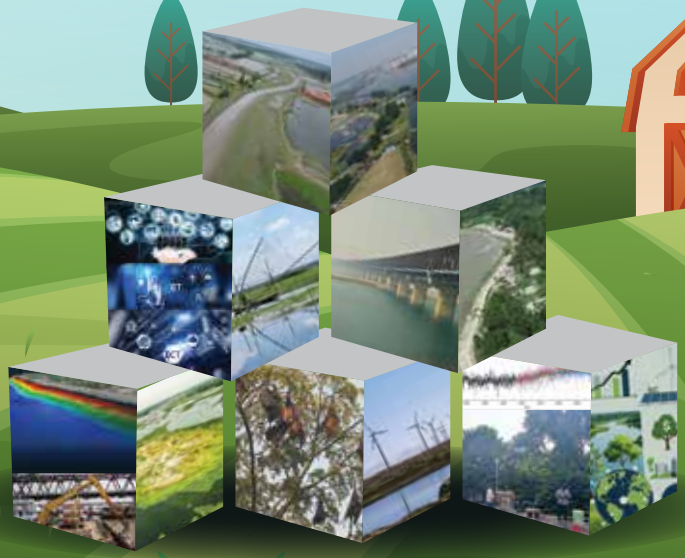
ANNUAL REPORT

2024-2025



IWM

Water Environment, Climate & ICT

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Areas of IWM Services

- Mathematical Modelling and Allied Science
- Green and Climate Resilient Development
- Climate Finance Related Policy Solutions
- Carbon Credit Assessment and Project Management
- Wetland and Lakes Management
- Irrigation Management
- Groundwater Management
- Water Supply, Sanitation and Urban Water Management (WSU)
- Water Supply Master Planning
- Water Quality & Ecology
- Fluvial Hydraulics and River Morphology
- River Engineering
- Bridge Hydraulics and Structural Analysis
- Flood Risk Management
- Integrated Coastal Zone Management
- Coastal Hydraulics and Morphology
- Tidal River Management (TRM)
- Port and Coastal Structure Management
- Estuary and Marine System Management
- Offshore Structures and Pipelines
- Software Management and IT Solutions
- Geographic Information Systems and Remote Sensing (GIS&RS)
- Topographic, Hydrographic, and Hydrometric Data Collection
- Digital Land Survey for Digitizing Mouza Map for accurate land Records
- Environmental and Social Impact Assessment (ESIA/EIA)
- Water Resources Optimization and Decision Support Systems
- Flood Forecasting and Early Warning Systems
- Water Governance and Policy Development
- Sustainable Development Goals (SDGs) in Water Management
- Hydrological and Meteorological Modelling
- Water Distribution Network Design and Management
- Wastewater Treatment and Reuse Technologies
- Ecological Restoration and Conservation Green and Water Bodies
- Aquatic Habitat and Biodiversity Management

IWM
Water Environment, Climate & ICT

About IWM

IWM was established in December 1996 as a Trust through a Cabinet decision, Government of the People's Republic of Bangladesh.

IWM is a self-sustained and independent Trust established in 1996. IWM services include but are 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.

IWM offers a wide range of specialist services in the field of water resources planning and management as well as hydrometric measurements, hydrographic bathymetric & topographic surveys and monitoring. Environmental Impact Assessment (EIA) & Social Impact Assessment (SIA), NBS, Climate Finance related Policy Solutions, Carbon Credit Assessment, Detail Design and Project Management.

IWM functions as a non-profit organization on a cost recovery basis.

Historical Development of IWM

SWSMP-I 1986-1989
- UNDP Aided
- 1D River Model Development for 2 Region-SERM General Model

SWSMP-II 1990-1993
- DANIDA Aided
- 1D Morphological and Salinity Modelling
- 4 More Regional Models Development NWRM, NCRM, NERM, SWRM

SWSMP-III 1994-1996
- DANIDA Aided Morphology, Water Quality, Ground Water, Urvan Drainage and 2-D Modelling, 2-D Hydrodynamic
- Commercial Application
- GIS Integration SWMC TRUST

SWMC TRUST 1997-2001
- Institutionalization Self sustaining
- Non-profit organization under Trust Act
- Command Area Development
- Coastal Zone Management
- Quasi 2-D Morphology, Waves
- 2-d Curvilinear Model IWM TRUST

IWM TRUST 2002-to date
- Regional Training Hydro informatics
- Climate Change Impact Assessment
- Flood Forecasting & Disaster Management
- Environment & Social Impact Assessment
- Urban Water Resources assessment & WS Network Modelling
- GW & SW Resources Integrated Assessment
- River Erosion Forecasting TQM
- Software development and IT Solutions
- Geographic information Services (GIS)

