



# PROFILE





# IWM Profile



# IWM CORPORATE PROFILE

## About us

IWM is a self-sustained and independent Trust established in 1996. IWM service includes but not limited to Policy Support, Capacity Building, Research and Innovation, Development Advisory and Consultancy Services. IWM is a unique organization in Bangladesh that provides World class services in the fields of Water Resources Management, Water Supply, Sanitation and Urban Drainage Management, Coast, Port & Estuary Management, Flood Management, Irrigation Management, Survey and Data, ICT- GIS and River Engineering for improved and sustainable Water Resources Management leading to Green and Climate Resilient Development. IWM also provides technical support related to Climate Finance, Carbon Credit and Disaster Risk Financing. IWM operates under the guidance of the Board of Trustees (BoT). The Secretary of the Ministry of Water Resources is the Chairperson of the BoT. IWM is an ISO certified institute. IWM has been awarded and successfully completed thousands of projects in Bangladesh. Besides the institute has expanded its services to Malaysia, India, Nepal, Sri Lanka, Tajikistan, Turkiye, the Philippines and USA.

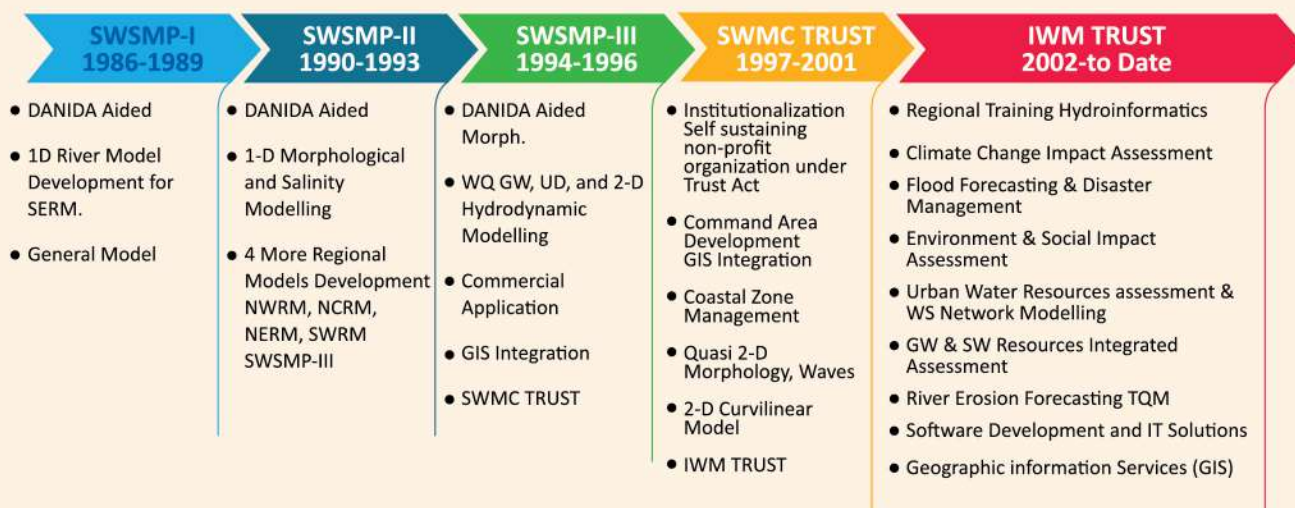
## ORGANIZATIONAL INFORMATION

01.	Name of the Company	:	INSTITUTE OF WATER MODELLING
02.	Acronym	:	IWM
03.	Type of Organization	:	Trust Organization
04.	Business Registration	:	Registered under the Trust Act of the People's Republic of Bangladesh on 24th December 1996 (Registration No. IV- 34, 2002)
05.	Office Address (Bangladesh)	:	IWM Bhaban, House 06, Road 3C, Block H, Sector 15, Uttara, Dhaka-1230, Bangladesh. Tel: 880 55087611-14, Fax: 880 55087615 E-mail: iwm@iwmbd.org, Website: www.iwmbd.org
06.	Office Address (Malaysia)	:	Institute of Water Modelling Malaysia Sdn Bhd NO.1, Jalan Ielok Impian 4, Taman Ielok Impian, 43000 Kiang, Selangor, Malaysia. Tel: +6012 2572878, Email: iwm@iwmbd.org
07.	Place of Incorporation/Registration	:	Dhaka, Bangladesh
08.	Number of Years in Operation	:	Operating since December 1996~ More than 28 years
09.	VAT Registration No.	:	5071018462
10.	Income Tax TIN No.	:	053-300-1284/C-22
11.	Registration and Enlistment	:	World Bank (WB) Vendor Identification No. 81263 Asian Development Bank (ADB) CMS No. 002263
12.	Total Number of Employee	:	More than 450
13.	Total Number of Completed Projects	:	More than 1000



# GENESIS

IWM was established as an independent organization under Trust Act in December 1996 to function as a Centre of Excellence and learning in the field of Computational Hydraulics, Water Modelling and Allied Sciences. Since then, IWM provides world-class services in the field of Water Modelling, Computational Hydraulics & Allied Sciences for improved and sustainable Water Resources Management. Through its state-of-the-art services, IWM has earned for itself an enviable place in the country's consultancy realm. It is some what an inimitable organization in the region having sustainable technological capability in developing mathematical models and decision support systems for both surface and groundwater as well as related environment. The applications of IWM modelling tools cover a wide range of water related aspects such as flood control, flood forecasting, water supply and sanitation, irrigation and drainage, water resources management, river morphology, salinity and sediment transport, coastal hydraulics, port, coast and estuary management, environmental impact assessment, bridge hydraulics and related infrastructure development.



IWM owes its genesis to the Surface Water Simulation Modelling Programme (SWSMP) that was launched in 1986 by the Ministry of Water Resources under the then Master Planning Organization (MPO) with the assistance of UNDP and the World Bank to develop sustained high level of analytical capabilities by use of state-of-the-art mathematical water modelling. With an added impetus generated by the two disastrous floods of 1987 and 1988, for developing a sustainable professional institution in carrying out all the mathematical water modelling tasks in Bangladesh, including hosting of all Flood Action Plan models the SWSMP continued in its 2<sup>nd</sup> and 3<sup>rd</sup> phases with the assistance of DANIDA by forming a new project organization Surface Water Modelling Centre (SWMC). By the end of 1996, SWMC was transformed into an independent self-sustained organization under the Trust Act 1882. From the 1<sup>st</sup> August, 2002 Surface Water Modelling Centre (SWMC) has been renamed as IWM in matching with its research and learning status created in its user community.

## VISION

IWM aims to become a world-class institute for Service and Research in Land and Water, Climate, Environment, ICT and providing smart solutions for enhancing quality of life.

## MISSION

IWM functions as a center of excellence and research in the fields of Land and Water Environment, Climate, ICT-Solutions, It provides intelligent solutions and professional services to enhance the quality of planning, design, implementation and monitoring by applying state-of-the-art technology.

## INTERNATIONAL PRESENCE

-  Head Office
-  Regional Office
-  Geographical Working Experience
-  Institutional Alliances



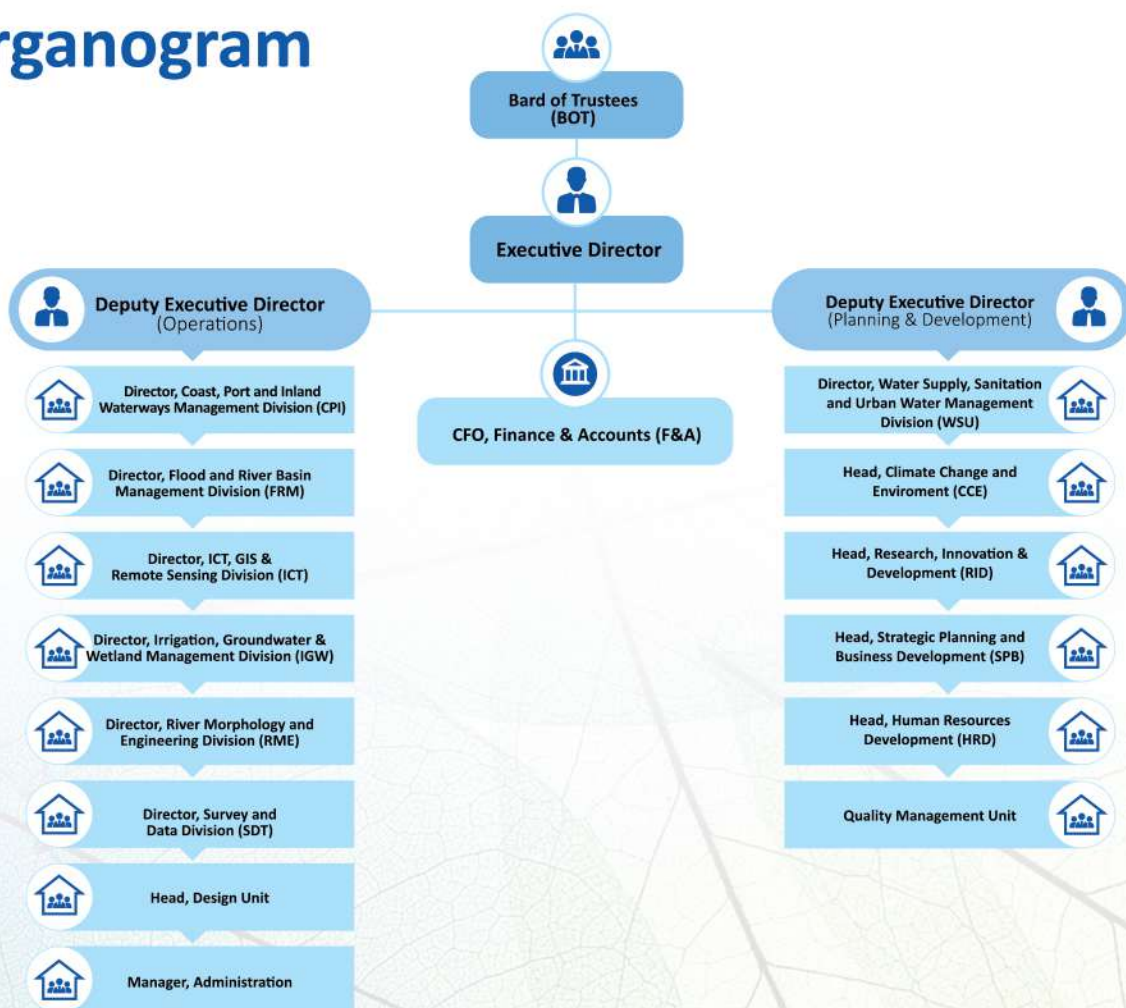
IWM Global work Experience and Alliances



## IWM MANAGEMENT

The Board of Trustees comprising fifteen members from reputed national and international organizations is the governing body and gives policy guidelines to the management. The Secretary, Ministry of Water Resources is the Chairperson of the Trust. The daily management is the responsibility of the Executive Director. IWM services are offered through seven divisions and a few units as seen in the organogram.

## Organogram



# BOARD OF TRUSTEES

1. **Secretary**  
**Ministry of Water Resources & Chairperson**  
**IWM Board of Trustees (BoT)**  
Building: 6, Room: 409, 4th Floor Bangladesh Secretariat, Dhaka-1000.
2. **Director General**  
**Bangladesh Water Development Board (BWDB)**  
Pani Bhaban, 72, Green Road, Dhaka-1000  
Member, IWM Board of Trustees
3. **Chief Engineer**  
**Roads and Highways Department (RHD)**  
Sarak Bhaban, Tejgaon Dhaka-1208  
Member, IWM Board of Trustees
4. **Chief Engineer**  
**Local Government Engineering Department (LGED)**  
LGED Bhaban, Sher-e-Bangla Nagar, Dhaka,  
Member, IWM Board of Trustees
5. **Chief Engineer**  
**Department of Public Health Engineering (DPHE)**  
14, Shaheed Captain Mansur Ali Sarani,  
Kakrail, Dhaka-1000.  
Member, IWM Board of Trustees
6. **Director General**  
**Water Resources Planning Organization (WARPO)**  
WARPO Bhaban, 72 Green Road, Dhaka-1215  
Member, IWM Board of Trustees
7. **Additional Secretary, Admin & TDM**  
**Ministry of Finance**  
Bangladesh Secretariat, Dhaka  
Member, IWM Board of Trustees
8. **Additional Secretary**  
**Irrigation Wings**  
**Planning Commission, Ministry of Planning**  
Block: 17, Room: 20, Sher-e-Bangla Nagar,  
Dhaka-1207  
Member, IWM Board of Trustees
9. **Chief Engineer, Water Resources Department**  
**Danish Hydraulic Institute (DHI)**  
Region Hovedstaden, 443 for bindelser, Denmark  
Member, IWM Board of Trustees
10. **President**  
**The Institution of Engineers, Bangladesh (IEB)**  
Ramna, Dhaka-1000  
Member, IWM Board of Trustees
11. **Head**  
**Department of Water Resources Engineering, BUET**  
Civil Engineering Building, 6<sup>th</sup> Floor, BUET, Ramna,  
Dhaka-1000  
Treasurer, IWM Board of Trustees
12. **Chairman**  
**Bangladesh Inland Water Transport Authority (BIWTA)**  
BIWTA Bhaban, 141-143 Motijheel C/A, Dhaka-1000  
Member, IWM Board of Trustees.
13. **Director General**  
**Department of Environment (DOE)**  
Paribesh Bhaban, E/16 Agargaon,  
Sher-e-Bangla Nagar, Dhaka-1207  
Member, IWM Board of Trustees
14. **Director General**  
**Department of Bangladesh Hoar and Wetland Development (DBHWD)**  
DBHWD Bhaban, 72 Green Road, Dhaka-1215  
Member, IWM Board of Trustees
15. **Executive Director**  
**Institute of Water Modelling (IWM)**  
IWM BHABAN, House 06, Road 3C, Block H,  
Sector 15, Uttara, Dhaka 1230, Bangladesh  
Member Secretary, IWM Board of Trustees



## AREA OF EXPERTISE

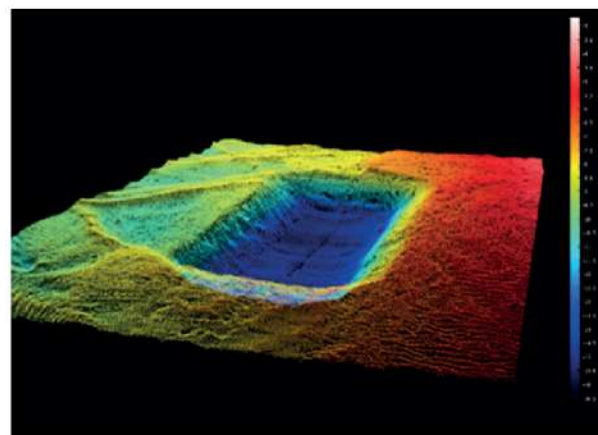
IWM has a high degree of competence in the field of computational hydraulics. Today IWM models are widely applied in Bangladesh to study river flow and floods, irrigation and drainage, water supply and sewerage, morphology and sediment transport, salinity, and water quality, off take dynamics, coastal and offshore-hydraulics, marine environment and groundwater flow processes. Hydrodynamic models are also applied to support the planning of dredging at riverbeds, hydraulic design of bridges and river training works, cooling water studies for power plants, siltation at the port and harbours, coastal protection, land reclamation and navigation route maintenance, flood forecasting and warning, sea level rise, biodiversity conservation, urban water management, rural water supply, master plan etc. IWM has also developed its expertise on Climate Change Impact Study, Atmospheric Modelling, Numerical techniques in weather forecasting, Dynamic Meteorology, Air Pollution Modelling, etc. In developing the models, IWM undertakes its own data collection campaign and has earned a high reputation for fast and cost effective topographic and hydrographic surveys in large rivers using state-of-the-art technologies and equipment such as Multibeam Echosounder, 3D Laser Scanner, RTK-GPS, DGPS, Digital Echosounder, ADCP, directional current meter and turbidity meter. IWM is continuously increasing strength and capacities of survey by procuring new equipment, software and training.

