channel



Suspended Sediment Sampling at Hatiya Channel

Water Supply Network in Naf & Sabrang Economic Zone

For encouraging rapid economic development, Bangladesh Economic Zones Authority (BEZA) has selected Naf and Sabrang area in Teknaf Upazila of Cox's Bazar district to develop as economic zones for recreational and tourism purposes. The proposed Sabrang Tourism Park comprises an area of 1048 acres. The proposed Naf Tourism Park is an Island to be designated as an economic zone covering an area of 271.93 acres.

BEZA engages IWM to prepare a Water Supply Master Plan to fulfill water demand for Naf & Sabrang Tourism Park. Under the study the following analysis has been done:

- Water demand estimation;
- Resources assessment of groundwater;
- Identified suitable water sources;
- Water quality analysis of Naf River;
- Water zoning and phasing plans ;
- Water Management Plan (WMP);
- Topographic and Engineering survey;
- Sub-soil investigation;
- Outline design of transmission main and distribution system;
- Cost estimation

The water demand of Naf Tourism Park is about 1.61 MLD for serve 4,200 nos. tourist and 1,700 nos. workforce daily. Whereas water demand for Sabrang Tourism Park is about 15.46 MLD to serve 61,360 nos. tourist and 14,600 nos. workforce daily. To fulfill water demand conjunctive use of different water sources and different options have been analyzed. The main water sources are:

- Groundwater
- Rooftop rainwater harvesting
- Dam-reservoir water in Teknaf

- Desalination plant
- Rainwater harvesting in the proposed lake area

The development of Naf Tourism Park is planned to be completed in 2031 and of Sabrang Tourism Park in 2036. Accordingly, the water supply and development of different infrastructures have been planned in four phases: Phase1 (2021-24), Phase 2 (2024-26), Phase 3 (2026-31), and Phase 4 (2031-36). SWOT analysis for different options has been prepared and the most suitable option has been selected. The tentative project cost for the suitable option is about 5,153 Million BDT which is in four-phase up to full development in 2036. It is recommended to use the building rooftop of area >300m² for rooftop rainwater harvesting. Moreover, a metering system is proposed for easy maintenance of the supply system and BEZA should develop its own O&M mechanism.



Base map of Naf and Sabrang Economic Zone

Understanding the Sea Level Rise Dynamics--Bangladesh Coast

The Climate Change Cell (CCC) of IWM is conducting “Understanding the Sea Level Rise Dynamics of Bangladesh along the Coast”, a two-year project and in partnership with the UK Met Office under ARRCC (Asia Regional Resilience to a Changing Climate) Programme funded by the UK Foreign Commonwealth and Development Office (FCDO). This study project will focus on the zone-wise and seasonal relative sea-level rise along the coast of Bangladesh with future climate scenario projection. The study area covers the whole coastal zone of Bangladesh. The specific objectives are:

- Investigate zone wise variation of sea level along the coast (for the three coastal zones separated as West, Central, and East)
- Find a seasonal variation of sea level along the coast
- Simulate sea level rise in the near future (2035-2065, 2070-2100) in different scenarios (RCP 4.5 & 8.5)
- Simulate sea level rise including local influences such as subsidence, tidal modulation, ENSO, etc.
- Investigate polder inundation extent and overtopping due to sea-level rise and increased storm surge

The following major works are being carried out to achieve the objectives:

- Collection and review of past study reports/maps relevant to the study.
- Collection of required data available from relevant secondary sources and primary sources
- Development of detailed methodology through consultation meeting with Stakeholders and Experts
- Analysis of tidal gauge data
- GCM downscaling, bias correction and data preparation
- Updating and calibration of GBM basin model, river model, and Bay of Bengal model
- Simulation of GBM, river and BOB model for present and future scenarios of local sea-level rise by the inclusion of updated Digital Elevation Model (DEM)
- Sea-level Rise Assessment in different Climate scenarios (RCP 4.5, RCP 8.5, the year 2050, the year 2100) – including ENSO, Subsidence and Tidal Modulation
- Assessment of polder overtopping for selected polders due to increased storm surge

- Development of Database and Web application
- Video documentary creation from field visits and survey

Under this ongoing project, the 1st stakeholder consultation workshop was held in February 2021 on virtual platform zoom. It brought together the researchers, providers, organizations, and users of future sea-level rise information and experts to discuss and identify needs, gaps, and issues related to sea-level rise information available for the coastal areas of Bangladesh. Based on the comments and suggestions, the methodology of the study has been fine-tuned. A detailed inception report has been submitted to the UK Met Office including an extensive literature review on global and regional sea-level rise and the different dynamics of it playing in the Bay of Bengal. The inception report also includes a detailed methodology focusing on data collection plan and survey plan, climate model downscaling and bias correction methods, numerical model development-calibration and validation methods (GBM basin model, River model, and Bay of Bengal model), and sea-level rise assessment methods including subsidence, impact from El Nino-La Nino effect on local sea level and tidal modulation.