IWM Board of Trustees (BoT)

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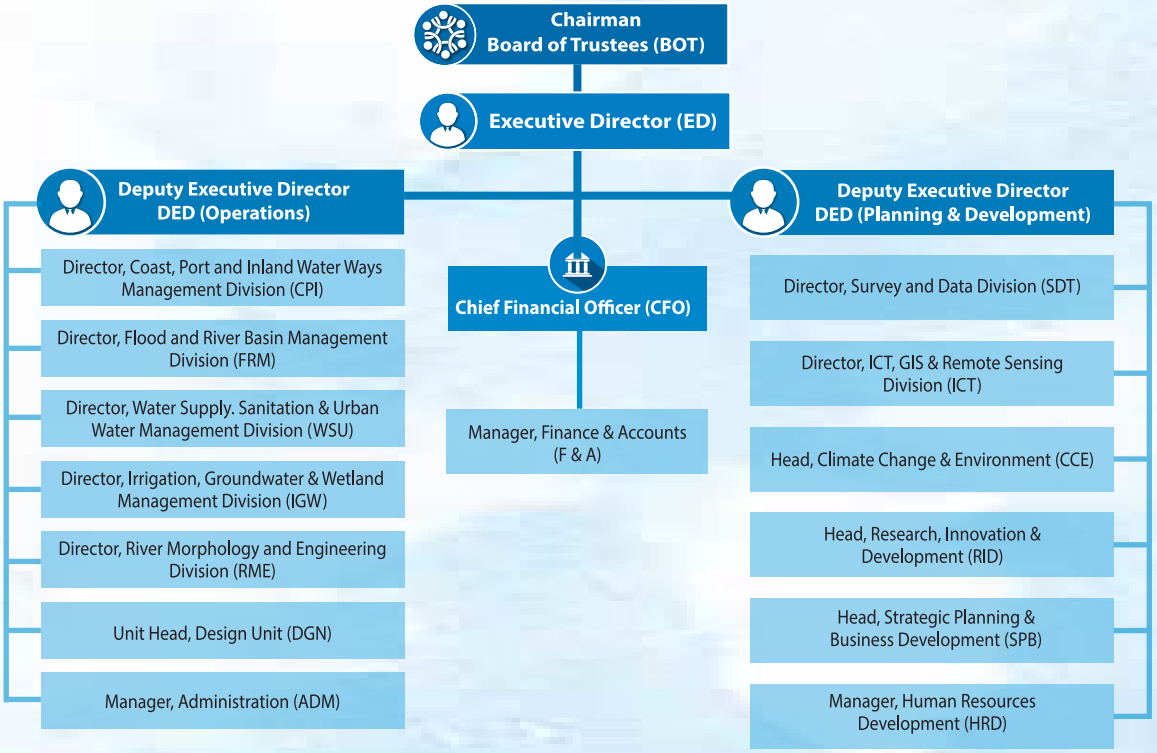
S M Mahbubur Rahman Executive Director, Institute of Water Modelling (IWM)	Member Secretary

IWM Organogram



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Message from

CHAIRPERSON

Mr. Nazmul Ahsan
Secretary

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

It is with great pride and deep appreciation that I extend my warmest congratulations to IWM on the publication of its Annual Report for 2024–2025. As Chairperson of the Board of Trustees (BoT), I have had the distinct privilege of witnessing firsthand the outstanding strides and transformative impact this esteemed Institution continues to make. Over the years, IWM has rightfully earned its stature as a national and international Center of Excellence, demonstrating leadership and innovation across a broad spectrum of disciplines. These include mathematical modeling, green and climate resilient development, environmental management, urban management, water supply management master plan, sanitation and sewerage management master plan, river morphology and erosion control, forecasting and monitoring condition of RTW/Piers of large bridges, water quality monitoring (WQM), and both surface and groundwater management. The Institute has also made commendable advancements in haor and wetland ecosystems and other allied sciences, playing a pivotal role in advancing integrated water resources management at both policy and operational levels.

Established in December 1996 through a Cabinet decision of Government of the People`s Republic of Bangladesh. IWM has played a pivotal role in supporting Bangladesh's journey toward becoming a prosperous nation. By delivering world-class solutions in water, environment, and climate-related sectors, the Institute has consistently demonstrated its expertise in the efficient planning, design, and implementation of infrastructure projects for various ministries. IWM's proficiency in mathematical modeling has earned it recognition both domestically and internationally. Equipped with state-of-the-art survey instruments and a team of highly skilled professionals, the Institute is well-positioned to undertake even the most complex survey projects with precision and excellence.