SL	Area of Expertise	EXPERTS
1	Climate Change, Climate Finance, Carbon Credit	10
2	Coastal Hydraulics and Morphology	33
3	Computer System Management	13
4	Engineering Survey & Investigation	21
5	Environment	7
6	Estuary and Marine System Management	17
7	Flood Management	25
8	Fluvial Hydraulics and River Morphology	14
9	Geographic Information Systems	13
10	Ground Water Management	17
11	hydrographic Survey	70
12	Hydro-meteorological Measurements	29
13	ICT and GIS	17
14	Inland Waterways Management	16
15	Integrated Coastal Zone Management	32
16	Integrated Water Resources Management	38
17	Irrigation Management	24
18	Laboratory Analysis of Sediment Samples	31
19	Offshore Structure and Pipelines	1
20	Port and Coastal Structure Management	9
21	Remote Sensing	4
22	River Engineering	24
23	Software Management and IT Solutions	15
24	Topographic Survey and Mapping	61
25	Urban Water Management	32
26	Water Quality & Ecology	27
27	Water Quality Investigation	5
28	Water Quality Management	2
29	Water Supply and Sanitation	13
30	Wetland and Lakes Management	9



# OUR SIGNATURE OUTPUTS/PRODUCTS

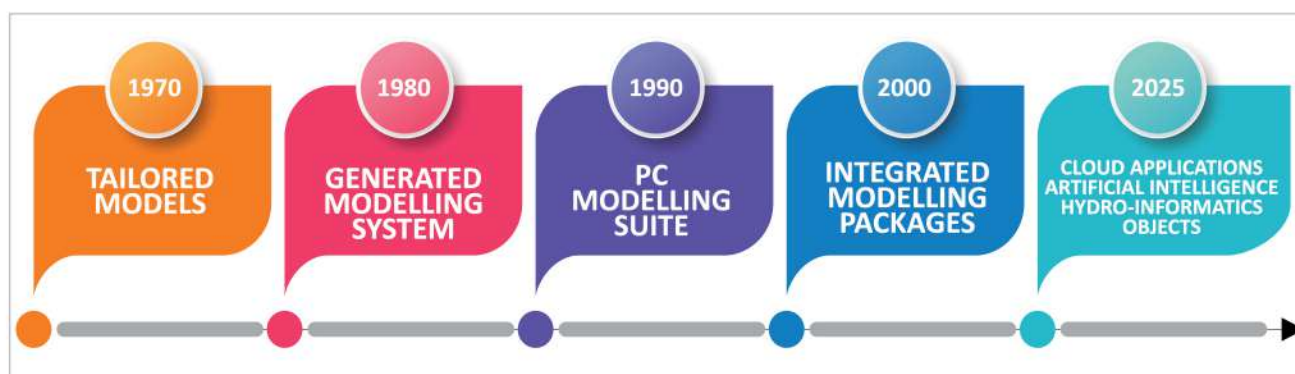
- DSS for Irrigation Management
- DSS for Flood Management
- DSS for Water Resources Management and Project Screening
- DSS for Reservoir Operation
- DSS for Coastal Zone Management
- Poribesh: Judgement Engine for Environmental Impact Assessment
- 1- Dimensional Model
- 2- Dimensional Model
- 3- Dimensional Model
- Ganges, Brahmaputra, Meghna (GBM) Basin Model
- Bay of Bengal Model
- Water Supply and Sewerage Management Model
- Web application for Crop Zoning
- Internet Based River Information System
- Water Information Management System
- Information System for Designers and Planners
- National Water Resources Database
- Scheme Information Management System of BWDB



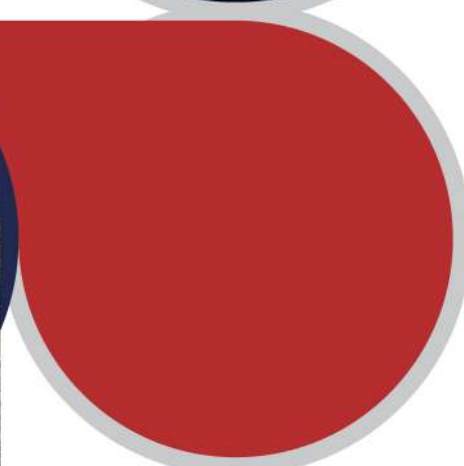
Trial Dredging Pit Monitoring at Kutubdia Channel by MB2

## OUR SERVICES

Demand of IWM services and products has grown towards more integration of the numerical modelling tools and state-of-the-art data campaigns in holistic approach for providing solutions more towards decision support system (DSS) for the planners, designers and water ecosystem scientists. With increased demand from the users for integrated solutions, the water modelling software developers are also fast upgrading their software products with integration of modelling software of related processes and with addition of Hydroinformatics modules of DSS as shown in the following figure:



The services of IWM include decision support services in a holistic approach with the application of water modelling, computational hydraulics and allied sciences in enhancing the quality of planning and implementation activities in the following fields.







# COASTAL HYDRAULICS WITH HYDROMORPHOLOGICAL STUDY

## Coastal Zone Erosion Management

Coastal erosion is a major challenge for Bangladesh. Natural forces such as storm surge and sea level rise due to climate change coupled with coastal infrastructure development are contributing to the erosion process. The main challenges is to assess the tasks associated with natural phenomenon and design infrastructure solutions to achieve the desired objective. IWM has extensive experience in management of coastal erosion at home and abroad.

Solutions offered by IWM includes:

- 2D morphological modelling of the coast and the estuaries for optimum design of erosion management options.
- Assessment of erosion and accretion along the coast and in the estuaries.
- Modelling of waves, flow and sediment transport.
- 2D hydrodynamics model of river and estuary, simulation of flow, water level and current speed.
- Assessment of sedimentation in the river/tidal basin.
- Movement of char and shifting of river thalweg.
- Sediment plume dispersion, river flow distribution and channel morphology due to dredging activity.

## Long Shore Transport & Shoreline Movement

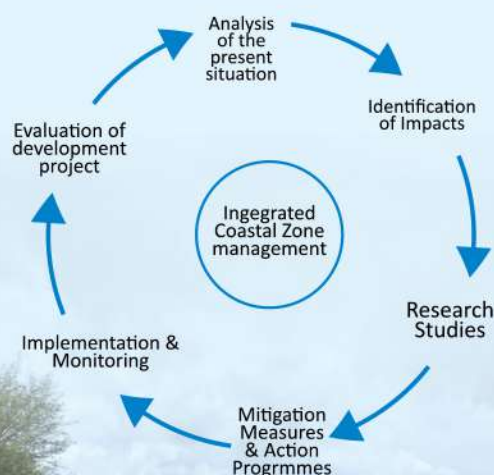
Expertise in this discipline comprises of development and application of advanced methods in response to challenges from a large number of coastal projects including advanced sand transport model capable of demonstrating the transport in any combination of waves and current, including conditions in the surf zone. Following outputs are generally envisaged from services in this discipline:

- Longshore sediment transport
- Shoreline management
- Coastal impact
- Sedimentation in harbors and navigation channels



## Integrated Coastal Zone Management

Integrated Coastal Zone Management (ICZM) is the integrated planning and management of coastal resources and environments. ICZM implies the integration of environmental protection goals into economic and technical decision-making processes with the objective of achieving sustainable development. IWM's services would cover the following main themes: resource assessment, coastal flood forecasting and management, cyclonic surge forecasting, impact assessment of development activities, cyclone risk and damage assessment.



## Modelling Tools

Use of state of the art modelling tools like MIKE Package of DHI (MIKE 11, MIKE 21FM, LITPACK etc.) and DELTARES Software Suites like (Delft 3D) IWM has long and vast expertise in Coastal Hydraulics with Hydro Morphological Studies, Integrated Coastal (ICZM), Shoreline Zone Management Movement and Long-Term Morphological Prediction in River and Estuaries etc.

## Flagship Projects

Coastal Embankment Improvement Project-I (CEIP-I)

Long Term Monitoring, Research and Analysis of Bangladesh Coastal Zone.

Coastal Hydraulics and Morphological Study for Protection of Marine Drive Road

Hydrological and Morphological Study for Extension of Runway at Cox's Bazar Airport

Environmental and Social Assessment Study for the Bangladesh Regional Waterway Transport Project- 1

Hydrological and Morphological Study for Installation of 33 KV Submarine Cable from Chattogram to Swandip under Chattogram Zone Power Distribution System Development Project, Chattogram

Technical Feasibility of Embankment-cum-road and Water Management Systems for Economic Zone-4 at Sonadia- Ghotibhanga Islands, Moheskhal, Cox's Bazar.



# NAVIGATION CHANNEL & PORT MANAGEMENT

## Dredging & Navigation Improvement

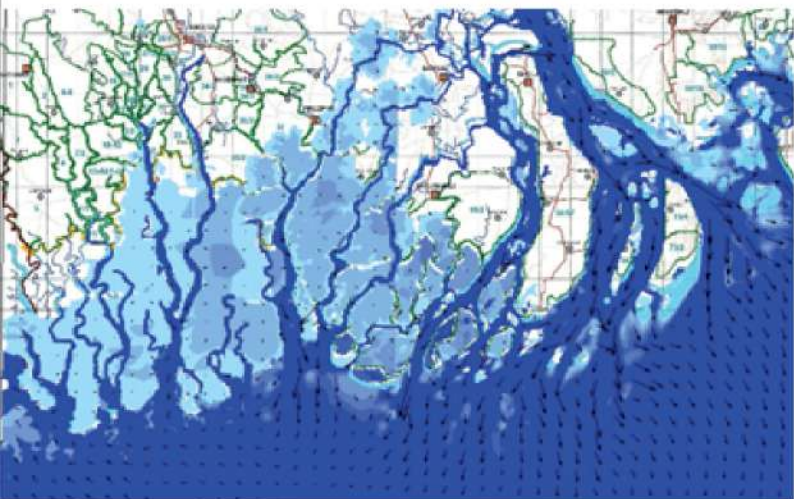
Transportation through waterways is environment friendly and relatively cheap mode of transport. Inland waterways are important to maintain transport link between various remote parts of the country. Over the decades the navigability during dry season in many rivers of the country has been deteriorating because of morphological processes. IWM has vast experience in river hydraulics and morphological dynamics of the river systems. At the moment dredging is the only effective method to improve the navigation of inland waterway transport. IWM uses state of the art modelling technique to find out the most effective dredging alignment and backfilling rate of the channel.

## Navigation Port Design

Passenger and cargo movement in the inland waterway is crucial for economic activity. A well-organized/designed navigation port ensures seamless business activity. IWM provides its consultancy services to BIWTA, Port Authority and other private institutions for port design.

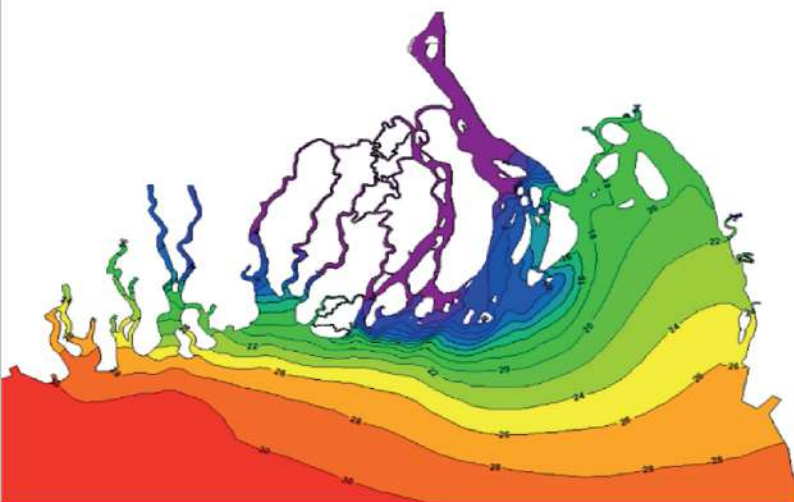
IWM proposed modernization of the following inland navigation ports (Khulna, Borguna, Narsingdi, Golachipa, Meghna, Sunamganj, Sirajganj-Jagannathganj, Ghorashal, Kanchpur, Daudkandi-Baushia River Port etc). IWM Also proposed the suitable location and design/layout and animation for three new inland navigation ports at Bagabari, Nagarbari and Chilmari (along Jamuna river).





## Cyclonic Storm Surge Risk Assessment

IWM has vast modelling experience, with highly efficient computing hardware and state of the art simulation software for Storm Surge modelling and forecasting. From the track and anticipated movement of cyclone track IWM can simulate the movement of cyclone in one- or two-day advance.



## Salinity Intrusion Modelling

IWM has calibrated salinity model of the Bay of Bengal and the rivers in the coastal zone. Salinity intrusion in the rivers of the coastal zone can be simulated under various hydrological and climate scenarios. Impact of Sea level rise, upstream fresh water flow and human intervention on salinity intrusion can be simulated with these models. Applying relative mean sea level rise movement of salinity isoline due to climate change can be simulated.

## Modelling Tools

Using state of the art modelling tools like MIKE packages of DHI (MIKE 11, MIKE 21FM, LITPACK etc.) and DELTARES (Delft 3D) Software Suite.

IWM has long and vast expertise in Cyclone Storm Surge Model, Bay of Bengal Model, Salinity Intrusion Model, Integrated Coastal (ICZM), Shoreline Zone Management Movement and Long-Term Morphological Prediction in River and Estuaries etc.

## Flagship Projects

Supervision and Monitoring the Performance 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.

Technical Feasibility Study for Planning and Design of Long-Term Erosion Mitigation Measures of Feni River at Downstream of Feni Regulator.

Monitoring and Evaluation of the Hydrological & Morphological Conditions of Rivers and Drainage Problems of Beels in the KJDRP area for the Planning of Drainage Improvement Measures under Southwest Area Integrated Water Resources Planning and Management Project (SAIWRPMP) under ADB Loan No.2200 BAN (sf) and GoN Grant No. 0036 BAN



# FLOOD FORECASTING

## & Disaster Management

### Flood Forecasting

Flood Forecasting and Warning Center (FFWC) of Bangladesh Water Development Board operates a real time numerical model developed by IWM, based on one dimensional fully hydrodynamic module (MIKE 11 HD) incorporating all major rivers and floodplains of the country. IWM is well equipped to develop such systems not only in Bangladesh but also in other countries. IWM has extensive experience in flood forecasting system development. For forecast generation, IWM carries out following tasks:

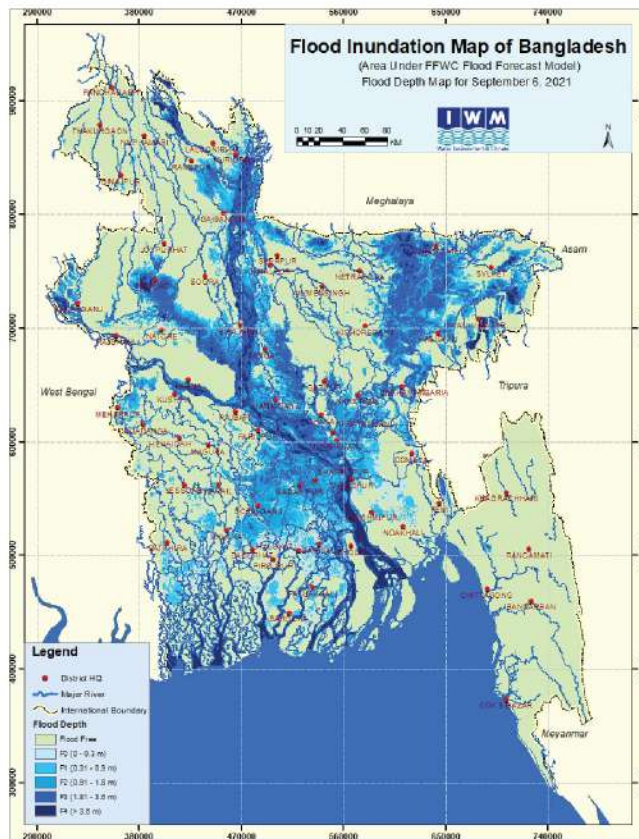
- Real-time data collection and processing through automated system
- Weather Forecast generation using WRF model
- Automatically computes cross border inflow, and produce flood forecast inside the country with lead time of five days

### Disaster Management

To mitigate the recurrent flood damage, flood forecasting is used as an efficient non-structural flood induced disaster management system. The flood forecasting model can be applied to produce:

- Flood forecast in all significant channels and flood plains in any target areas with 5 days lead time.
- Flood forecast generated on the channels are then transferred/extrapolated to nearest object/places: Union Parishad Offices, Schools, Madrasa, Mosques, Village Markets, and any other desired places that is identified as crucial to the local community.





Flood Inundation Map of Bangladesh

## Flood Risk Management

Around 20% of the country is affected by flooding of different depths even in an average hydrological event, and that may be raised up to 70% under higher hydrological storm like 100 years return period. Flood Risk Management of Bangladesh can be assessed based on six regional models of IWM covering river systems of the country. These impressive tools provide immediate solution, data and suggestions in the regional scale desired by planners and policymakers.

## Modelling Expertise

Using state of the art modelling tools like MIKE HYDRO, MIKE FLOOD, MIKE BASIN, MIKE+, etc. IWM has long and vast expertise in flood forecasting and disaster management projects. IWM is now working with some globally available free of cost software like HEC Packages, SWAT, WRF, etc.

## Flagship Projects

Research and Prediction Modelling Through Upgrading of Flood Forecasting System by Increasing Lead Time, a Introducing Location Specific Flood Warning.

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.

Khatlon Province Flood Risk Management Project (KPFMRP), Tajikistan

Local Level Flood Forecasting Applying Remote Sensing Technology in River Basin Management of Bangladesh

Flood Forecast Technology for Disaster Preparedness in Bangladesh

Consolidation and Strengthening of Flood Forecasting and Warning Services

Updating and Maintenance of Flood Forecasting & Warning System of FFWC, BWDB



# DEVELOPMENT OF GANGES, BRAHMAPUTRA, MEGHNA (GBM) BASINS MODEL

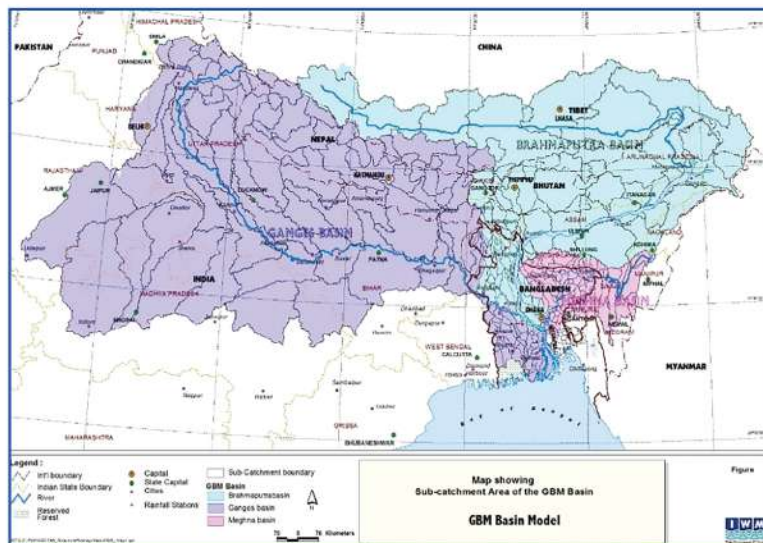
## And Its Application

Bangladesh is a deltaic country and comprises a large number of rivers. Around 58 nos. of rivers originated outside the country. The rivers of Bangladesh drain a basin area of around 1.73 million sq. km out of which 1.59 sq. km (92%) is cross-border area, and the remaining 0.14 million sq. km (8%) is located inside the country. Five major rivers: Brahmaputra, Dharala, Dudkumar, Teesta and Ganga are both snow and rainfed while the rest are rain fed only. The huge cross-border basin area produces significant amount of water flow during monsoon months (June-September) which causes floods in the country almost every year. Moreover, the round the year water use in the country and salinity front intrusion depends on the water flow from the upstream rivers. The

management of water including recurrent floods in Bangladesh requires through knowledge on climate and hydrology, physical setting, water use of the basin located in cross-border area. Addressing the stated crucial items of basin water regime, IWM has developed 'GBM Basin Model' covering the three major river basins: the Ganges Basin, the Brahmaputra Basin and the Meghna Basin. Areal extent of the GBM Basin Model is around 1526733 sq.km: Ganges Basin 979503 sq. km, Brahmaputra Basin 520663 sq. km. and Barak Basin (Meghna Basin) 26567 sq. km.