Stakeholder consultation workshop, held on Zoom platform

Assessment of Sustainable Potable Water Sources in the Selected Coastal Areas of Bangladesh

The Coastal Zone is one of the six hotspots considered in Bangladesh Delta Plan 2100. The selected study area are Coastal Polders P-29 at Dumuria of Khulna and P-40/1 at Patharghata of Barguna in Bangladesh.

The coast of Bangladesh is known as a zone of vulnerabilities as well as opportunities. The combination of natural and man-made hazards has adversely affected lives and livelihoods in the coastal zone and slowed down the pace of social and economic developments in this region. Even after 50 years of liberation, assurance to access safe drinking water to all the dwellers of coastal polders remains a great challenge. Providing adequate drinking water of acceptable quality is a necessity. Ensuring the sustainable, long-term supply of such drinking water is

of national and international concern. Considering the issue of drinking water insecurity in coastal polders of Bangladesh, a research study is formulated to develop a methodology to sustain potable drinking water sources in terms of quality and quantity for the selected polders (P-29 and P-40/1). Polder P-40/1 is situated in the vicinity of the coastline and P-29 is around 75km away from the coast. Literature review, social survey, geophysical survey, hydro-geochemical survey and groundwater salinity modelling are the major activities under this project. Baseline information for existing drinking water sources, existing and future water demand and sources of the study area, and way forward for suitable and cost-effective water purification methods are the expected major output of this study.



A village girl is collecting water from PSF.



IWM R&D team is conducting in-situ Arsenic test.



DU team is conducting Geo-physical Survey.



Household survey by Social Survey team

NEW EXECUTIVE DIRECTOR AND DEPUTY EXECUTIVE DIRECTORS OF IWM PAY HOMAGE TO BANGABANDHU MAUSOLEUM AT TUNGIPARA

The newly appointed Executive Director and Deputy Executive Directors of the Institute of Water Modelling (IWM) pay homage to the Father of the Nation Bangabandhu Sheikh Mujibur Rahman at the Mausoleum at Tungipara, Gopalganj. Mr. Abu Saleh Khan, Executive Director, IWM was accompanied by Deputy Executive Director (Operations), IWM, Mr. Zahirul Haque Khan and Deputy Executive Director (Planning & Development) Mr. S. M. Mahbubur Rahman and Head of Business Mr. M. Samiun Nabi. They paid homage by placing floral wreaths at the mazar of the Father of the Nation at Tungipara.

After placing the wreath, Mr. Khan and his team of IWM stood there in solemn silence for some time as a mark of profound respect to the memory of Bangabandhu Sheikh Mujibur Rahman, the architect of the country's independence.

Mr. Khan and his team, then, offered Fateha and joined a munajat seeking eternal peace of the departed soul of Bangabandhu and his parents and those martyred on 15th August 1975. Prayers were also offered for the well-being of Honorable Prime Minister Sheikh Hasina,

the country's continued peace, progress and prosperity.

After that, Mr. Abu Saleh Khan signed the guest book at the Mausoleum.

It may be mentioned that the Institute of Water Modelling (IWM), a Trust organization affiliated with the Ministry of Water Resources, Government of the People's Republic of Bangladesh, was established by the Honorable Prime Minister Sheikh Hasina in 1996 by a cabinet decision.



Executive Director and Deputy Executive Directors of IWM paid homage by placing floral wreaths at the Mazar of the Father of the Nation

HONORABLE CHAIRPERSON OF IWM BOARD OF TRUSTEES (BOT) & SENIOR SECRETARY MINISTRY OF WATER RESOURCES MR. KABIR BIN ANWAR VISITS IWM BHABAN



The Executive Director of IWM Mr. Abu Saleh Khan welcomes Honorable Chairperson, IWM BOT with flower bouquet



Inspecting the development of construction work of IWM Bhaban



Bangabandhu Corner at IWM Bhaban



Honorable Chairperson discussing with the top Management of IWM at IWM Bhaban

Some of the Major Enents and Contract Signing Ceremony



A contract signing ceremony for the project titled, "Prepare the master plan to protect Meghna River from pollution and increase navigability", was held on 23rd January, 2021 at Pan Pacific Sonargaon Hotel between the a High level Committee of Local Government Division (LGD) and IWM. In this program Hon'ble Minister of Local Government, Rural Development and Cooperatives Mr. Md. Tajul Islam, MP; Mr. Helal Uddin Ahmed, Senior Secretary, LGD; Engineer Taksem A Khan, Managing Director, Dhaka WASA; Mr. Abu Saleh Khan, Executive Director, IWM and many other local and foreign dignitaries were present. The program was broadcasted online.