IWM's impact extends far beyond Bangladesh, as it has successfully addressed numerous water-related challenges in other countries as well. It is particularly encouraging to note that IWM's collaborations with educational and research institutions, both within the country and abroad, have grown exponentially. These partnerships have opened new avenues for cooperation across South and East Asia, North America, and Europe, further solidifying IWM's global reputation.

As Chairperson of the Trust, I would like to express my sincere gratitude to the members of the Board of Trustees for their invaluable contributions and unwavering support over the years. I also extend my deepest appreciation to the dedicated professionals at IWM for their relentless efforts in elevating the institution's stature and enhancing the nation's image on the global stage. I am confident that IWM will continue to thrive and achieve even greater milestones in the years to come. Wishing the Institute a future filled with success and prosperity.

Mr. Nazmul Ahsan
Secretary

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

Message from

Executive Director

SM Mahbubur Rahman
Executive Director
Institute of Water Modelling (IWM)

It is my pleasure to present the Annual Report 2024–2025 of IWM to our valued clients, partners, and well-wishers. This report offers a comprehensive overview of our services and accomplishments over the past year.

Throughout 2024–2025, IWM demonstrated strong resilience and a commitment to excellence, successfully navigating numerous challenges while advancing its mission. I sincerely thank all IWM staff for their dedication and hard work. I am also grateful to the Chairperson, Board of Trustees (BoT) for his ongoing support and guidance.

This year, IWM made significant progress at both national and international levels. We collaborated with around 40 clients on nearly 120 projects. The Coast, Port & Inland Waterways Management (CPI) Division undertook key projects such as Marine Spatial Planning & Stakeholder Consultation, Understanding the Blue Economy for Sustainable Development of Bangladesh, Feasibility Study of Improvement of Connectivity and Community Infrastructure Development in the Selected Polders of Coastal Zone of Bangladesh, Feasibility Study for Emergency Flood Response project in the Flood/Disaster Affected Districts of Bangladesh.

The Flood & River Basin Management (FRM) Division initiated critical efforts to expand Flood Forecasting and Early Warning System for Karnali and Narayani River Basin in Nepal. It also completed Management Support to the Mathematical Modelling Centre (MMC) for Water Resources Research & Development under Water Resources Department, Government of Bihar, India.

The ICT-GIS & Remote Sensing Division (ICT) played an instrumental role in a study of integrating solar renewable energy into the existing power grid system of Bangladesh. It is also continuing the Development of Upazila Land Suitability Assessment and Crop Zoning System of Bangladesh (Phase-II) and Khamari Mobile App in collaboration with Bangladesh Agricultural Research Council (BARC).

The Irrigation, Groundwater & Wetland Management (IGW) Division successfully executed several key projects, including a Comprehensive Study for Livelihood Improvements through Integrated Management of Land and Water Resources in Arial Beel Area, Department of Bangladesh Haor and Wetlands Development (DBHWD) and a Study for assessment of the effectiveness of constructed/to be constructed Rubber Dams, Bangladesh Agriculture Development Corporation (BADC).

The River Morphology & Engineering (RME) Division contributed to Feasibility Study for the Management of Mohananda River in Chapai Nawabganj, Bangladesh Water Development Board (BWDB), Hydro-Morphology Study of Bridges under Chattogram and Sylhet Divisions, LGED. The division also provided forecast ahead of monsoon and monitored the Jamuna River to protect the River Training Works (RTWs) of the Jamuna Bridge on behalf of BBA.

The Survey and Data Division (SDT) enhanced IWM's data acquisition capabilities using advanced equipment such as Multibeam and single Beam Echo Sounders, 3D Laser Scanners, Professional Survey drones with Camera & Lidar, Acoustic Doppler Current Profilers, RTK GPS, and survey vessels. Notable assignments included Detailed topographic survey for proposed Khulna to Darshana railway line, Bangladesh Railway (BR) as well as Survey support to Jamuna Rail Bridge construction project in dredging, rock dumping and bed monitoring work.

The Water Supply, Sanitation and Urban Water Management (WSU) Division completed several essential infrastructure projects. These included the Support to Feasibility for sewerage system development in Uttara, Dhaka Water Supply and Sewerage Authority (DWASA), the Review of Water Supply Masterplan of Dhaka Water Supply and Sewerage Authority (DWASA).

The Climate Change and Environment (CCE) Unit worked on climate projections and scenario-based studies in partnership with BUET, DOE, the World Bank, and other stakeholders. Notable project is Climate Change and Urban Heat Island (UHI) Effect in major Cities of Bangladesh, Department of Environment (DoE).