The GBM basins model has been developed and calibrated which is capable of generating the trans-boundary inflow coming to Bangladesh. The model has been developed in MIKE HYDRO Basin which is a versatile and highly flexible model framework for a large variety of applications concerning Management and Planning aspects of water resources within a river basin. MIKE HYDRO Basin models utilize a river network and catchments within the specific river basin as the basic model-data.

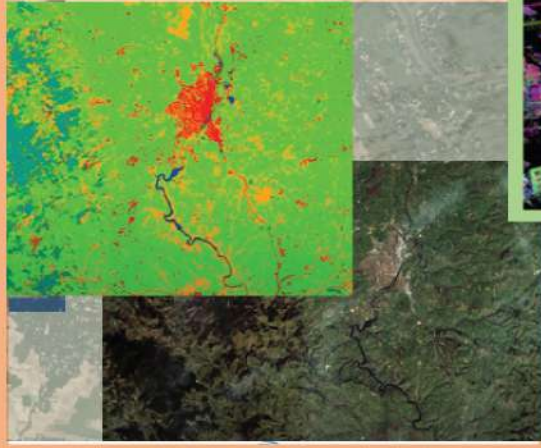
The GBM model comprises of 133 sub-catchments using 664 rainfall stations (10 in China, 511 in India, 40 in Bhutan, and 21 in Bangladesh), evaporation stations of 28 nos., and temperature stations of 4 nos. Annual or monthly estimated potential evaporation data have been downloaded at 28 stations from reports, publications, etc. available in public domain. Daily high, low and average temperature data at 4 stations in the snow or glacier areas of the GBM basin have been collected from public domain. The complex glacier melt phenomenon is not defined in the model. Lumped features of the water retention and control structures (reservoirs and dams) within India, Nepal and Bhutan are incorporated in the model based on information available in secondary sources. Time series runoff at each catchment is given as input at the catchment nodes of the basin. MIKE HYDRO Basin then routes the inflow given at all catchments to the outlets using hydrological routing method: Linear reservoir, Muskingum, Wave translation. The model is calibrated at three key stations: Hardinge Bridge, Bahadurabad and Amalshid inside Bangladesh; and also been calibrated in some of the sub-catchments like Karnali, Narayani and Koshi river basins in Nepal. The GBM basin model is well representative of the basin, and is now being frequently used in assessment of water resources, cross border inflow forecasting, and impact assessment due to change of climate, land use, and water use in the basin.







GIS Analysis and Mapping



Satellite image processing



Photogrammetry and LiDAR data processing

# ICT & GIS SOLUTIONS DEVELOPMENT

IWM has a long history of implementing projects related to Information & Communication Technology (ICT) and Geographic Information Systems (GIS), along with mathematical modelling tools & techniques for providing professional services in Water Resources Planning and Management. Over the years, it has gained huge experiences in providing ICT-GIS solutions to different public and private organizations using advanced technologies for diverse applications. The organization specializes in advanced analyses and mapping, including topographic and cadastral mapping, image classification, feature extraction, photogrammetry, LiDAR data processing and 3D terrain modelling.

IWM has also made significant contributions to national projects by developing comprehensive national databases, interactive information systems and Decision Support Systems (DSS) tailored for public sector organizations.

The ICT Division at IWM boasts a team of highly skilled, experienced and dedicated professionals capable of delivering solutions that meet international standards. Their areas of expertise include:

- Geographic Information Systems (GIS) and remote sensing: data preparation, analysis and solution development
- Development of GIS-based interactive information systems, decision support systems and management information systems
- Enterprise solution development using web GIS technologies and smart devices

The ICT Division is furnished with a mini-data Center, 22 high-end RAC Servers and workstations and a secured network running on Linux and Windows platforms.



## Site Specific Plan (SSP) and ODK Development

Bangladesh Forest Department (BFD) under the Ministry of Environment, Forest and Climate Change has implemented a 5-year (01 July 2018 to 30 June 2023) project named 'Sustainable Forests & Livelihoods (SUFAL) Project'. The specific objectives of the project are:

- To improve organizational effectiveness by strengthening the institution's information systems and providing necessary training to forest officials and staff
- To strengthen collaborative forests and Protected Areas management for enhancing forest restoration, wildlife protection, biodiversity conservation and ecosystem services
- To increase access to alternative income-generating activities. (AIGAs) including forest extension service & planting trees in "Trees Outside Forests (ToF)" areas to reduce forest exploitation and improving environment
- To monitor forest restoration and enhance tree cows in the ToF

For SSP and ODK Development, IWM carried out the following tasks:

- Part 1: Field data collection using an ODK in smart device
- Part 2: Developed web-GIS based application and data management and reporting system
- Part 3: Technical Supports and capacity building activities
- Part 4: Management Support/Issues



## ICT-GIS Tools

Using state-of-the-art GIS/RS software, Development tools and technologies, and the latest RDMS, ESRI ArcGIS Suit, QGIS, MS Visual Studio, MS SQL Server, Oracle, PostgreSQL, PostGIS, MS .net, Java, MySQL, PHP, Python, etc.

## Flagship Projects

Site Specific Plan (SSP) and ODK Development

Development of Upazila Land Suitability Assessment and Crop Zoning System of Bangladesh

Developing ICT Connectivity Decision Support System Through Interactive GIS Map

SiMS-Smart Application Development

Upgrading, Updating of Existing and Development of -Smart, Google & App for Smart Phone for Flood Forecasting and Warning Center (FFWC)



## Empowering the Farmers for Efficient Cropping in Bangladesh

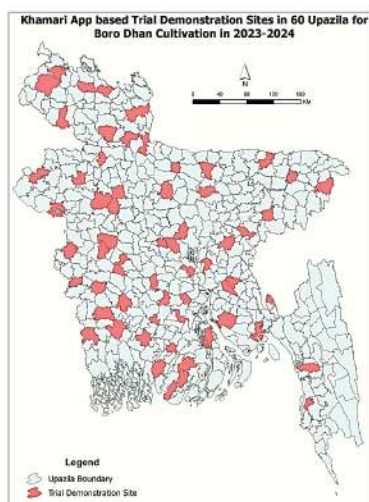


To secure food supply for Bangladesh's growing population, it is essential to develop an efficient and sustainable agricultural production system. This requires proper planning and the adoption of modern technologies for land resource utilization. Identifying areas best suited for high agricultural output, considering soil quality and climate conditions, is a key step in this direction.

Bangladesh Agricultural Research Council (BARC), with funding from the Krishi Gobeshona Foundation (KGF), launched the "Development of Upazila Land Suitability Assessment and Crop Zoning System of Bangladesh" project in 2017, set to complete in late 2025. The project's main goal is to assess land suitability for crop production by evaluating soil quality and climate scenarios, ultimately helping to create crop zoning maps for sustainable agricultural development. By following crop zoning guidelines, farmers can achieve higher yields at lower costs, ensuring profitability and food security.

As partner organization of this project IWM provided GIS and ICT based solutions making web applications (<https://cropzoning.gov.bd/>) and a Mobile App named "Khamari". This can be downloaded from Google Play Store: [https://play.google.com/store/search?q=Khamari&c=apps&hl=en\\_US](https://play.google.com/store/search?q=Khamari&c=apps&hl=en_US).

The developed systems promote sustainable agriculture, encourages commercial farming, boosts agricultural exports, enhances nutrition security, and helps farmers optimize their income. The system also provides soil health assessments, recommends appropriate fertilizers, and increases collaboration between farmers, scientists, and other stakeholders.



By using the Khamari Mobile App, farmers can make decisions to select most suitable crop for his specific land to get maximal production utilizing minimal fertilizer doses. The system agro-edaphic and agro-climatic parameters to estimate the suitability of 76 crops of Bangladesh.

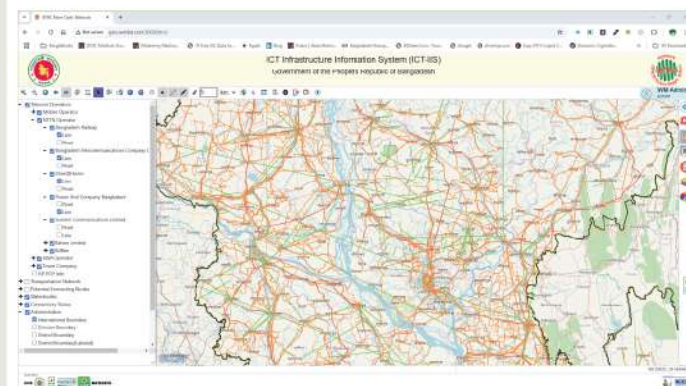
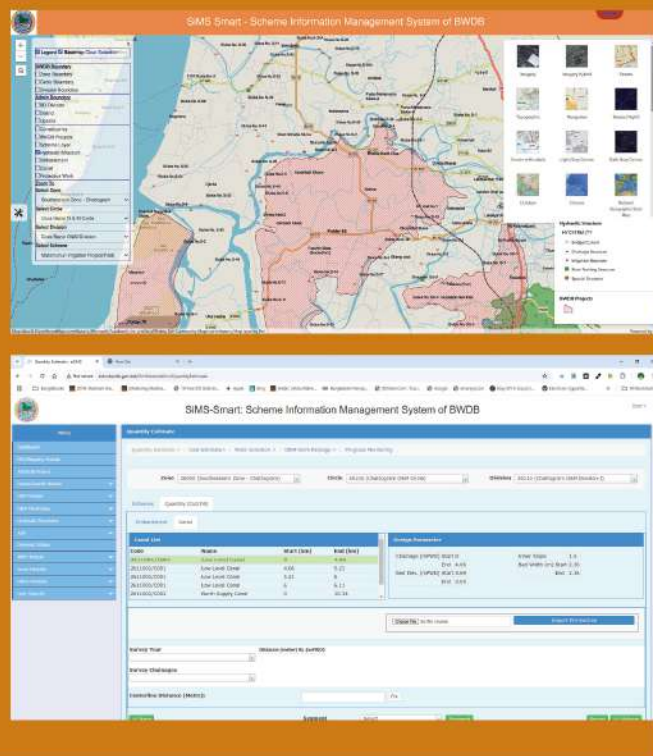
The "Khamari" app increases crop production significantly and contribute to food security and optimize fertilizer usage that reduces import costs and improve soil health and the overall environmental sustainability of agricultural practices.



## Developing ICT Connectivity Decision Support System Through Interactive GIS Map

BTRC aimed to prepare a GIS based online system to visualize the fiber optic networks operated by different agencies to improve their regulatory activities. IWM was assigned the project named "Developing ICT Connectivity Decision Support System Through Interactive GIS Map" by Bangladesh Telecommunication Regulatory Commission (BTRC). The dynamic Web-GIS-based system contains all Government Office Locations, fiber optic network layers, map navigation, search and specific analytics for better decision-making to plan and monitor the ICT connectivity.

Open-source technologies were used to develop the system.



## SiMS-Smart Application Development

IWM has provided services for developing SiMS-Smart application software to support BWDB in planning, budgeting, estimating, and monitoring the rehabilitation/improvement and O&M works of FCD/FCDI Schemes. SiMS-Smart comprises several modules and tools such as the web GIS Module Scheme, Project Inventory Database, Search/Query Module, O&M Module, Monitoring Module, SIMS Mobile, Document Archive, WMO Information Module, Scheme Performance Module, Flood Forecasting and Warning Sub-System, BWDB Asset Information Management System (AIMS), Report Module, Metadata Module.

SiMS-Smart facilitates visualizing BWDB embankments, canals, hydraulic structures, and protective works with status information, including photos and videos. It helps in operation, monitoring, and planning activities.

SiMS-Smart is an online web-GIS and mobile solution with an IP camera that provides real-time monitoring options.

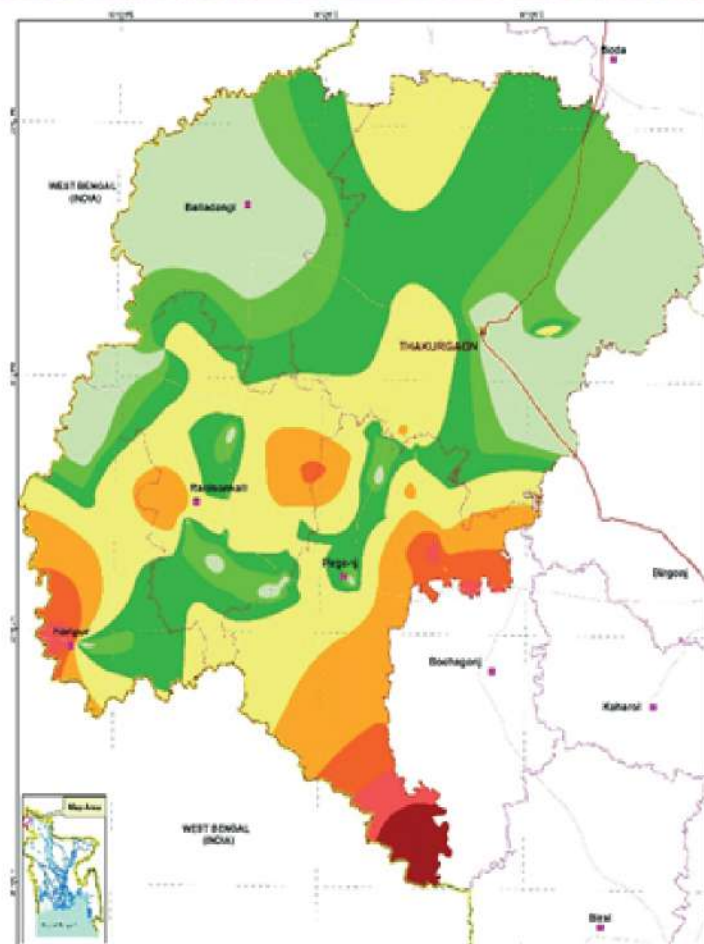


# IRRIGATION & GROUNDWATER MANAGEMENT

## Hydrogeological Investigations and Aquifer Mapping

Due to complexity in nature, it is important to understand the different characteristics of Holocene — Pleistocene sedimentary rocks for characterizing the lithology of aquifer formation. Groundwater flow and recharge depends mostly on formation of lithology and aquifer parameters. Proper identification of such aquifer will facilitate in developing essential input data on aquifer geometry and characteristics for water well design, resource monitoring and modelling. IWM has achieved a leading position in the field of hydrogeological investigations and analysis of various crucial projects at home and abroad. IWM has conducted the test drilling upto 460m depth in high Barind region successfully. Regular services provided by IWM in such studies are as follows:

Exploratory Drilling
Sediment Sampling and Analysis
Groundwater Level Monitoring
Geophysical Survey
Bore hole Logging
Aquifer Test
Slug Test
Hydrogeochemical Study
Environmental Isotope Analysis



Aquifer Mapping of High Barind Region of Bangladesh



## Surface Water-Groundwater Interaction Modelling and Water Resources Assessment

Assessment and management of water resources can be done considering surface water and groundwater in isolation, but this isolated approach fails to address the integrated behavior of the land and water ecosystem, interaction between the surface and groundwater within the water ecosystem specially in the study areas. To ensure the integrated management of water resources, a physically based distributed modelling system is needed which is more realistic and appropriate over the traditional analytical approach. IWM is pioneer in conducting the surface water-groundwater interaction modelling both at home and abroad. IWM has delivered the following outputs for groundwater assessment as well as management:

Groundwater exploitation/resources assessment.

Recharge and discharge areas of the aquifer.

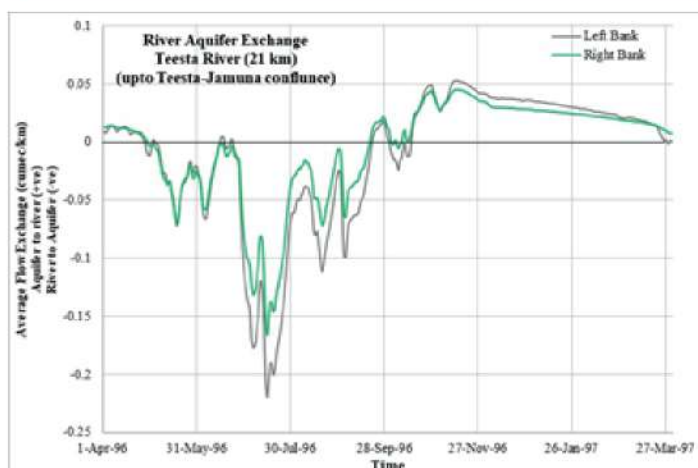
Groundwater vulnerability mapping and protection.

Safe yield level of aquifer and the water stress area.

Ground water management and zoning.

Groundwater quality analysis.

Groundwater salinity distribution and mapping.



Surface water-Ground water Interaction at Teesta

## Modelling Tools

IWM uses diversified tools such as MIKE SHE, MIKE-11, MIKE GIS, MODFLOW, FEFLOW, HYMOS, CROPWAT etc., all are widely acclaimed tools across the world. IWM develops tools like Decision Support System (DSS), Interactive Information System (IIS) and Management Information System (MIS) which helps decision maker in taking decisions.