A contract signing ceremony between Water Resources Planning Organization (WARPO) and IWM for the project titled, "Hydrological investigation and modelling of the state of surface and groundwater resources in the Barind region", was held on 1st February, 2021 at WARPO Conference Room, Green Road. In this program Director General of WARPO Mr. Md. Delwar Hossain; Mr. Md. Alamgir Hossain, Director (Planning), WARPO; Mr. Md. Rezaul Karim, Principal Scientific Officer(Engineering), WARPO; Mr. Abu Saleh Khan, Executive Director of IWM; Mr. Zahirul Haque Khan, DED (Opn.) of IWM; Mr. Goutam Chandra Mridha, Director of IRM division of IWM and many other senior officials were present.



IWM has signed a contract with 24 Engineer Construction Brigade of Bangladesh Army for the project titled, "Hydrological Monitoring and Implementation Support Service in connection with Dredging/Re-Excavation of Bangali-Karotoa-Fuljor-Hurasagor River System with Bank Protection" on 17th June, 2021. In this program Lt. Colonel Kismat Hayat, Project Director of this Project and Mr. Md. Amirul Islam, Director of SDT division signed the contract on behalf of IWM. Major Muhammad Shah Alam from Bangladesh Army, Mr. Pankaj Kumar Maitra, Associate Specialist, Mr. M. Samiun Nabi, Head, Business & Strategy of IWM and other senior officials were also present there.



Dr. Craig Meisner, former International Technical Adviser at Food and Agriculture Organization (FAO), visits IWM on 23 June 2021. Mr. Abu Saleh Khan, Executive Director of IWM, greeted Dr. Meisner with a crest of IWM in presence of senior officials of IWM Mr. Zahirul Haque Khan DED (Opn.), Dr. Mollah Md. Awlad Hossain, Director ICT-GIS Division; Mr. Goutam Chandra Mridha, Director, IRM Division.

IWM Observing Different National Days



IWM pays homage to celebrate The Victory Day at National Monument, Savar on 16 December, 2020

IWM Bhaban was illuminated with decorative lighting to celebrate the Victory Day 16 December 2020



IWM Observes International Mother Language Day 2021

IWM Tribute to the National Memorial for the celebration of Independence Day, March 26, 2021



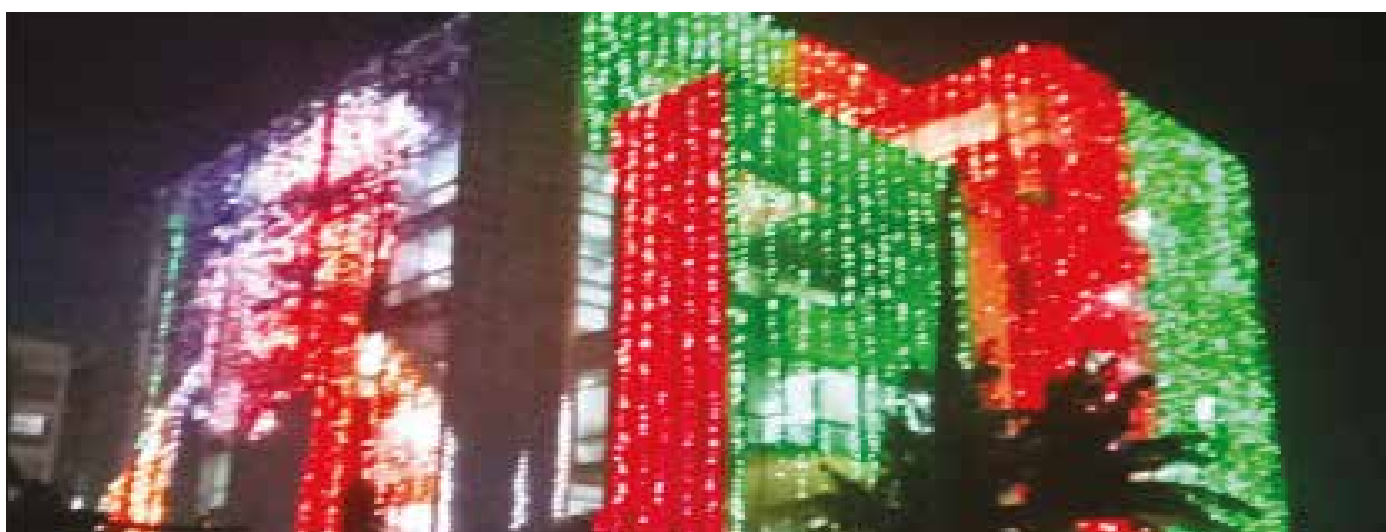
IWM Celebrates the Birth Centenary of the Father of the Nation, Bangabandhu Sheikh Mujibur Rahman



IWM participation in the celebration of the birth centenary of the Father of the Nation, 17 March, 2021



IWM paid homage by placing floral wreaths at Banganadhu Memorial at road 32, Dhanmondi



IWM Bhaban was illuminated with decorative lighting and banner to celebrate the Day



IWM Bhaban, House 6, Road 3C, Block H
Sector 15, Uttara, Dhaka 1230
Tel: +88 02 55087611-4, Fax: +88 02 55087615
Website: www.iwmbd.org