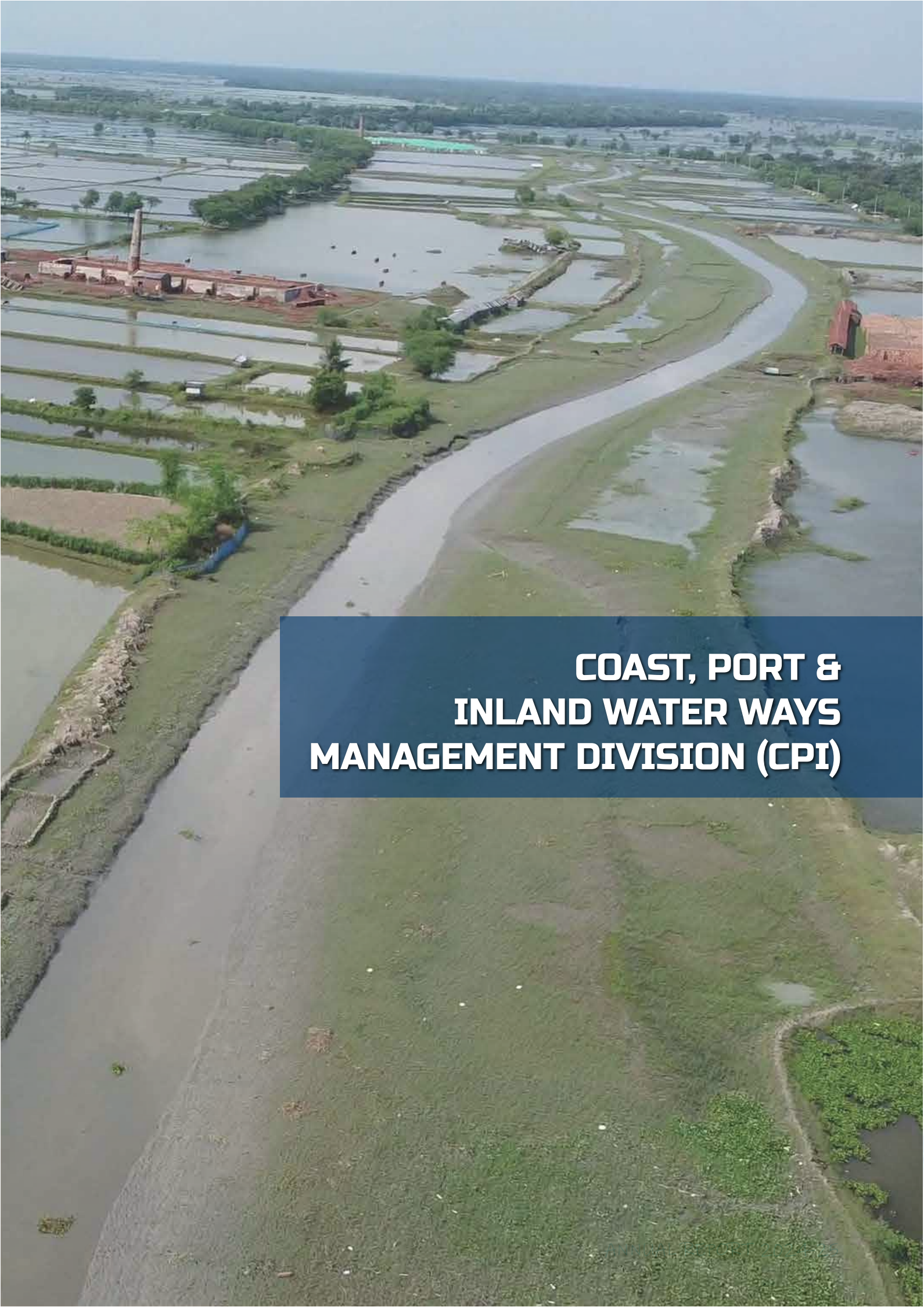
The Research, Innovation & Development (RID) Unit conducted impactful research including traffic-induced vulnerability assessments in Dhaka, assessments of potable water sources in Dumuria (Khulna) and Patharghata (Barguna), and evaluations of drought indices to identify patterns across Bangladesh during 2024–2025.

SM Mahbubur Rahman
Executive Director
Institute of Water Modelling (IWM)

Some Important Projects of IWM in FY 2024-25

We are steadily growing to provide sustainable solutions to the water sector of not only in Bangladesh but also in neighboring countries. Since its inception in 1986, IWM has been continuing to thrive in an extraordinary manner and is growing day by day. In 2023, IWM has taken several challenging projects of great national interest and experienced a steady growth. We have provided our services on **90** projects and to **40** clients. Maintaining our strong pursuit in modelling. We are exploring some relevant sectors to meet the pressing demand of our valuable clients. Services of IWM are requested from different integration agencies from various countries and thus IWM is getting recognition at a global scale.