## Flagship Projects

Study on Aquifer Mapping and Groundwater Resource Assessment for Management of Eco-Friendly Sustainable Agricultural Development in Bangladesh for BADC

Hydrological Investigation & Modelling of the State of Surface and Groundwater Resources in the High Barind Region for WARPO

Study of the Selangor State Groundwater Resource Availability for LUAS, Malaysia

Command Area Development of Teesta Barrage Project Phase - I for BWDB

Groundwater Hydrological Study for "Probable Site Selection for Construction of Nuclear Power Plant in the Southern Part of Bangladesh" for BAEC

Groundwater Management and Zoning Study for Repair and Rehabilitation of Deep Tubewell Project in Greater Dinajpur District Under Post Drought Agricultural Rehabilitation Programme for BWDB



# COMMAND AREA DEVELOPMENT WETLANDS & ECOSYSTEM MANAGEMENT

## Command Area Development

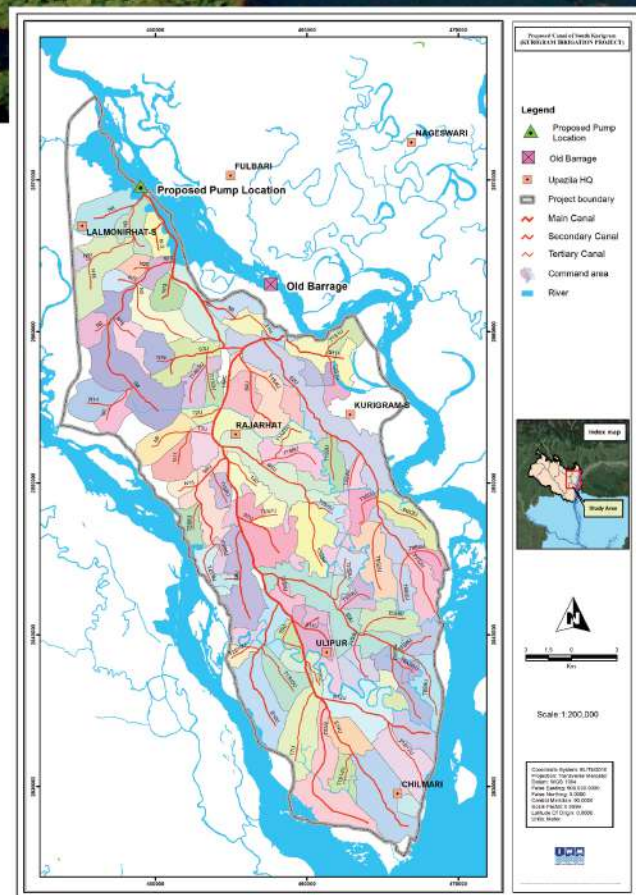
IWM has achieved substantial experience in Command Area Development (CAD), information and decision support system for improved operation of irrigation system and efficient irrigation management. Irrigation management requires advanced approaches in estimation of demand of irrigation water and analysis of water allocation strategies at the field scale, for entire irrigation schemes or in a basin wide perspective. IWM has gathered a sound knowledge for developing Interactive Information System (IIS) or Management Information System (MIS) and Decision Support System (DSS) for improved operation of irrigation system and command area development. Services that are included for irrigation management projects are as follows:

Study of irrigation, drainage and water logging

Canal layout and structure design

Optimization of structure operations

Water shortage and irrigation management



Command Area of Kurigram Irrigation Project in Bangladesh



## Wetlands and Ecosystem Management

Wetlands come under threat due to unsystematic utilization, encroachments and reclamation, urbanization, unplanned agricultural development, and flood control actions. The protection and management status of wetlands in Bangladesh are complex due to financial, technical, social, and political issues, as well as lack of integration of multiple sectors. Beels and wetlands have not yet received proper attention. IWM plays an important role in the field of restoration and protection of wetlands in Bangladesh and provides the following services:

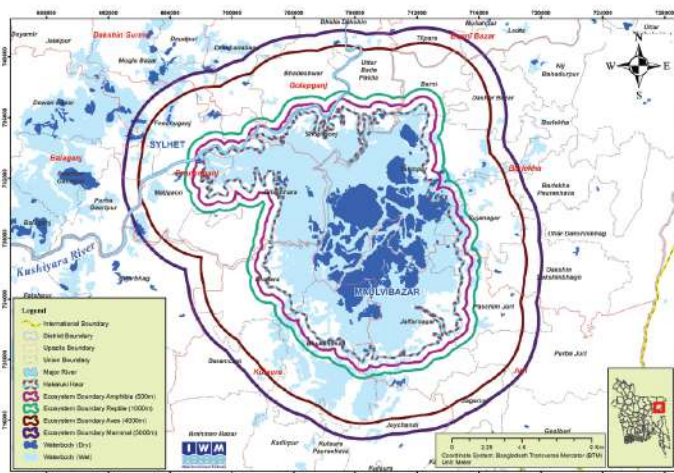
Delineation, classification and Inventory of Wetlands

Valuation and Vulnerability Assessment of Wetlands

Delineation of Ecosystem Boundary

Wetland Management Framework and Best Management Practice

Restoration and Protection of Wetlands



Delineate Wetland Ecosystem Boundary at Maulvibazar

## Modelling Tools

IWM uses diversified tools such as MIKE SHE, MIKE-11, MIKE GIS, MODFLOW, FEFLOW, HYMOS, CROPWAT etc., all are widely acclaimed tools across the world. IWM develop tools like Decision Support System (DSS), Interactive Information System (IIS) and Management Information System (MIS) which helps decision maker in taking decisions.

## Flagship Projects

Kurigram Irrigation Project (North & South), BWDB

Flow Assesment of Minor Irrigation Project of BADC

Drainage & Irrigation Study of Beel Gazna and adjoining region of Pabna District, BWDB

Study on interaction between haor and river ecosystem including development of wetland inventory and sustainable wetland management framework of Department of Bangladesh Haor & Wetlands Development.

Comprehensive Feasibility Study for Sustainable Restoration and Protection of Wetlands (Haor, baor, beel and connected rivers etc.) in Different Hydrological Regions of Bangladesh of Department of Bangladesh Haor & Wetlands Development.

Mathematical Modelling on Saline Water Intrusion to Assess Salinity Intrusion, Salinity Level, Sea Level Rise due to Climate Change, Movement of Salinity for BWDB of Bangladesh Haor & Wetlands Development.

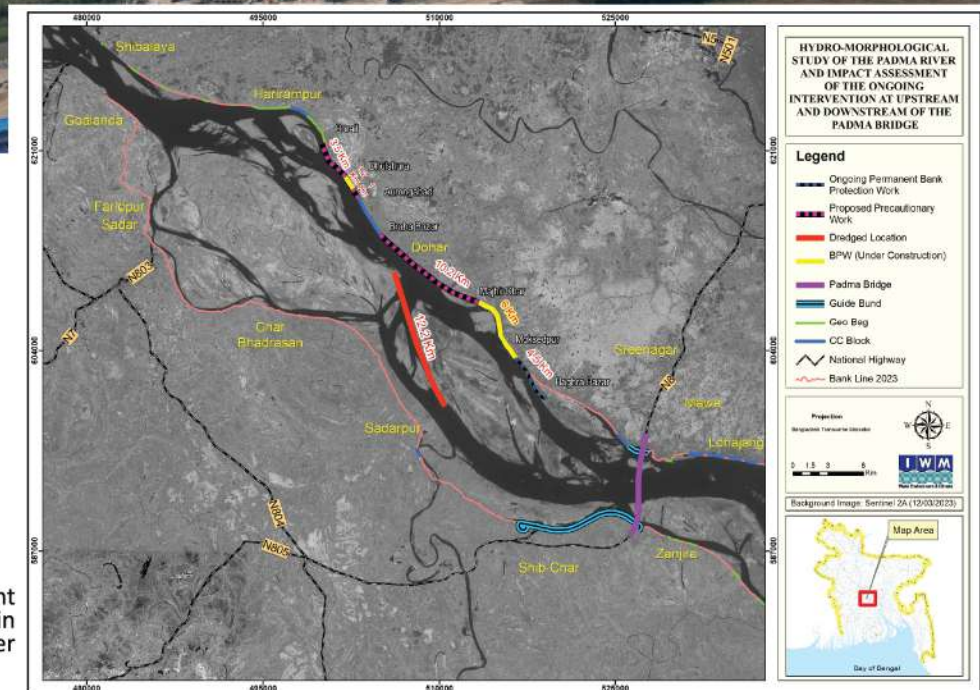
Groundwater Modelling for Barapukuria Coal Mine Area



# HYDRO-MORPHOLOGICAL ASSESSMENT

## Erosion Management

Dredging Alignment  
Determination in  
Padma River



## Dredging & Erosion Management

Unpredictable flow of the rivers accompanied with huge sediments keep changing the riverbeds, banks and planform relentlessly. Frequently such drastic and abrupt change pose threat to the existing hydraulic structures, navigability and riverbanks. These phenomena cause havoc to assets, lives and livelihoods. Such adverse impact of the river can be minimized with execution of dredging, which actually requires astute formulation of strategies including selection of suitable alignment and dumping locations, schedule, dimensions, maintenance based on backfilling rate, etc. Mathematical modelling can support in pre- and post-dredging with application of model incorporating the dredged alignment and assessing the performance and thus helping in achieving obtain desirable river condition. IWM with vast experience in the fields of river hydraulics and morphology, expertise and knowledge base developed over the years, state of the art modelling techniques and self-reliant supporting facilities can develop the most optimum dredging solution for any problem, in terms of efficiency and effectiveness.



## Determination of Formation Level of proposed Road/Rail Embankment

Hydraulic structures including bank protection works, embankment, revetment, spurs, etc. are costly and require regular monitoring and maintenance. For providing dependable protection and desired functionality of the structural measures, scientific approach is required for the design at planning stage to post construction phase with assessment of probable adverse condition. Selection of suitable hydraulic design parameters is of prime importance. Considering the braided, meandering and wandering channel layouts and alluvial river characteristics, application of 2D models is absolutely necessary for the true representation of the flow conditions and to understand the river behavior of past, present and probable future condition. IWM, with its vast experience and application of models, is contributing at different stages of river management and thus assists the planners to provide cost effective design of road/rail embankments, bridge, culverts etc.

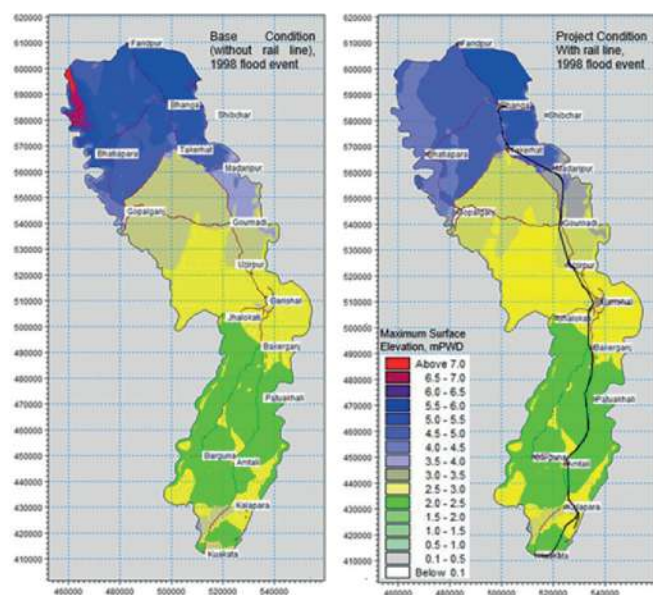


Figure: Digital Elevation model along with railway alignment.

## Modelling Tools

Using state-of-the-art modelling tools of MIKE by DHI (MIKE 11, MIKE 21, MIKE 21C, MIKE 21FM, etc.), IWM has a long experience in one/two-dimensional hydrodynamic & morphological modelling of rivers and water bodies.

### Bridge Hydraulics

Bangladesh, one of the largest delta plains in the world with an intricate tapestry of numerous major rivers and their tributaries and distributaries. Before constructing any major bridge over the dynamic rivers of Bangladesh, it is very essential to assess the hydro-morphological condition of the river underneath. Moreover, hydro-morphological assessment of the major rivers is also required even after construction for monitoring of the safety of the mega structure like bridges. IWM provides expert services with numerical modelling technology to predict the responses of the rivers to proposed large bridges.

## Flagship Projects

Mathematical Model Study for Dredging of the Padma River at the upstream of Padma Bridge under Dohar Upazilla.

Hydrological and Morphological Survey and 2D Hydrodynamic & Morphological Modelling for proposed Bangabandhu Sheikh Mujib Rail Bridge.

Topographic Survey & Mathematical Modelling Study for Proposed Rail Line from Bhanga to Payra Port.

Monitoring of Hydraulic and Morphological Conditions of Jamuna River for the Safety of the RTW of Bangabandhu Bridge during 2018-2023. Mathematical Modelling Study for Sustainable Management of Gorai River Basin including Offtake.





# HYDROGRAPHIC & MET-OCEAN SURVEY



IWM Survey Vessel

## Hydrographic Survey

Hydrographic Survey includes Bathymetric Survey, Water Level and Discharge Measurement in the Inland Rivers, Drainage Channels and Estuaries. IWM needs large amount of survey data for setting, updating and validating of different models. Survey & Data Division Provides supports to all modelling divisions by hydrographic data collected using state of the art survey equipment. Survey & Data Division is also supporting dredging and marine construction activities by providing prework survey, post work survey and interim survey. Bathymetric data is also used to design RTW works, dredging and navigation. It is also used to monitor scour hole around bridge piers, guide bundh and river training works.

## Met-Ocean Survey

Oceanographic survey includes Bathymetric Survey, Current & Wave Measurement and Suspended Sediment/Turbidity Measurement.

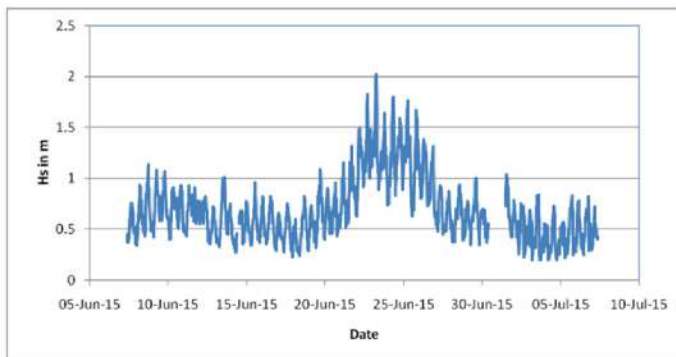
IWM started measurement of current & wave during September 2012 at Himchari, Cox's Bazar for Marine Drive. Later on, it completed challenging work of Project. measurement of Current and Wave at 4 locations in the sea near Matarbari Island for Matarbari Power Plant Project. In this, project simultaneous measurement of current, wave and turbidity were measured at 4 locations (from 5m to 20m CD depth). IWM started using Multibeam Echosounder station during 2018 for Kutubdia Energy Hub Project of Beximco LPGIWM is now regularly engaged in bathymetric survey using Multibeam and current and wave measurement using Acoustic Doppler Current Profiler.



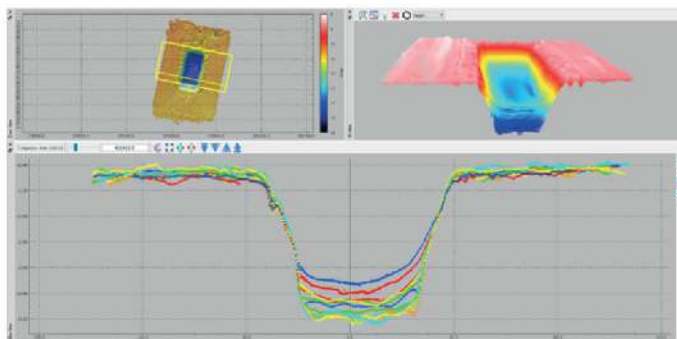
## Flagship Projects



Deployment of ADCP at Matarbari Area



Wave Height observed near Matarbari



Monitoring of Trial Dredging Pit Area

IWM was assigned by Nippon Koei Co to carry out bathymetric survey and hydraulic survey (seabed materials, wave, current and turbidity). IWM mobilized for the work during February 2015 and completed bathymetric survey and dry season hydraulic data collection works during April 2015. Report on the same was submitted during May 2015. IWM remobilized for monsoon data collection from June 2015 and completed field data collection during July 2015. All data and reports have been submitted to clients within stipulated time. During the measurement it successfully recorded the wave height during one cyclonic storm occurred during July 2015.

Kutubdia Energy Hub Project was implemented under a contract from Royal Haskoning was Beximco LPG, studying feasibility of a Deep-Sea Port for berthing 14m draft vessel in the Kutubdia Channel at Anowara Upazilla. IWM mobilized team during June 2018 and started collecting met ocean data from 4 proposed trial dredging pit area around northern tip of Kutubdia Island (current, wave height and turbidity). IWM conducted pre and post work bathymetric survey during October and November 2018. It also started intensive monitoring survey of trial dredging pits by using Multibeam Echosounder, Dual Frequency Single beam Echosounder, Bed and Suspended Sediment Samples. All monitoring works continued up to May 2019. The project enhanced the skill of IWM staffs in offshore area and use of Multibeam Echosounder. It also enriched its database by met ocean data which is very rarely available in Bangladesh.





## Urban Stormwater Drainage Management

IWM has rich experience in solving the stormwater drainage management related issues for more than two decades through consultancy and research activities. IWM experience in managing urban stormwater has reached beyond Bangladesh. So far, IWM has conducted several stormwater management related projects with local government institutions, utility service providers, research organizations, development partners, large development agencies, such as: BWDB, DWASA, DPHE, DNCC, Dsc, GCC, SCC etc. IWM has adequate number of skilled manpower in this field who are adept in the use of mathematical modelling software and of state-of-the-art tools in planning and designing stormwater related infrastructures.

As a part of storm water management IWM provides the following solution related with stormwater management:

Planning and design of stormwater drainage system

Mathematical modelling using DHI's Mike suite and other open-source tools

Urban flood risk assessment

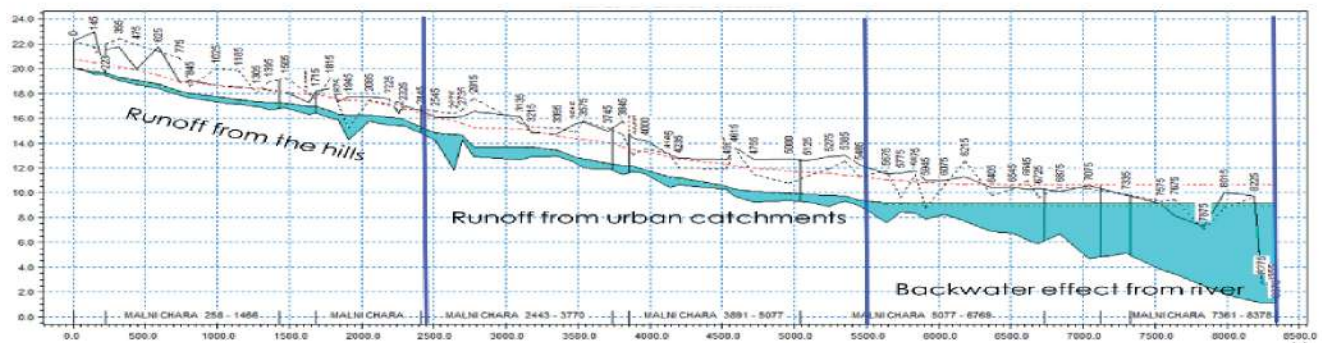
Feasibility study & master planning

Detail design & cost estimates

Tender document preparation

Construction supervision, etc.

IWM is leading through the paradigm shift of future smart cities from drained cities to water sensitive cities through integrating low impact development strategies by adopting nature-based solution.