- Assessment of Urban Heat Island Effect at City Level in Different Climate Change Scenarios. (DOE/BCCTF)
- Comprehensive Study for Livelihood Improvements through Integrated Management of Land and Water Resources in Arial Beel Area Arial Beel Area (DBHWD)
- Detailed Feasibility Study for Integrated Development of Selected Stable Chars in the Meghna Estuary for Implementation under CDSP V and Erosion Management Plan at Boyer Char, Char Nangulia and Noler Char (BWDB)
- Consultancy Services for Monitoring of Hydraulic and Morphological Condition of the Jamuna River for the safety of River Training Works of Bangabandhu Bridge for 5 (Five) years (BBA)
- Comprehensive Study for Evaluation and Updating of Haor Master Plan (DBHWD)
- Consultancy Services for "Coordination and Capacity Building Support to Institutions to ensure the quality of water in the Meghna River" (GIZ)
- Feasibility Study on Expand of "National Emergency Service-999" of Bangladesh Police (Bangladesh Police)
- Updating of the Sewerage Master Plan for Dhaka City (DWASA)
- Consultancy Services for grid capacity study with an objective to optimize the integration of Variable Renewable Energy (VRE) (SREDA)
- Consultancy Services for Monitoring of Hydraulic & Morphological Conditions of Padma River for the Safety of the River Training Works of Padma Bridge for 5 (Five) Year, Bangladesh Bridge Authority (BBA)
- Feasibility Study for improvement of drainage congestion in the Bhabodah Area in Jashore District and development of sediment management plan for the Sibsa and Pussur River basins of South-West region of Bangladesh (BWDB)
- Feasibility Study for the Implementation of Water Supply and Sanitation Schemes under proposed Municipal Water Supply & Sanitation Project (Package No.: BMWSSP/SD-16 (DPHE)
- Supporting Water Supply and Sanitation Regulatory Mechanism Development (ADB)
- Bangladesh In-country Process of Global Shield against Climate Risks (GIZ)
- Feasibility Study on Integrated Development of Goranchatbari Ponding Area in Dhaka City (BWDB)
- Flood Forecasting and Early Warning System for Karnali and Narayani River Basin in Nepal (GON)
- Feasibility Study of Improvement of Connectivity and Community Infrastructure Development in the Selected Polders of Coastal Zone of Bangladesh (LGED)
- Consulting Services for a Feasibility Study for Emergency Flood Response project in the Flood/Disaster Affected Districts of Bangladesh, (LGED)
- Implementation Support Services in connection with different ongoing projects of BWDB during 2024-2025, (BWDB)
- Consultancy Services for Design and Construction Supervision under Establishment of Offsite Water Intake Facility for Rooppur Nuclear Power Plant, (DWASA)
- Integrated Hydro-Morphological Model Development and Monitoring Survey to Predict Morphological Changes in Padma River (Goalondo to Chandpur), (BWDB)
- Survey Support to OTJ in connection with monthly monitor the RTW area using Multibeam survey, (OTJ-IHI-SMCC)



COAST, PORT & INLAND WATER WAYS MANAGEMENT DIVISION (CPI)

Management and Development of River Navigation in Bangladesh

Rivers of Bangladesh – a Lifeline of the Country's Transport and Economy

As a riverine nation, Bangladesh's waterways are lifelines of trade, transport, and livelihoods. However, changing hydrology, climate impacts, and expanding infrastructure have made safe navigation increasingly challenging. To address this, the Bangladesh Inland Water Transport Authority (BIWTA) commissioned the Institute of Water Modelling (IWM) to deliver the most comprehensive update in decades on river navigation standards, reference water levels, and route classifications. For the first time, these critical tasks have been carried out by a national institute-marking a proud milestone in Bangladesh's capacity for inland waterway management.

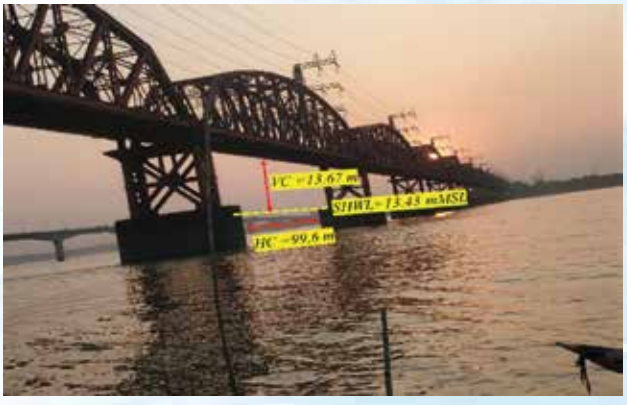
Determination of SHWL and SLWL

The Standard High Water Level (SHWL) determines the vertical clearance required under bridges and crossings, while the Standard Low Water Level (SLWL) helps to define the minimum depth essential for vessels to pass safely. Previously, these reference levels were based on data from the 1980s, which often resulted in unnecessarily high bridge designs and increased construction costs. Over the past three decades, rivers have shifted due to siltation, erosion, upstream regulation, and climate-induced changes.

Using 25 years of recent data (1996–2022) from 442 water level stations, IWM recalculated the SHWL and SLWL values across Bangladesh. All data were converted to a common reference, i.e., Mean Sea Level (MSL) established by the Survey of Bangladesh and processed using advanced hydrological and statistical models.

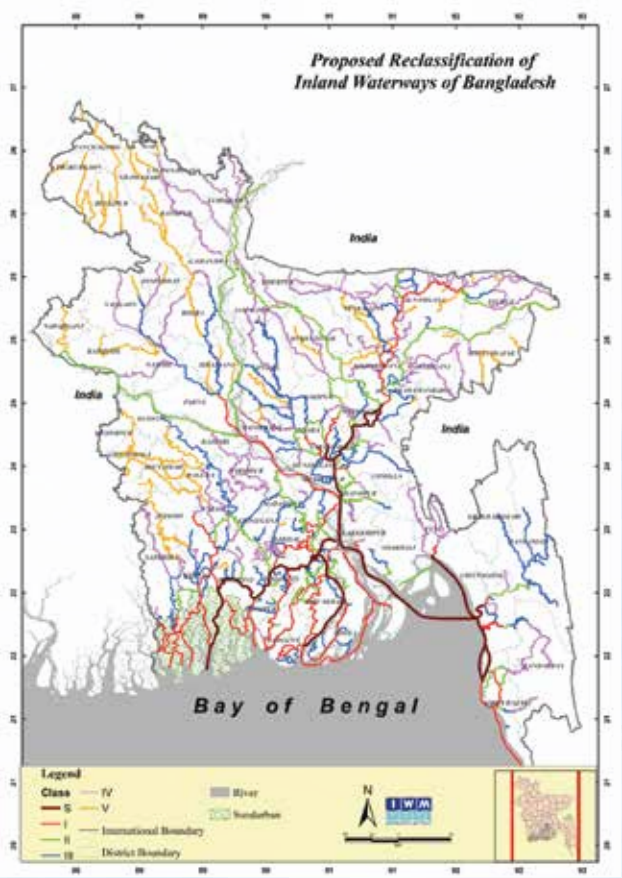
Mapping Depths, Bridges, and Navigational Challenges

Alongside water level analysis, IWM conducted field visits, extensive data and information collections to assess the Least Available Depth (LAD) and navigational clearances across the country's river system. Over 800 bridges were visited, with 619 bridges surveyed in detail using RTK-GPS to determine exact horizontal and vertical clearances. This meticulous work has identified critical bottlenecks where vessel movement is constrained, information essential for BIWTA, RHD, LGED, and other agencies in planning of waterway navigation as well as designing new bridges over the waterways. The team also conducted waterway traffic survey to assess volume of passengers and goods transported along core waterway routes.



Reclassification of Bangladesh's Inland Waterways

Inland waterways of Bangladesh have been reclassified into six classes considering the navigational qualities such as LAD and also economic importance of the waterway replacing the previous four-class system classified in 1989. Key highlights of the new classification include:

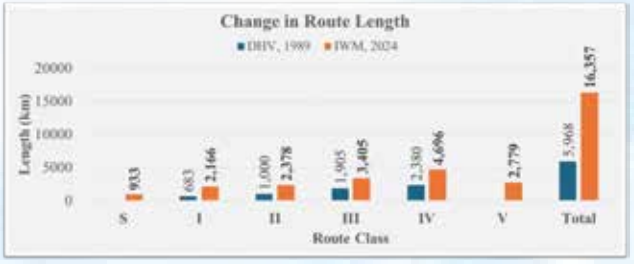


- **Class S (Specialized Routes):** High-priority routes connecting Dhaka–Narayanganj with the maritime ports at Chattogram, Mongla, Payra, and Matarbari; maintained at 4.0–4.5 m depth, with electronic pilotage and night navigation facilities.
- **Class I:** Major perennial routes linking Class S routes to maritime and regional ports; maintained at 4.0 m depth with night navigation and mandatory pilotage.
- **Class II:** Perennial routes connecting major inland

ports and international protocol routes; maintained at 2.5 m depth with provisions for night navigation and pilotage.