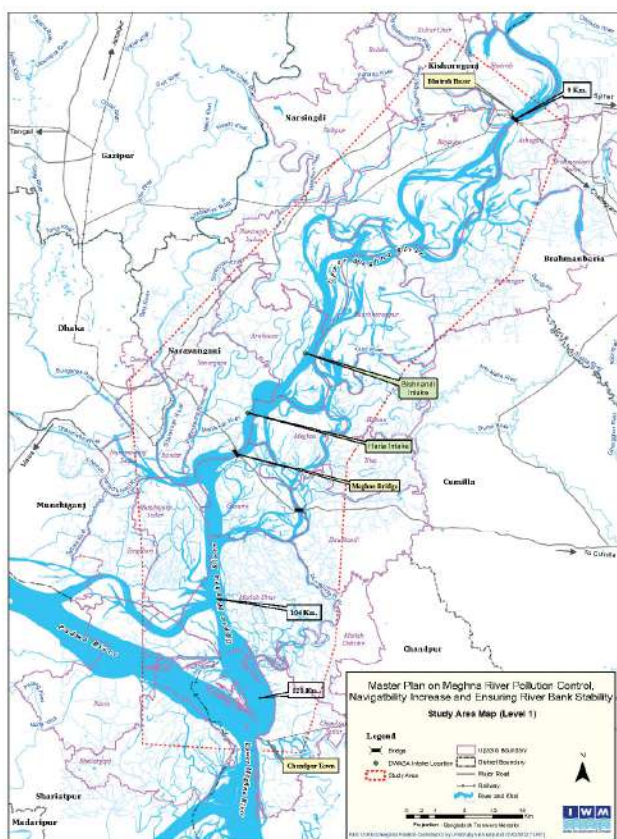


Long Profile of a Canal in Sylhet City Drainage Models



## Master Planning

IWM has vast experience in formulating Master Plans of major cities and economic zones in connection with water supply, drainage, sewerage, road networks, planning etc. IWM has worked in several water pollution control related projects and recently has been entrusted for preparing Master Plan of Meghna River for pollution control, increase navigability and ensuring river bank stability. IWM has prepared a master plan with detail design for Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) Permanent Campus to be constructed in Chattogram. IWM has also played significant role in preparing the Bangladesh Delta Plan 2100. Moreover, drainage plans of DNCC and DSCC have been incorporated in the latest Detailed Area Plan (DAP) of RAJUK.



Master Plan for Meghna River Pollution Control

### Modelling tools used for stormwater management:

Mike 11, Mike Urban, Mike, SWMM, Water GEMS Sewer GEMS etc.

### Urban Stormwater Drainage Management

Feasibility and SEIA Study for Expansion of Drainage Networks & Development of Canals in Dhaka City

Feasibility Study for Mitigation of Drainage Congestion & Water Logging in Sylhet Metropolitan Area including ESIA Mathematical Modelling for Safe Drinking Water Source Identification including Drainage system Improvement, Sanitation and Solid Waste Management in 148 Pourashavas (Municipalities).

Technical Study of Flood Control and Drainage Development at Dhaka Circular Road (Dhaka Eastern Bypass) Project

Detail Survey, Design & Preparation of Master Plan on Water Supply & Sanitation issues using Mathematical Modelling Technique & Construction Supervision of Water Supply, Sanitation & Drainage in Sylhet & Barisal City

The Economics of Solid Waste Management and Drainage: Sustainable Approach to Making South Asian Cities Climate-Resilient for Bharatpur, Nepal and Sylhet, Bangladesh

Water Logging of Greater Dhaka Area in a Changing Climate

## Master Planning

Water Supply Master Plan of Dhaka City

Sewerage Master Plan of Dhaka City

Sewerage Master Plan with Detail Design of Priority Works Project for Sylhet City Corporation

Sanitation and Drainage Improvement Strategy and Master Plan for the City of Chittagong

Preparation of Master Plan, Architectural Design, Detail Design, Drawings, BOQ, Tender Documentation and Construction Supervision of Bangabandhu Sheikh Mujibur Rahman Maritime University (BSMRMU) Permanent Campus at Chattogram

Master Plan and Feasibility Study for Newly Added Wards of DNCC & DSCC

Master Plan on Meghna River Pollution Control, Navigability Increase and Ensuring River Bank Stability

Water Supply Master Plan for Bangabandhu Sheikh Mujib Shilpanagar (BSMSN)

Feasibility Study of Netrokona Economic Zone including Master Planning





# WATER SUPPLY and Sanitation

Securing life of the millio

## Planning and Design of Surface Water Treatment Plant, Well Field and Water Transmission System

Implementation of surface water treatment plants are the priority projects of the Government of Bangladesh to meet increasing demand for drinking water and to ensure sustainable use of groundwater resources.

IWM provides front-line services to the water supply authorities in all major cities of Bangladesh regarding planning and design of large-scale surface water treatment plants, well fields and associated water transmission and distribution systems aimed to continue its sincere effort in supporting the GoB's vision of securing safe water for all, thereby, achieving the sustainable development goals by 2030.

## Modelling and Design of Sewerage System

With the aid of state-of-the art modelling tools and trained experienced professionals, IWM is effectively supporting DWASA, CWASA, KWSA in planning, designing and implementation of sewage treatment

plants, sewer network and sewage lift stations. IWM intend to intensify its consistent effort in the sanitation sector so that the GoB's vision of providing safe sanitation system to all by 2030 is achieved.

## Modelling, Design and Implementation of DMA

DMA is a discrete area of a distribution system in which the quantities of water entering and leaving the area are metered. It is useful for water loss minimization in a system. With the help of metered data, the amount of water leakage can be estimated and remedial measures can be taken to minimize water loss.

IWM provides state-of-the-art services to DWASA, CWASA, RWASA & other organizations in modelling, design and implementation of DMAs in major cities of Bangladesh. The DMAs are designed to cope with present as well as the future water demand. While designing, the distribution network is analyzed for criticality, flushing, water quality, automated fire flow, surge protection and system reliability.

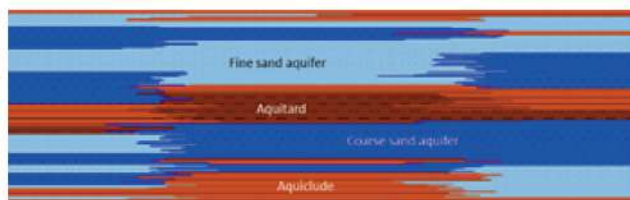




### Groundwater Resources Assessment, Exploration and Long-term Monitoring

IWM has outstanding expertise in exploring and managing groundwater resources all over Bangladesh.

IWM has notable expertise in geophysical survey, exploratory borehole drilling, pumping test analysis, groundwater quality analysis and three-dimensional (3-D) groundwater modelling. Besides, it has extensive experience in design & construction supervision of production tube wells, and design & implementation of artificial recharge schemes as well as groundwater monitoring network.



### Supervision of Water Supply and Sewerage System Implementation Project

IWM is also providing supervision services for detailed design and implementation of water treatment plants, sewage treatment plants, water transmission & distribution network, sewage collection network and groundwater well fields. Milestone projects include the 450 MLD Padma water treatment plant of DWASA, 150 MLD well field at Savar, Dhaka, 50 MLD water treatment plant at BSMSN, Mirsarai, and two 100 MLD sewage treatment plants at Chattogram and Khulna.

## Cutting-edge Modelling Tools

IWM has extensive experience in modelling of water supply and sewerage systems as well as surface & groundwater resources assessment. Using the state-of-the-art software solutions from DHI (MIKE URBAN, MIKE+, MIKE 11, MIKE SHE) and opensource software's like EPANET and MODFLOW, WaterGEMS, SewerGEMS, IWM is providing cost-effective sustainable solutions to the clients regarding water and wastewater management.

## Flagship Projects



Independent Engineer Services for the Development of Water Distribution and Supply Facilities at Purbachal New Town Project through Public Private Partnership

Design Supervision and Construction Supervision of 50 MLD Water Treatment Plant at BSMSN including Intake, Raw & Treated Water Transmission Main and Distribution Networks



Consulting Services for Feasibility Studies and Preparations of Conceptual Designs & Bidding Documents for DBO/DB Contracts (Pagla Sewage Treatment Plant and Associated Sewage Collection Network)

Design and Management Consultant (DMC) of Dhaka Water Supply Sector Development Project



Establishment of Groundwater Monitoring System in Dhaka City for Aquifer Systems and DWASA Production Wells

Resource Assessment & Monitoring of Water Supply Sources for Dhaka City



# DESIGN, CONSTRUCTION AND SUPERVISION

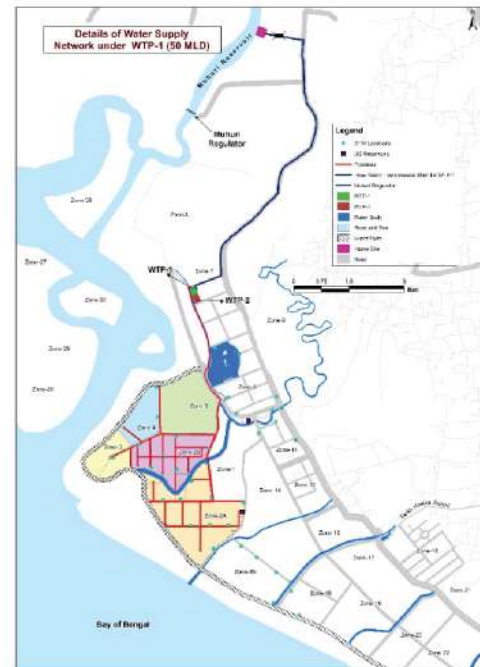
## Design and Construction Supervision of 50 MLD WTP in National Special Economic Zone

To ensure uninterrupted water supply to the valued investors in the National Special Economic Zone (NSEZ), Bangladesh Economic Zones Authority (BEZA) has initiated implementation activities for construction of a 50 MLD Surface Water Treatment Plant (SWTP) including intake, raw water transmission main, treated water transmission main and distribution networks. The project is funded by the Government of Bangladesh (GoB) and consist of four main components namely construction of a 50 MLD SWTP, construction of a 105 MLD Intake at the Muhuri Reservoir, construction of 9.6 Km Raw Water Transmission Main, and around 42 Km Treated Water Transmission and Distribution Network in the priority zones of NSEZ.

The Project timeline has been set from July 2019 to February 2025 with an estimated cost of Tk. 673.52 crore. The project is being implemented by following FIDIC (Plant & Design-Build) method of procurement. IWM is working as “the Engineer” for design supervision and construction supervision of the project. The design of the major components of the project has been finalized. Pile foundation and the base slab for all the structures of the WTP have been completed. Construction of superstructures of different structures of the WTP is ongoing. The project timeline may be extended up to June 2026 for successful completion of the project.

The SWTP component of the project contains structures like mixing, flocculation, sedimentation structure, filter with backwash pumping station, treated water reservoir and pumping station, sludge thickener, sludge dewatering plant, chemical building, chlorine building, admin building, officer’s quarter, staff quarter, warehouse and guard room. ZHEC-BOW-SMEDRIC JV is working as “the Contractor” of the project. Construction of WTP structures commenced in November 2023. IWM has deployed a highly qualified professional team for supervision of construction works at the WTP site.

The Intake at the Muhuri Reservoir will be a Tower type intake with a capacity of 105 MLD. This intake will serve the purpose of WTP phase 1 & 2 with a total capacity of 100 MLD. Intake Pumping station consists of pump house, Electrical substation, operator room, generator room will be constructed in the Intake site. IWM’s involvement in design supervision and construction supervision in this project will ensure the work to be completed in a timely, professional, competent manner by ensuring compliance with the approved construction documents, contract documents, applicable regulations, project schedule, and all other applicable requirements.



Construction activities at the WTP site



Animated view of the 50 MLD WTP in NSEZ



## Survey Support to River training works (RTWs) of Bangabandhu Sheikh Mujib Railway Bridge Construction Project (BSMRBCP)

The Bangabandhu Sheikh Mujib Railway Bridge Construction Project (BSMRBCP) encompasses the construction of a 4.8 km railway bridge over the Jamuna River, running parallel to the existing Bangabandhu Bridge. This ambitious endeavor hinges on the continued effectiveness of the River Training Works (RTWs) associated with the Bangabandhu Multipurpose Bridge, safeguarding against potential outflanking and scour scenarios.

To support this project, IWM employs state-of-the-art technology, including Multibeam Echosounder and high-precision RTK GPS (heading technique), ensuring the quality hard rock dumping at river training work (RTWs) as per design.

Furthermore, IWM ensures the precise positioning of the barge by maintaining the guidance run line for the desired hard rock dumping location as per the design, which is a critical aspect of the operation. This is achieved through the deployment of dumping boxes on open flat barges, with coordinates provided to guide the sinking of the Fascine mattress. The dumping barge is equipped with primary and secondary RTK GPS antennas for heading, a 43" TV monitor for display, and a laptop equipped with Hydro Pro Software.

The procedure involves setting up a base station at a known location either onshore or on a fixed platform nearby. This base station is equipped with a reference GPS receiver and a means to transmit correction data, be it through radio signals or an internet connection. The RTK GPS on the barge processes the received GPS signals in conjunction with the correction data from the base station, enabling the calculation of precise position information and heading. To ensure accuracy, calibration procedures are conducted using checkpoints. Real-time position data of the barge is then displayed on a navigation screen, providing a clear visualization of its position relative to the dumping area, designated routes, run lines, and other reference points. This high-precision positioning system allows the rock-dumping barge to navigate precisely to the designated locations, following the planned routes or run lines. Any necessary adjustments to the barge's heading and speed are made as required.

Throughout the rock dumping operation, continuous monitoring of the barge's position ensures accurate placement of the rocks. Feedback regarding the barge's position and any deviations from the intended path or dumping locations are provided to the operators and crew. After the hard rock material was dumped in the RTWs area with precise positioning, a multibeam survey was conducted in the same area to ensure the hard material and Fascine mattress were correctly placed underwater.

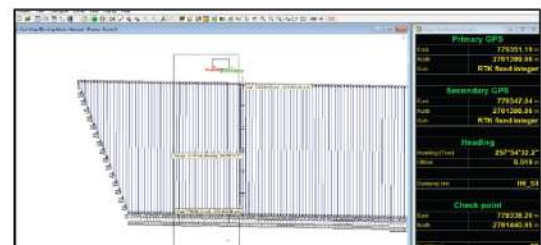
By implementing this Rock Dumping Barge Positioning System with RTK GPS and the Multibeam Survey, the project benefits from unparalleled accuracy and efficiency in rock dumping operations, contributing significantly to the success of the Bangabandhu Sheikh Mujib Railway Bridge Construction Project.



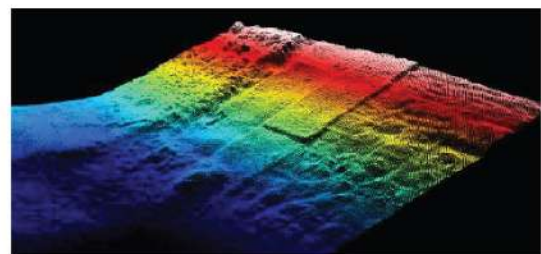
*Dumping Barge at Bangabandhu Rail Bridge*



*Barge Positioning Using RTK-GPS*



*Planview of Hydropro Software*



*Riverbed Geometry after Hard Rock Dumping under water using Multibeam Echosounder*





# CLIMATE CHANGE & ENVIRONMENTAL MANAGEMENT

Bangladesh is one of the most vulnerable countries to the impacts of climate change. Climate change and environmental management plan plays an important role for the sustainable development of a country. IWM has vast knowledge and experiences in this field including risk management, due to climatic variability. The major expertise of this institution are:

- Climate modelling, Bias correction of GCMs data, down-scaling of climate model data
- Projection of sea level rise under different climatic scenarios, assessment of zonal and seasonal variation of sea level changes
- Impact assessment on water resources management due to climate change using climate as well hydrodynamic modelling
- Drought impact assessment, cyclone modelling, storm surge modelling, salinity modelling water quality modelling, heat transfer modelling, air pollution modelling, noise modelling
- Planning of mitigation and adaptation measures
- Environmental and Social Baseline survey including Environmental and Social Impact Assessment (ESIA)
- Environmental Management Plan (EMP) including Mitigation Plan, Enhancement Plan, Compensation Plan and Environmental Monitoring Plan
- Development of land acquisition plan and dredged material management plan
- Impact on river morphology due to climate change
- Simulation of salinity intrusion under different sea level rise scenarios

## Tide Gauge Analysis

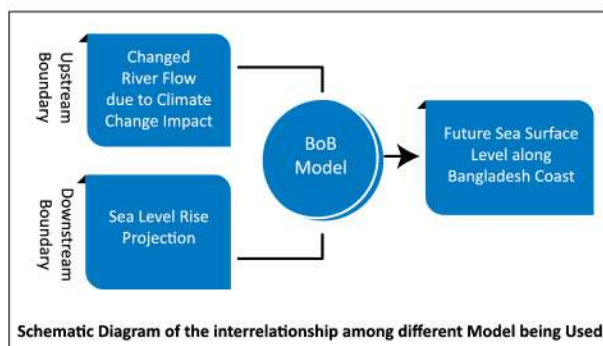
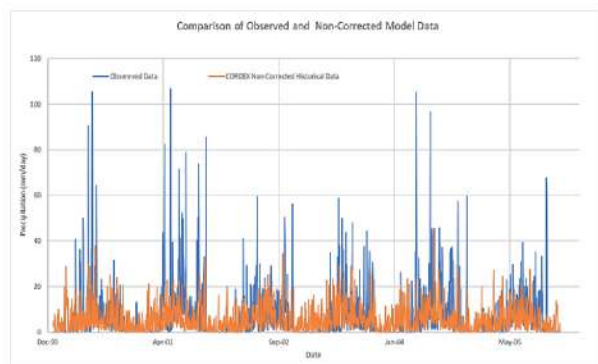
The expertise in this discipline use harmonic analysis of tide level using MIKE model tool. Trend analysis of tide level is done using non-parametric Mann Kendall package.





## Down-scaling of Climate Models and Bias correction of GCMs

The expertise in this discipline is in quantile mapping algorithms for bias correction of meteorological data from climate models. Bias Correction is required for correcting the projected raw GCM output for matching with the observed data



## Socio-economic Impact Analysis

Expertise in this arena is in assessment of present environmental situation, carrying out Environmental Impact Assessment (EIA) and prepare outline of Environmental Management and Monitoring Plan (EMP). They are experienced in performing techno-economic feasibility study and Environmental Impact Assessment of the seaport as well as dredging project.

## Modelling Tools

Using state of the art climate modelling tools like Bias-correction model (Quantile mapping approach), Python automation tools for big data handling, DHI software like Mike Basin, Mike SHE, Mike II, Mike 21 FM, FEFLOW and others software. IWM is efficient in Climate Change impact analysis, future climate impact prediction etc.

## Flagship Projects

Assessment of Urban Heat Island Effect at City Level in Different Climate Change Scenarios

Understanding Sea Level Rise Dynamics of Bangladesh along the Coast along with UK-MET

Feasibility Study of Improvement of Connectivity and Community Infrastructure Development in the Selected Polders of Coastal Zone of Bangladesh

Technical Assessment of Tidal River Management (TRM) in the Sundarbans Region of Bangladesh

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

Groundwater Rejuvenation as Climate Change Resilience for Marginalized and Gender Sensitive Ganges (GRACERS) in Collaboration with Indian Institute of Technology Bombay (IITB)

Promoting Resilience Through Index Insurance in Bangladesh. The Economics of Adaptation to Climate Change Study, Vulnerability Mapping of Coastal Areas-Bangladesh Case Study

Use Existing Data on Available Digital Elevation Models to Prepare Useable Tsunami and Storm Surge Inundation Risk Maps for the Entire Coastal Region

Preliminary Techno-Economic Feasibility Study with Environmental Impact Assessment for Sea Port at Rabnabad Channel in Patuakhali district under CPA +3

Hydraulic and Morphological Modelling Study to Aid "Technical Feasibility Studies & detailed Design for Coastal Embankment Improvement Project (CEIP)

Investigating the impact of relative sea level rise on coastal communities and their livelihoods in Bangladesh

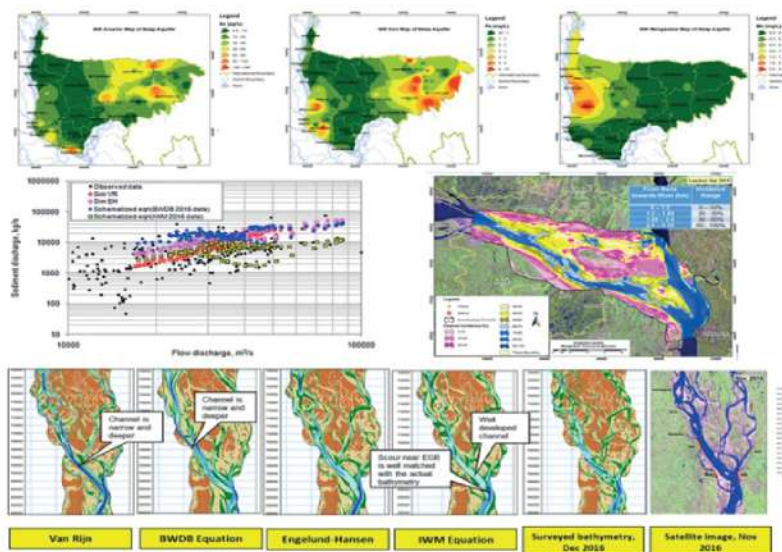
Multi-hazard Risk and Vulnerability Assessment, Modelling and Mapping



# RESEARCH, INNOVATIONS & DEVELOPMENT

IWM undertakes both sponsored and development types of research. Here sponsored research planned the devising solution to problems of national/international importance for its clients. The development research is for development of new tools and methods for adaptation of some new technology or tools for future useful purposes, intended for providing better services to its clients in the long run. The development research may be undertaken either entirely by IWM's own resources or by resources drawn from partners and associates through collaboration / sub-contracts / joint ventures. The field of research may be more specific especially in the context of the burning water related issues of the present and the future nationally and internationally. Either the topics may be wide ranged in the field of:

- Hydrology and Hydraulics
- Sediment Transport and River Morphology
- Oceanography, Marine Science and Coastal Engineering
- Climate Change Adaptation and Disaster Risk Reduction
- Global Warming and Sea Level Rise
- Water Quality Management
- IWRM, IRBM and ICZM, etc.





# Modelling Tools of Expertise

Efficient, innovative & specialized professionals, a large collection of modelling suites/ software, diversified workforce in different water related sectors, strong database, modern equipment, library, and laboratory facility with own premises are the strength of R&D unit of IWM.



## Research & Development Activities

Other than the research projects, variety of activities are performed for generating knowledge, which are as follows:

- Organization and participation of professional meetings, workshops, conferences, and seminars
- Work as resource in some national and international technical committees, professional groups
- Review some study reports/ papers of IWM or others
- Active support to MSc and PhD dissertation
- Writing of manuals/ books
- Publications in professional journals
- Temporary exchange of personnel between IWM and research institutions in Bangladesh and abroad

## Flagship Projects

Assessment of Sustainable Drinking Water Sources in the Selected Coastal Polders P-29 at Dumuria of Khulna and P-40/1 at Patharghata of Barguna in Bangladesh

Research on Two-Stage Hydro-Meteorological Pre-Monsoon Flash Flood Forecast over North-East Haor Regions of Bangladesh

Assessment of Suitability of Sediment Predictor of the Major Rivers of Bangladesh (Phase-I)

Assessment of Effectiveness of Bank Protection Works/ River Training Works Suggested by BWDB through Mathematical Modelling of the Padma River at Naria of Shariatpur District to Combat Bank Erosion

Collaborative Research on Flood Resilience in Urban Areas (CORFU)

Joint Action Research on Salt Water Intrusion in Groundwater in the Coastal Area

Manual on Hydrologic and Hydraulic Design of Bridges

Assessment of Vulnerability of Seepage and Percolation Loss in Irrigated Rice Field

Study on Effect of Oblique Flow & Char Movement in Rivers & Bank Protection Works



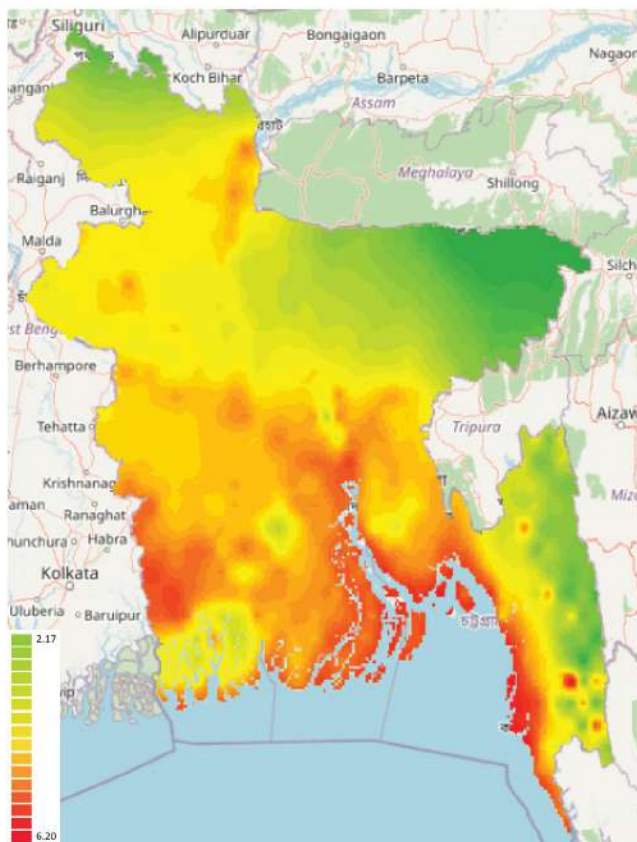


## SUPPORTING RENEWABLE ENERGY DEVELOPMENT IN BANGLADESH

The Sustainable and Renewable Energy Development Authority (SREDA) has engaged IWM to conduct Bats and Birds Survey for Wind Energy Assessment under the Technical Assistance for Renewable Energy Resource Assessment and Piloting (TARERAP) project. The main objective of this study is to survey the bat and bird communities, particularly their habitat, activity, and mortality of target species prone to collision, in and around the proposed wind turbines at Charfession and Kutubdia, in connection with wind energy assessment.



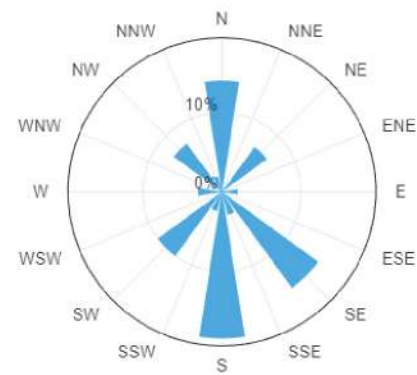




SREDA engaged IWM to develop a GIS-based Wind Information System (WIS). WIS provide maps on three sets of data layers- Mean Wind Speed, Wind Power Density and other data layers at different altitudes.

This was developed to help investors in taking decision regarding best option for wind farms.

**Average Wind Speed (100m): 5.90 m/s**



Long: 91.87 Lat: 21.90  
Upazila: Kutubdia, District: Cox's Bazar, Division: Chattogram



## Smart Climate Financing: IWM signed MoU with ERD to Support ICFC



IWM signed a Memorandum of Understanding (MoU) with the International Climate Finance Cell (ICFC) of the Economic Relations Division (ERD) on November 5, 2024, at the NEC-II Conference Room, Planning Commission in Dhaka. Under this partnership, IWM will support ICFC in prioritizing and aligning public and private sector climate project ideas with international climate finance opportunities. IWM will facilitate communications with key stakeholders, including government entities, development partners, private sector participants, and civil society, to ensure a coordinated approach to mobilizing climate finance. Additionally, IWM will disseminate information on international climate fund procedures and requirements, represent ERD in national and international forums on climate finance, and organize training, workshops, and conferences to strengthen climate finance knowledge for government and development partners.

Formulation of Climate Finance Strategy

- By summarizing different National and International Climate Change Policies/Strategies, IWM can support ICFC, ERD to formulate Climate Finance Strategies for Bangladesh.

Capacity Development of ERD Officials

- IWM can support by identifying key and relevant sectors of Climate Finance and organize systematic and regular capacity development programs for ERD officials with ICFC.

Stakeholders Communication and Coordination

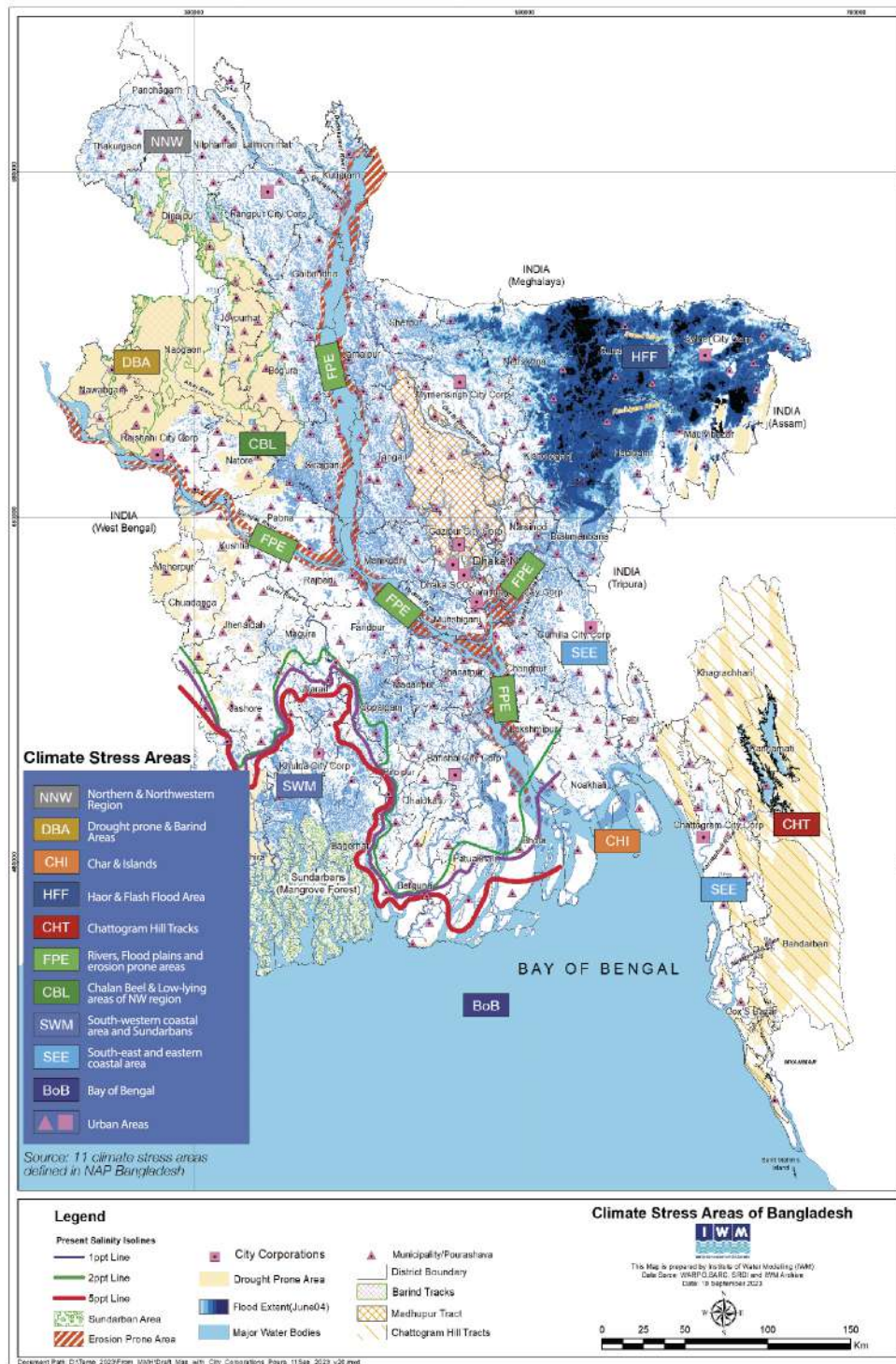
- By proactive, coordination and communication with key stakeholders across government, development partners, private sector and civil society on international climate finance through meetings, workshops and seminars, IWM can support ICFC.

Research Partners, Ideas and Knowledge Management

- IWM can facilitate ICFC, ERD to analyze the priority, eligibility and sensitivity of different climate finance projects.





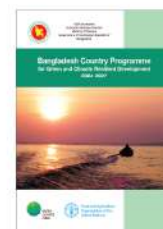


## Climate Stress Areas of Bangladesh



# Climate Finance: Bangladesh Country Program for Green and Climate Resilient Development 2024-2027

IWM has capacity to design and develop climate finance projects. With the support of the Green Climate Fund (GCF) and FAO, IWM developed "**Bangladesh Country Program for Green and Climate Resilient Development 2024-2027**". IWM team conducted a detailed study & consulted with more than 25 ministries and relevant agencies. IWM submitted the report to Economic Relations Division (ERD). It has 74 projects with climate financing size of USD 16.4 billion, all are qualified to address the adaptation or mitigation measures to face the challenges in Bangladesh due to climate change.



## Carbon Financing Scheme with Carbon Footprint Calculation

IWM is capable to contribute for development of carbon credit mechanism in Bangladesh with support of international partners Future, Inc (Japan) and GCS (UK). Bangladesh has opportunity to earn \$5.76 Billion (projected between 2024-2030) from \$38.6 billion carbon trading amount worldwide.



A Sample Process of Implementing a Carbon Credit Project



$$\text{Carbon footprint (tonnes CO}_2\text{e/million invested (USD))} = \frac{\sum_{i=1}^N \left[ \frac{\text{Investment}_i \times \text{Emissions}_i}{\text{EVIC}_i} \right]}{\text{AUM}}$$

### Carbon Pricing & Carbon Credits

A price on carbon can help shift the burden for the damage back to those who are responsible for it and who can reduce it. Instead of dictating who should reduce emissions where and how, a carbon price gives an economic signal to bargain with the polluters.

Carbon Credits and offsets are vital components of global emissions trading strategies to lower emissions and reach net zero.

Activity data x Emission factor = GHG emission

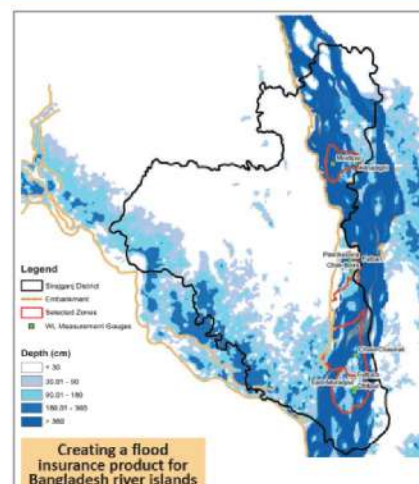


## Promoting Resilience Through Index Insurance in Bangladesh

IWM has good link with Financial Institutions in Bangladesh. We conducted a study for Oxfam and Pragati Insurance Ltd. to develop Flood Insurance Product for Bangladesh River Islands. In this study a flood hazard model for Sirajganj area was developed and utilized for community flood insurance piloting in the project area.

Flood Insurance Payout for flood event were as follows:

- Total Household: 1661
- Maximum Payout: Tk 8,000
- Premium Per Household: Tk 824 + VAT



## IWM Recognized as Bangladesh's Implementation Partner for Global Shield against Climate Risks



IWM has been recognized as the In-Country Process (ICP) partner for the "Global Shield" initiative in Bangladesh. As part of the study titled "Support Structure for Implementation of the Global Shield Against Climate Risks," IWM will assess specific needs and identify tailored options for Climate and Disaster Risk Finance and Insurance (CDRFI) interventions and instruments.

Leading this inclusive, country-driven process, IWM will actively engage key stakeholders to advance CDRFI, incorporating the voices and needs of climate-vulnerable and affected communities. This process encompasses a comprehensive review of existing initiatives, a gap analysis, a formal request for CDRFI support, and the subsequent design and implementation of a customized support package.

Given the extensive tasks and resources required for ICP implementation, a dedicated support structure will be established to aid in coordination efforts in Bangladesh. This support structure will operate under the guidance of the Economic Relations Division, Ministry of Finance of Bangladesh, in close collaboration with the Global Shield Secretariat, and will work alongside institutions such as the V20 Secretariat and members of the Global Shield Coordination Hub (CH) and Technical Advisory Group (TAG).