- **Class III:** Secondary perennial routes serving regional and passenger transport; maintained at 2.0 m depth, with selective night navigation and optional pilotage.
- **Class IV:** Seasonal routes connecting landing stations and primary centers; minimum 1.5 m depth during monsoon, maintained as far as practicable year-round.
- **Class V:** Local or isolated seasonal waterways (e.g., haor and hillroutes) minimum 1.0 m depth in monsoon, with basic channel marking and loading-unloading facilities where requied.

With this reclassification, Bangladesh's total length of navigable and classified waterways increases from 5,968 km to 16,357 km, a significant leap toward harnessing rivers as sustainable transport corridors.



Digital Tool Development, Capacity Building, Extensive Stakeholder Consultation and Policy Framework

To ensure continuity and ease of updating, IWM developed a Web-GIS and MIS-based system that integrates hydrological data, SHWL/SLWL profiles, waterway routes, and vessel traffic. This user-friendly platform allows BIWTA to periodically revise data, visualize changes, and generate digital maps for future decision-making. IWM also conducted training and capacity building programs on hydrological data analysis, GIS, and MIS operation to build BIWTA's long-term capacity. A foreign training in the Netherlands was also conducted on modern port management and navigation safety.

Moreover, the study carried out extensive consultations with a wide range of agencies, BIWTA, BWDB, RHD, LGED, BBA, port authorities, waterways users and so on through meetings and workshops.

Additionally, a new Draft Rules for the Control of Construction of Installations over Inland Waterways (2024) was prepared which simplifies procedures, clarifies clearance standards, and strengthens enforcement to prevent encroachments that restrict navigation.

Feasibility Study for improvement of drainage congestion in the Bhabodah Area in Jashore District and development of sediment management plan for the Sibsa and Pussur River basins of South-West region of Bangladesh

Riverbed siltation and waterlogging are a long-standing problem of Bhabodah area. To address this, Bangladesh Water Development Board (BWDB) implemented the Khulna-Jessore Drainage Rehabilitation Project (KJDRP) from 1994 to 2002 for removal of waterlogging from Polder 24 and 25. In the meantime, local people introduced Tidal River Management (TRM) and implemented first TRM at Beel Bhayna during 1997–2001, which successfully removed waterlogging. Following its success, BWDB implemented TRM at Beel Kedaria (2002–2004) and East Beel Khukshia (2006–2013). These TRM operations increased the river conveyance capacity and raised the land elevation of Beel (adjacent low laying area of river). No drainage congestion occurred in the Bhabodah area during the period when TRM was in operation in different Beels.

IWM studied the area in 2009 and proposed to operate next TRM in Beel Kapalia. Another study by IWM in 2011 suggested sequential operations of TRM in the Teka–Hari–Telegati River system for long-term sediment management. However, the Beel Kapalia TRM could not be implemented due to stakeholder conflicts, which eventually led to severe waterlogging in 2016. In 2017, following strong demands from local people, BWDB again engaged IWM to update the previous study, which recommended excavation of river and khal, TRM operation in Beel Kapalia and sequential operation of TRM in different Beels of Hari River basin. However, the project again interrupted due to conflicts among stakeholders.

To provide temporary relief, BWDB installed 20 drainage pumps over the Bhabodah Regulator in 2021 with a combined capacity of 220 cusec. This endeavor improved waterlogging in some areas, but sedimentation in major rivers continued. Therefore, excessive rainfall in 2024 caused severe waterlogging in Bhabodah area. In this circumstance, BWDB again engaged IWM in April 2025 to conduct a comprehensive study for devising short-term, mid-term, and long-term sediment management and drainage improvement plans/strategies for Bhabodah area.

The study is being conducted in a participatory approach, involving all stakeholders, including local communities, water experts, and implementing agencies. Hydrographic and topographic surveys of the rivers, khals, and beels have been completed. Additionally, a socio-economic survey has been conducted at the household level. Environmental samples have been collected from various locations within the study area and analyzed in the laboratory. Mathematical models have been developed incorporating the river system, hydraulic structures and beels in order to assess the effectiveness of different interventions. The study already submitted a Technical Report describing short-term plan for sediment management and drainage improvement of Bhabodah area for immediate implementation. The study has suggested to excavate 81.5 km length of Teka-Hari-Telegati, Upper Bhadra-Harihor rivers along with TRM operation in Beel Damukhali (Payra). A long-term plan for sediment management and drainage improvement will be suggested in the Final Report of this study in June 2026.