## INTERNATIONAL **EXPERIENCE** OF IWM

IWM is recognized as a center of excellence in delivering advance engineering, modelling and design innovation in the water, environment and climate and managed services. Aligning global experience with local knowledge, IWM collaborates with clients and partners to enhance value and maximize outcomes. Specialist technical strengths in water engineering and major projects combined with emerging technologies and data-driven services, enable IWM to provide innovative solutions to clients at home and abroad.

IWM has been working in different international assignments with great repute. The Institute provided services in Bagmati River of Nepal, Neel Ganga River of Sri Lanka. Sarwak Valley of Malaysia, Sea Level Rise with the University of New Zealand, Capacity building of National Hydraulic Research Institute of Malaysia, EIA of Coastal Land Development projects in the Zohor Bay, Langkawi Island and Malacca Strait in Malaysia and Central Asia (Khatlon province of Tajikistan).



# SOME INTERNATIONAL PROJECT HIGHLIGHTS

## Some Major Projects in Malaysia

- Program Pembangunan Water Balance bagi Pengurusan Sumber Air Negara (Fasa 1)- National Water Balance Management System (NAWABS) bagi Lembangan Sungai Muda, Malaysia.
- Hydraulic Study for the Proposed Island Reclamation of 430 Acres of Padang Lalang, Mukim of Ayer Hangat, Langkawi, Malaysia.
- Availability Study on Groundwater Resources for Selangor Water Management Authority, Malaysia.
- Hydraulic, Salinity and Groundwater Modelling Study of Sungai Langat Water Abstraction Studies for Megasteel SDN. BHD.
- Hydraulic and Morphological Study for Coastal Developments at Labuan Island, Sabah, Malaysia.



The Sungai Langat Navigation Development, Completed Projects, Selangor, Malaysia

## IWM MALAYSIA

Since its inception in 2011, IWM Malaysia SDN BHD has developed and widened its services to fulfill the present and future needs in the field of Water Resources Management, Coastal Hydraulics, Environmental and Climate Impact Assessments etc. Of Malaysia and seeks to do the same in the Eastern Asia region with continuous development of its specialist professionals. IWM Malaysia has been mandated with providing research, technical, scientific and consultancy services in connection With the supply and use Of water for all purposes and derived from all sources, the reclamation and disposal of used water, the availability, distribution, conservation and control of quality of water resources, navigation, recreation, amenity and functions related to inland waters, sewerage and sewage treatment and disposal, land drainage, pollution prevention etc.

Project Area Bagi Lembangan Sungai Muda





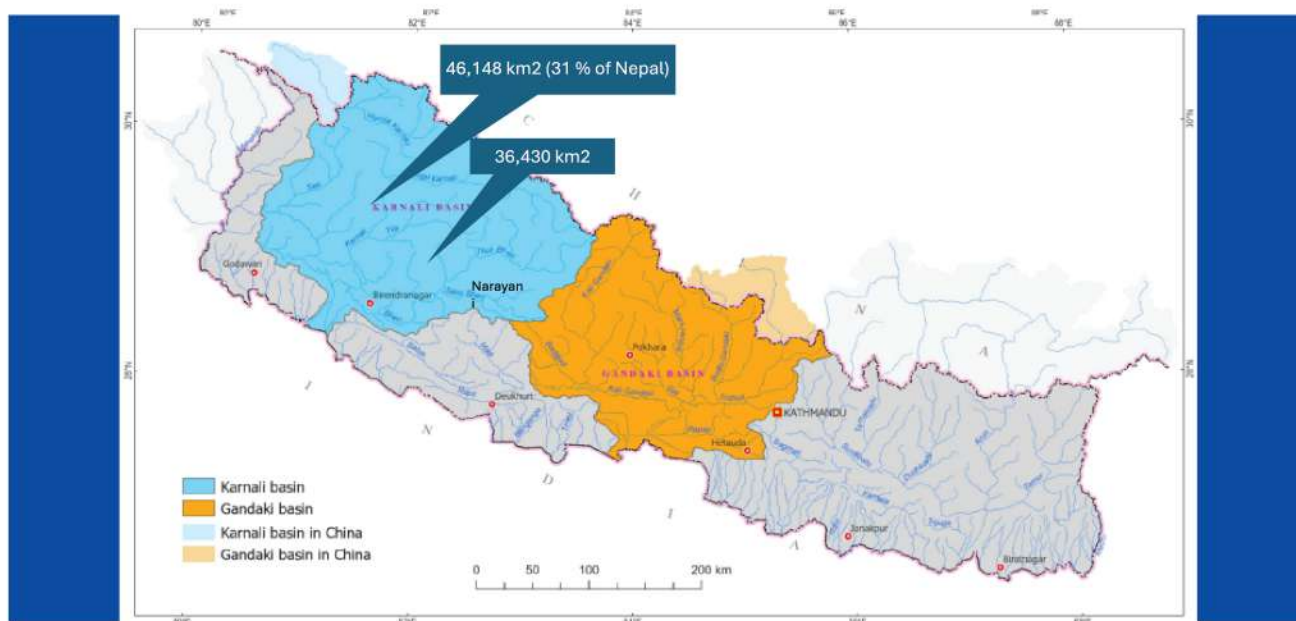


IWM Malaysia also intends to broaden its horizon in the field of education, training and research both in Malaysia and in the region. At the same time IWM Malaysia is determined to remain the market leader and provide world-class service in the field of Water Modelling, Computational Hydraulics and Allied Sciences.

Water Resources Department of Government of Bihar (GOB) has embarked upon several major initiatives and projects under the Bihar Kosi Basin Development Project (BKBDP). In this context, the Flood Management Improvement Support Centre (FMISC) has welcomed IWM consultancy services for Management Support to the Mathematical Modelling Center (MMC) for Water Resources Department, Government of Bihar. The project aimed at management support for various facets of water resources development including flood management of Ganga Basin in general and rivers of Northern Bihar like Bagmati-Adhwara, Mahananda, Kosi, Burhi-Gandak and Gandak in particular. A Regional Network Model comprising entire area of Bihar has also been developed which has finally been transferred into a Regional Flood Forecasting Model. The Regional Flood Forecasting Model of Bihar has been experimentally operated to generate flood forecast with 3-days lead time at a total of 40 Nos. of stations located on different rivers following in Bihar.



River and Basin System of Bihar Flood Forecasting Model



DSS for Flood Forecasting and Early Warning System (FFEWS) in NEPAL

Jabatan Pengairan dan Saliran initiated a project in Northeastern side of Kedah state and Penang state, Malaysia with IWM Consultancy Services for **National Water Balance Management System (NAWABS) Bagi Lembangan Sungai Muda**. The goal of the Project is to develop a system that will assist and support the Client's Water Resources Managers to manage their water resources in the Study Area with efficiency through a suite of updated and state-of-the-art operational management and planning tools.

IWM services were hired in Turkey under a project titled, **Technical Assistance to Prepare Integrated Water Projects — Lot No. 1 and 3**. Ministry of Environment and Urbanisation (MoEU) initiated the nationally prioritized project aiming at providing technical assistance to seven selected municipalities in order to prepare them for integrated water projects. The objective is to improve water and wastewater services in the municipalities of Kirikhan (Hatay), Viransehir (Sanliurfa), Igdir, Sirnak, Bismil (Diyarbakir), Yüksekova (Hakkari), and Bolvadin (Afyonkarahisar). The overall objective of the project is to enable Turkey to achieve a high level of environmental protection and compliance with the EC water sector directives. This is achieved by i) the preparation of water and wastewater investment projects ready for financing and implementation under IPA funds, ii) the preparation of Tender Dossiers for tendering and implementation of IPA funds, iii) the improvement of the operational and technical capacity of the municipalities within the water and wastewater sectors.

Consultant services from IWM were provided for the **"Preparatory Survey for Flood Risk Management Project for Cagayan De Oro River (FRIMP-CDOR) in the Philippines"**. The Government of the Philippines (GOP) has set measures for flood mitigation such as watershed management, and efficient and appropriate infrastructure development, as one of the important policies in the Philippine Development Plan (2011-2016).

Khatlon Province of TAJIKISTAN suffered terrible flood problems in their mountainous terrains. IWM was hired to render its services in Flood Risk Management Project (KPFMRP) as the follow up of ADB financed project. IWM was responsible to provide technical supports with the aid of mathematical modelling tool in devising remedial measures to flood problems and development of flood forecasting system as non-structural measures.



## 1. India

- Develop Flood Forecast and Inundation Modelling System
- Basin level water assessment
- Climate change and environmental studies
- Capacity Development & Technology Transfer

## 2. Nepal

- Development of flood risk map and flood forecasting with warning system at Bagmati basin area
- Capacity building and technology transfer
- Basin level water assessment

## 3. Malaysia

- Groundwater and surface water resource assessment
- Land reclamation
- River management
- Development of flood forecasting system
- Capacity building and technology transfer

## 4. Sri Lanka

- Salinity intrusion and river management

## 5. Central Asia

- Water resources study
- Flood forecasting system in Tajikistan

## 6. Turkiye

- Application of the state-of-the-art technology for water supply and sewerage system improvement

## 7. USA

- Hydro-Morphological Modelling of Lake Elmdale Spillway, Arkansas, USA
  - 1) Stepped Spillway of different number of steps
    - 7 steps with 3 ft drops    • 8 steps with 3 ft drops
  - 2) Stepped Spillway with Baffle Piers
    - Baffle Piers with 13.5 inch Baffle Pier Height (Based on Design Calculations)
    - Baffle Piers with 18 inch Baffle Pier Height



Field Visit in Bagmati River Bank, Nepal



Consultation Meeting Organized with NAHRIM in Malaysia



Survey Work Conducted in Khatlon Province, Tajikistan



Study Area of Lake Elmdale Spillway, Arkansas, USA



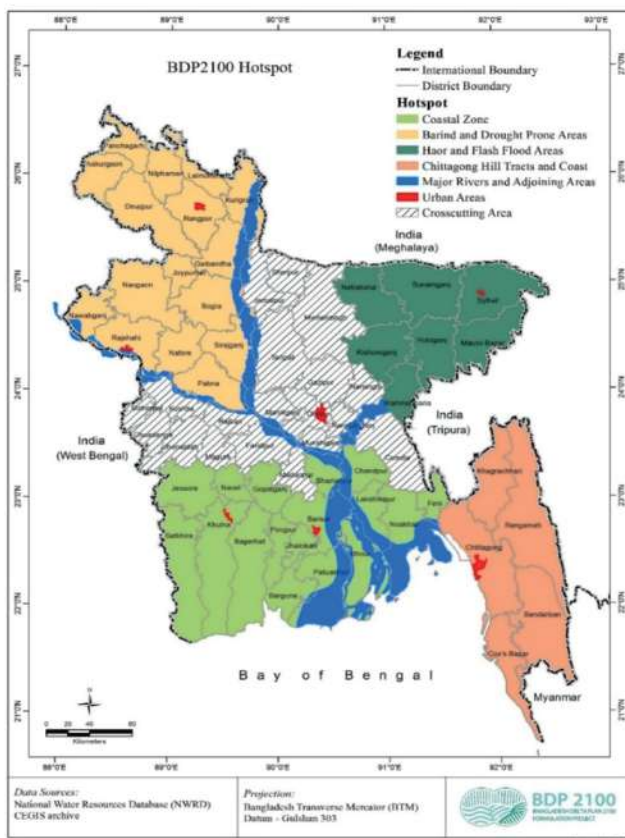
# BANGLADESH DELTA PLAN 2100: IWM OUTLOOK

## DeltaPlan Centric Solutions by IWM.

Bangladesh Delta Plan 2100 (BDP 2100), a farsighted vision of Bangladesh aimed at moving Bangladesh forward towards the end of 21st Century with the aspiration of achieving a safe, climate resilient and prosperous Delta.

BDP 2100 is the combination of long-term strategies and subsequent interventions for ensuring water and food security, economic growth and environmental sustainability while effectively reducing vulnerability to natural disasters and building resilience to climate change and other delta challenges. BDP 2100 focuses on six hotspots, like Coastal Zone, Barind and Drought Prone Areas, Haor and Flash Flood Areas, Chittagong Hill Tracts and Coast, Major Rivers and Adjoining Areas, Urban Areas.

Since its inception in 1997, IWM has been working towards making a resilient nation by providing infrastructure development solutions with state-of the art mathematical modelling tools coupled with world class survey resources and data. With the BDP2100, IWM also has aligned its path to develop solutions for efficient use of its resources.



## Strength of IWM to support BDP 2100

1. State-of-the art modelling tools (calibrated and validated)
2. Latest and updated data and survey
3. Relation with stakeholders
4. Relation with other BDP partners
5. Relation with Donors
6. Division wise expertise (flood management, ICT-GIS, River engineering, Water resources, planning, Coast-port and estuary management, Climate change R&D Unit, Irrigation management)
7. A wide range of expert consultants (economists, sociologists, ecologists)





# TRAINING & TECHNOLOGY TRANSFER

IWM offers training courses on water and environmental modelling, decision support systems, GIS, advanced data acquisition and survey techniques. The objectives of the training programs are promoting technology transfer, exchange of experience & skill, initiating developmental processes and cooperation. Together with partner organizations in Bangladesh and abroad, IWM forms an international network offering theoretical and on-the-job training to a wide range of participants from home and abroad. In addition to the training courses, IWM offers support to undergraduate and postgraduate students from national and international institutes and universities. A wide range of commercial and customized modelling tools are available for the training course.

## AVAILABLE TRAINING COURSES

### Advanced Professional Training on Water and Environmental Modelling

- Flood Management Modelling
- Groundwater Modelling
- Low Flow Modelling
- Sediment Transport Modelling
- Water Quality Modelling
- Flood Forecasting
- Morphological Modelling
- Rainfall-runoff Modelling
- Groundwater Modelling
- Decision Support Systems
- River Basin Modelling
- Water Supply and Sewerage Network Modelling
- Salinity Modelling

### Advanced Professional Training on Survey and Data Acquisition

- Advance Survey Techniques
- Operations of advance Survey Equipment : GPS, DGPS, RTK-GPS, Total Stations, Digital Current meters, Self Recording Current Meter, Digital Echosounder, Digital Levels, Automatic Water Level Recorder, Pressure cells, CTP, Sediment Sampler, Turbidity Meter, Salinity Meter, ADPC, Multibeam Polaris, LIDAR, Drone

### Professional Training on Information Technology and Management

- Database System Development
- Geographic Information Systems
- System Support and Network Maintenance



## IWM Provides Training on following Technologies



## Support to Undergraduate and Postgraduate Students

IWM offers support to undergraduate and postgraduate students from national and international institutes and universities listed below:

- Bangladesh University of Engineering and Technology, Bangladesh
- Ahsanullah University of Engineering and Technology, Bangladesh
- Military Institute of Science & Technology, Bangladesh
- Asian Institute of Technology, Thailand
- Wageningen University & Research
- International Institute for Infrastructural, Hydraulic and Environmental Engineering
- Chattogram University of Engineering and Technology
- Islamic University of Technology

## IWM Training Strengths

- 3 state of the art training rooms with 100+ capacity
- Digital Multi-Touch Board
- Highly skilled experts
- Hands on training with Real Data
- Using latest version of software
- Arrangement of International Trainings with affiliated partners

## Joint Training Partners

- Bangladesh Water Development Board (BWDB)
- Bangladesh Inland Water Transport Authority (BIWTA)
- Bangladesh Agricultural Development Corporation (BADC)
- Bangladesh University of Engineering and Technology (BUET)
- Military Institute of Science and Technology (MIST)
- Texas Tech University (TTU), USA
- Wageningen University & Research — WUR
- IHE, DELFT
- Department of Public Health Engineering (DPHE)
- CITY CORPORATIONS
- Bangladesh Space Research and Remote Sensing Organization (SPARRSO)
- ICIMOD
- Asian Disaster Preparedness Center (ADP)
- Barind Multipurpose Development Authority (BMDA)
- Bangladesh Water Partnership (BWP)
- Local Government Engineering Department (LGED)
- Bangladesh Bridge Authority (BBA)
- Civil Aviation Authority of Bangladesh (CAAB)
- Department of Environment (DOE)
- Water Supply and Sewerage Authority (WASA)
- Water Resources Planning Organization (WARPO)
- River Research Institute (RRI)
- WORLD BANK
- Asian Development Bank (ADB)



## Some Important Training Programs Participated by IWM



IWM Professional Participated in a Training Course on Multi-Scale Integrated River Basin Management in the Hindu Kush Himalaya" held at ICIMOD, Nepal



IWM Organized training for Bangladesh Bridge Authority (BBA) professionals at DHI Denmark



IWM Professionals have Provided Specialized Training for the Operation of Flood Management Support Systems to Mathematical Modelling Center (MMC) of the Water Resources Department (WRD), Government of Bihar, India



IWM provided training for NAHRIM staffs on 'Groundwater Modelling of Linggi River Basin using MIKE SHE' in Malaysia



IWM provided training on "Basin Model development using MIKE Hydro Basin" to the different Universities (University of Kabul, American university of central Asia and Institute of Water Problems, Hydropower and Ecology, Tajikistan) professionals and it American University of Central Asia, at laboratory, AUCA, Computer Kyrgyzstan





## IWM Library

- More than 10,000 books on flood control, flood forecasting, irrigation and drainage, river morphology, salinity and sediment transport, coastal hydraulics, port, coast and estuary management, environmental impact assessment, bridge hydraulics.
- 5,000 unique reports
- 1,000 sophisticated maps
- Using latest version of library software
- Connectivity with affiliated International Universities and research partners

## MOU between IWM and Other Institutes at Home and Abroad

IWM has MOU with knowledge partners mainly for research collaboration and human resource development as well as technology transfer

THE **ACADEMY**  
by DHI

UNESCO  
**IHE**  
DELFT

UNIVERSITY OF  
**EXETER**

 **Clarkson**  
UNIVERSITY

**TU**  
TENNESSEE TECH  
UNIVERSITY

**Lancaster**  
University

 **WASHINGTON STATE**  
UNIVERSITY

 **WAGENINGEN**  
UNIVERSITY & RESEARCH

 **NIPPON KOEI**  
BANGLADESH Engineering Consultants

 **MIST** Technology for  
Advancement  
Military Institute of Science and Technology

 **Daffodil**  
International  
University





## IWM Supports to Develop Different National Plans and Policies

IWM has played a pivotal role in shaping and contributing to several national plans and strategies in Bangladesh. Leveraging its expertise in computational hydraulics and integrated water management, IWM has been instrumental in formulating and upgrading significant policy frameworks, strategic plans and development projects. These contributions span across diverse sectors, including water resource management, climate change adaptation, disaster risk reduction, and environmental conservation.

IWM provided support to different ministries and agencies to prioritize, categorize and selection of climate change adaptation, mitigation and implementation projects of “Bangladesh Green Climate Resilient Development (2024-2027)” with its strong linkage with the ministries, government agencies, development partners, private sectors, NOGs. IWM consulted several times with the relevant stakeholders during development of the country program. IWM also supported to formulate Bangladesh Delta Plan 2100, National Adaptation Plan of Bangladesh (2023-2050), National Strategy for Water Supply and Sanitation 2014 and Development of Water Supply and Sanitation Mechanism 2024, etc.





# IWM SURVEY & MAPPING

Survey data is essential for the design, planning, implementation, and maintenance of infrastructure development, especially in the field of water resources. Present-day modern survey equipment has come up to provide additional advantages to make the field survey faster and comprehensive than before. From the very day of her journey, IWM has been enriching its capacity through procurement of highly specialized equipment like Multibeam Echosounder, Terrestrial Laser Scanner, RTK-GPS, UAVAcoustic Doppler Current Profiler, etc. We are capable of almost all types of survey works practiced worldwide. Nonetheless, some of the conventional equipment like Auto Level and Conventional Current Meters are also being used for the works where these equipment's are still bestsuited.

## Acoustic Doppler Current Profiler (ADCP)



ADCP being deployed on the seabed

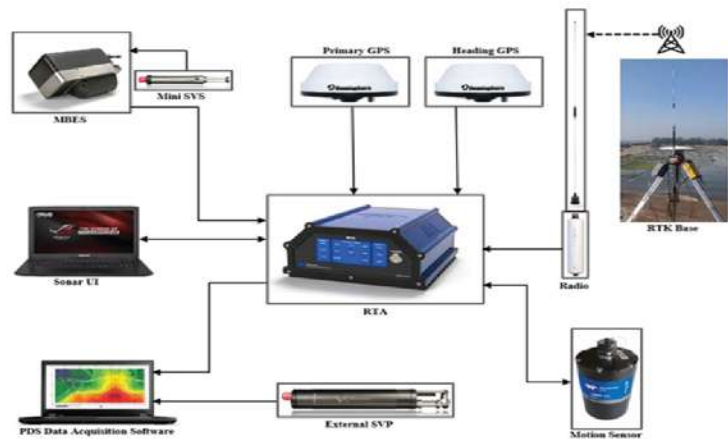
ADCP measures current and waves in the river and estuaries. Depending on the deployment type, IWM has two 2 different types. For inland rivers, moving boat measurement is done by mounting the ADCP on a boat or towed on afloat. This equipment shows real-time depth, ship tracking, velocity, and discharge 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. ADCP 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).



## Multibeam Echosounder System

Multibeam Echosounder System is used for the bathymetric survey where total coverage of the seabed is needed. IWM has acquired 2 sets of Multibeam System, 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. Data of T20R has high resolution and minimum noise. Model MB2 is also a good quality instrument capable of measuring river/seabed using 512 beams and up to 140-degree swath width. This allows the instrument for use in the ports & harbor, dredging monitoring, river training works monitoring, monitoring scour holes around bridge piers and river training works.



## Bathymetric Survey (Single Beam)



IWM is conducting hydrographic surveys using state-of-the-art GPS and Digital Echosounder for more than 24 years. IWM own 3 survey boats for the bathymetric survey. The Echo sounder measures the depth of water by transmitting sound signals and receiving the echo reflected from the bed of the channel. All 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 position of the echo sounder. 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 Echo-sounder. It uses DGPS or RTK-GPS receivers mentioned earlier as well.

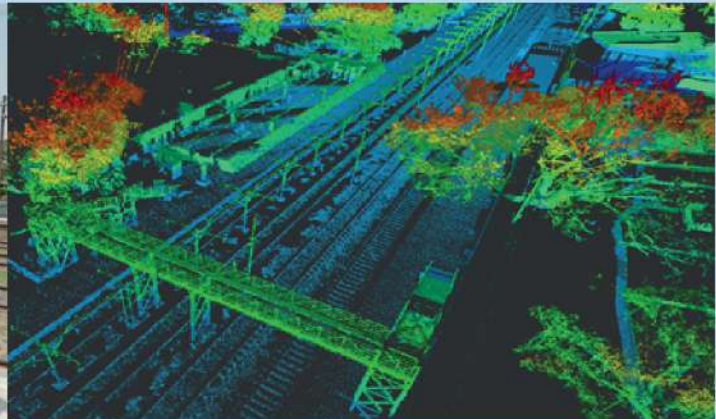


## 3D Terrestrial Laser Scanner

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 is capable of scanning up to 1500m distance depending on the type of target. 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 and 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 electric towers), 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 Chapainawabganj

## Unmanned Aerial Vehicle (I-JAV)

IWM is conducting a topographic survey by UAV (Drone) at places where 3D DSM or DTM is needed. IWM owns DJI Phantom 4 Pro Version 2. UAV is operated at the site for a predefined flight path generated using



Photogrammetry, Aerial Lidar & Documentary Video Drones



## 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 Georeferencing, and other conventional engineering/ hydro-graphical surveys where high precision is important for both Horizontal & Vertical co-ordinate. Presently IWM owns more than 30 RTK-GPS



## Optical Backscatter Sensor



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

An optical Backscatter Sensor is used to measure turbidity for Met Ocean Survey. The instrument is deployed in the sea bed for continuous data collection. The instrument is fitted with temperature, conductivity, turbidity, and pressure sensor. 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 sample concentration. IWM owns OBS 3 from Campbell Scientific Instruments and Aquatroll from In Situ Instruments.

## Water Laboratory Facilities

IWM Water Laboratory is a state-of-the-art facility equipped with advanced technology and tools for comprehensive water quality analysis. The laboratory supports a wide range of tests, including physical, chemical, and biological assessments of water samples. It is capable of analyzing various parameters such as pH, turbidity, dissolved oxygen, heavy metals, nutrients, and microbial content, ensuring the accuracy and reliability of results. The lab plays a critical role in supporting IWM's research, project implementation and monitoring activities.



IWM extended its sphere beyond national borders through formidable networking, unwavering commitment, and sophisticated international branding.

## National



## International





## LIST OF IWM SURVEY EQUIPMENT AND VESSELS:

Sl. No.	Equipment Type	Name of Equipment/Model	Brand/Manufacturer	Quantity	Total
1	Multibeam Echosounder System (MBES)	R2Sonic 2022+	R2Sonic	1 set	3
		T20R Multibeam Echosounder	Teledyne Reson	1 set	
		MB2 Multibeam with embedded Hemisphere 321 GPS	Teledyne Odom + Hemisphere	1 set	
2	UAV/Drone (Areal Photogrammetry & Videography)	DJI Matrice 300 with DJI Zenmuse P1	DJI Enterprise	1 set	7
		DJI Phantom 4 V2	DJI Enterprise	3 set	
		DJI Air 2S	DJI Enterprise	1 set	
		DJI Mini 2	DJI Enterprise	2 set	
3	LiDAR (Aerial & Terrestrial)	UAV LiDAR	DJI Enterprise	1 set	2
		DJI Zenmuse L2, DJI Matrice 350			
		Terrestrial Laser Scanner (TLS) Polaris TLS 750	Teledyne Optech	1 set	
4	Met Ocean Survey (Current and Wave Measurement ADCP)	Sentinel V	Teledyne RD Instruments	3 set	3
5	River Discharge Measurement ADCP	River Ray ADCP 600 KHz	Teledyne RD Instruments	2 set	3
		Workhorse Rio-Grande ADCP (600 KHz)	Teledyne RD Instruments	1 set	
6	Single Beam Echosounder	Echotrac CV 200 (Dual-frequency)	Teledyne Odom	1 set	11
		Echotrac MKIII (Dual-frequency)	Teledyne Odom	1 set	
		E 20 (Dual-frequency)	Teledyne Odom	1 set	
		Echotrac CV 100 (Single-frequency)	Teledyne Odom	1 set	
		E 20 (Single-frequency)	Teledyne Odom	6 set	
		Hydrotrac (Single-frequency)	Teledyne Odom	1 set	
7	Global Navigation Satellite System (GNSS Receiver)	Heading RTK GNSS, Hemisphere 361	Hemisphere	1 set	72
		Heading RTK-GNSS, P2 Elite	CHC-NAV	2 set	
		RTK-GNSS, SPS 855	Trimble	8 set	
		RTK-GNSS Reach RS2	EMLID	24 set	
		RTK-GNSS Polaris Sloo	Polaris	18 set	
		RTK-GNSS, 190 Pro	CHC-NAV	10 set	
		RTK-GNSS, 183	CHC-NAV	2 set	
		RTK-GNSS, 193	CHC-NAV	2 set	
		RTK-GNSS, I base	CHC-NAV	1 set	
		RTK-GNSS, Model R6 with TSC3	Trimble	3 set	
		DGPS GNSS 361	Trimble	1 set	
		Handheld GPS	Garmin	45 set	
8	Total Station	Total Station TS 06 Plus	LEICA	4 set	14
		Total Station Trimble S5 Auto-lock	Trimble	1 set	
		Total Station Trimble M3	SOKKIA	4 set	
		Total Station SOKKIA 1M 101	SOKKIA	1 set	
		Total Station SOKKIA Set 550RX	SOKKIA	3 set	
9	Auto Level	Auto Level (820)	SOKKIA	40 set	40
10	Current Meter	Current Meter BFMOOI (Speed only)	Vale ort	2 set	2

## LIST OF IWM SURVEY EQUIPMENT AND VESSELS:

Sl. No.	Equipment Type	Name of Equipment/Model	Brand/Manufacturer	Quantity	Total
11	Water Quality Equipment	Salinometer /Conductivity Meter	Hach	2 set	18
		Dissolved Oxygen Meter (DO)	Hach	1 set	
		Optical Backscatter Sensor- OBS3A	Campbell	3 set	
		Optical Backscatter Sensor- Aquatroll 600 (OBS+)	Insitu	2 set	
		pH meter	Hach	1 set	
		Submersible Pumps	Eijkelpemp	10 set	
12	Pressure Sensor	Auto Level (820)	SOKKIA		25
13	Water Level and Infragravity Wave Measurement	water Level Recorder (MiDAS WLR)	Valeport	2 set	2
14	Sound velocity Profiler (SVP)	Mini SVS	Valeport	1 set	3
		Swift SVP	Valeport	1 set	
		Monitor SVP	Valeport	1 set	
15	Motion Sensor	DMS 05 Motion Sensor	TSS	2 set	2
16	Underwater Beacon System	Pinger Receiver System along with 3 Underwater Locator Beacon	RJ International, USA	2 set	2
17	IWM Survey Vessel	Atomix 600 Sports Cuddy for MultiBeam Survey	Netherlands Design Sreebangla BoatBuilders	2 set	4
		17 ftSingle Beam Survey Boat	Local Made	1 set	
		12 ftSingle Beam Survey Boat	Local Made	1 set	





## SOFTWARE FACILITY IN BRIEF AT IWM

Items	Software Short Specification	License Quantity
ArcGIS Software (Mapping, Remote Sensing and Photogrammetric Tools)	ESRI ArcGIS Product Suit (current version) <ul style="list-style-type: none"> <li>ArcGIS Pro 2.8 (ArcGIS Pro provides the capability to compile three-dimensional (3D) feature data in a stereo viewing and mapping system as <b>Photogrammetric Stereo techniques</b>. Remote sensing and image processing techniques can be used to automatically identify and classify features at photogrammetric accuracy using an orthorectified image base)</li> </ul>	30
	Single use term license <ul style="list-style-type: none"> <li>ArcGIS Desktop Advanced 10.8.1</li> <li>ArcGIS Desktop Standard 10.8.1</li> <li>ArcGIS Desktop Basic 10.8.1</li> <li>ArcGIS 3D Analyst for Desktop 10.8.1</li> <li>ArcGIS Spatial Analyst for Desktop 10.8.1</li> <li>ArcGIS Geostatistical Analyst for Desktop 10.8.1</li> <li>ArcGIS Publisher for Desktop 10.8.1</li> <li>ArcGIS Network Analyst for Desktop 10.8.1</li> <li>ArcGIS Schematics for Desktop 10.8.1</li> <li>ArcGIS Data Reviewer for Desktop 10.8.1</li> </ul>	30 30 30 30 30 30 30 30 30 30
	Up to Four Cores Term License <ul style="list-style-type: none"> <li>ArcGIS Enterprise Advanced (Windows) 10.9</li> <li>ArcGIS Enterprise Standard (Windows) 10.9</li> <li>ArcGIS Enterprise Workgroup Advanced 10.9</li> <li>ArcGIS Enterprise Workgroup Standard 10.9</li> <li>ArcGIS Workflow Manager for ArcGIS GIS Server Advanced (Windows) 10.9</li> <li>ArcGIS Workflow Manager for ArcGIS GIS Server Standard (Windows) 10.9</li> <li>ArcGIS Data Reviewer for ArcGIS GIS Server Advanced (Windows) 10.9</li> <li>ArcGIS Data Reviewer for ArcGIS GIS Server Standard (Windows) 10.9</li> <li>ArcGIS Image Server (Windows) 10.9</li> <li>ArcGIS GeoEvent Server (Windows) 10.9</li> <li>ArcGIS Monitor for ArcGIS Server 10.9</li> <li>Esri Production Mapping for ArcGIS GIS Server Advanced (Windows) 10.9</li> <li>Esri Production Mapping for ArcGIS GIS Server Standard (Windows) 10.9</li> </ul>	10 10 10 10 10 10 10 10 05 05 10 10 10 10

Items	Software Short Specification	License Quantity
	Single Use Term License <ul style="list-style-type: none"> <li>Esri Production Mapping for Desktop 10.8.1</li> <li>ArcGIS Engine 10.8.1</li> <li>ArcGIS 3D Analyst for Engine 10.8.1</li> <li>ArcGIS Spatial Analyst for Engine 10.8.1</li> <li>ArcGIS Engine Geodatabase Update 10.8.1</li> <li>ArcGIS Network Analyst for Engine 10.8.1</li> <li>ArcGIS Schematics for Engine 10.8.1</li> </ul>	10 30 30 30 30 30 30
	50 Pack Single Use Deployment License <ul style="list-style-type: none"> <li>ArcGIS Runtime Basic 10.8.1</li> <li>ArcGIS Runtime Standard 10.8.1</li> <li>ArcGIS Runtime Advanced 10.8.1</li> <li>ArcGIS Runtime Analysis Extension 10.8.1</li> </ul>	1 1 6 6
<b>Mapping, Remote Sensing and Photogrammetric Tools</b>	<ul style="list-style-type: none"> <li>ArcGIS 9.1, with Spatial Analyst, Image Analyst Extensions, Image Analyst</li> </ul>	1
	<ul style="list-style-type: none"> <li>ArcGIS Engine Developer Kit,</li> </ul>	1
	<ul style="list-style-type: none"> <li>ArcView GIS 3.2 with Spatial Analyst, 3D Analyst, Image Analyst, Network Analyst Extensions.</li> </ul>	2
<b>Mathematical Modelling</b>	<ul style="list-style-type: none"> <li>ERDAS Imagine Professional 9.1</li> </ul>	1
	<p>IWM uses the state-of-the-art world leading mathematical modelling software tools developed by Danish Hydraulic Institute (DHI), Delf-Hydraulics (Deltares), Lakes Environmental, Sound Plan Asia Ltd. Bently-US Army Corps of Engineers and US Geological Survey.</p> <p>MIKE+ (Water Distribution, Collection Systems, Rivers, Flooding), MIKE Cloud (Mesh Builder), FEFLOW, MIKE 21C, MIKE HYDRO Basin, MIKE HYDRO River, MIKE SHE, MIKE URBAN+, MIKE URBAN, WEST, Water Net Advisor, DIMS.CORE, MIKE FLOOD, MIKE ECO Lab, MIKE OPERATIONS, MIKE 3 Wave FM, MIKE 21/3, MIKE 21 Bossiness Waves, MIKE 21 Mooring Analysis, MIKE 21/3 Oil Spill, MIKE 21/3 Particle Tracking, MIKE 21/3 Sand Transport, MIKE 21/3 Mud Transport, MIKE 21 Shoreline Morphology, MIKE 21 Spectral Waves, MIKE ECO Lab, ABM Lab, LITPACK, MIKE Animator Plus, MIKE C-MAP, Hymos, AERMOD (Air Quality), Sound PLAN (Noise Pollution), Delft3D, HEC-RAS, Modflow WaterGems, SewerGems, NeuroSolutions etc.</p>	80 nos. Network license for each module + 35 Single use licenses.



Items	Software Short Specification	License Quantity
<b>Topo &amp; Hydrographic Survey</b>	Atласcan, Fieldgenius, Trimble Business Center, PDS 2000, Autoclean, Autopatch, Hypack, HydroPro, Terramodel, ViSeaDAS, WinRiver II, Velocity, Wavemon, AutoCAD, 3D Survey, Pix4D	
<b>Database System</b>	Latest MS SQL Server, Oracle 12c, MySQL, PostgreSQL MS Access etc.	1 no.
<b>Programing and Others</b>	MS Visual Studio, Microsoft .Net Framework, ASP .Net, PHP, Microsoft Visual Basic .Net, C#, Java, Python, Android Studio, PHP, HTML. CSS, Java Scripts, Laravel, Geoserver etc.	1 no.
<b>Computer Aided Design &amp; Graphics</b>	AutoCAD, Visio, Adobe Photoshop etc.	
<b>Office Product</b>	Microsoft Office 365 Enterprise as Subscription license	250 nos.
<b>IWM Office software (own development)</b>	Project Information Management	1 no.
	Financial & Accounting Management	
	Leave Management	
	Payroll Management	
	User Management	
	Personal Information Management	
	Asset Inventory Management	
	Provident Fund Management	
<b>Business Manegment</b>	TallyPrime	Network license
<b>Video Conference</b>	ZOOM Meeting Pro	2 nos.
	Microsoft Team	2 nos.
<b>SSL Web Service</b>	RapidSSL Certificate for different Web sites	1 no.
<b>Data Backup Software</b>	Symantec Backup Exec for Data Archive	1 no.



Water Environment, Climate & ICT

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