Flood & River Basin Management (FRM)

Flood and Disaster Management

Urban Flood Forecasting and Management

IWM is advancing a next-generation urban and river flood early warning and risk management system through the integration of advanced hydrological and hydraulic modelling, real-time weather forecasting and high-resolution geospatial analytics. Supported by DANIDA in 2022, the initiative focused on the Dhaka metropolitan area, one of the most densely populated and climate-vulnerable megacities globally. The system is built on the MIKE+ modelling framework and incorporates updated meteorological, hydrological and spatial datasets to simulate stormwater drainage performance, overland flood pathways and river–city interactions under both normal and extreme rainfall conditions.

The forecasting architecture combines numerical weather prediction outputs with dynamic hydrodynamic modelling to generate high-resolution flood intelligence for decision-makers. The system delivers predictive information on inundation extent, waterlogging duration and flood-prone hotspots with a 12 to 18 hour lead time, depending on the accuracy of rainfall forecasts. Outputs are designed to support operational decision-making for municipal agencies through impact-based warnings, priority mapping, emergency routing and early preparedness actions.

The proposed system strengthens the institutional capacity for climate-resilient urban water management by providing a scalable digital infrastructure that can be beneficial for agency like DNCC, DSCC, Chittagong City Corporation etc. and can be included in the national early warning frameworks. The approach aligns strongly with international development objectives on climate adaptation, disaster risk reduction and sustainable urban development. The work demonstrates IWM's capability to deliver high-quality, data-driven and evidence-based solutions for rapidly urbanizing and climate-exposed regions.

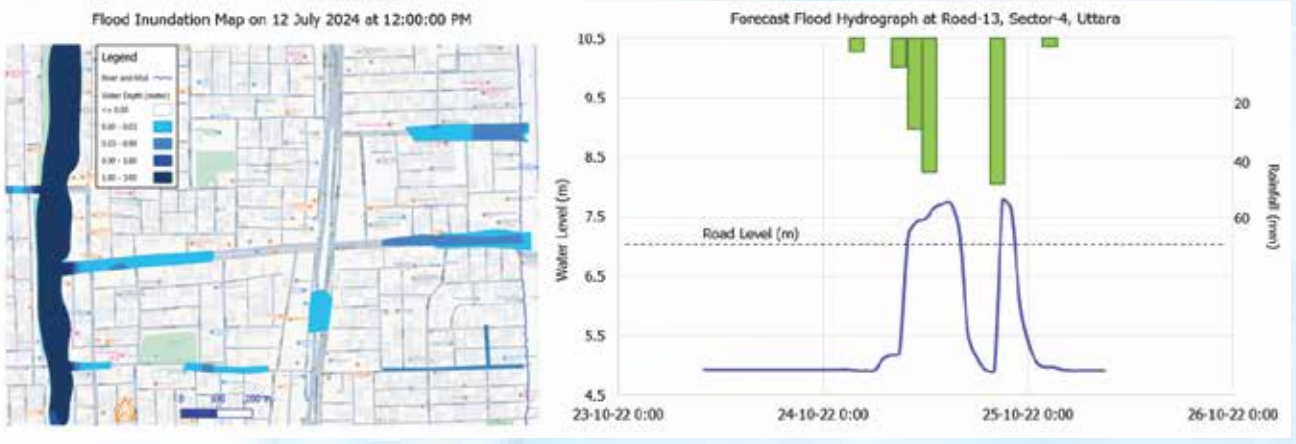
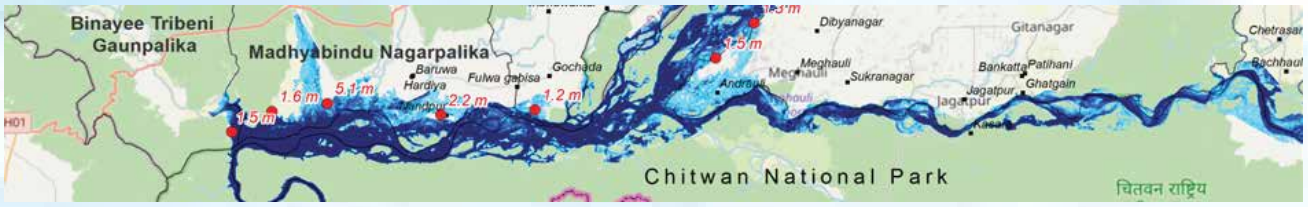


Figure: A Typical Area Specific Inundation Map on 24th October 2022, Forecast Made on 23rd October 2022.

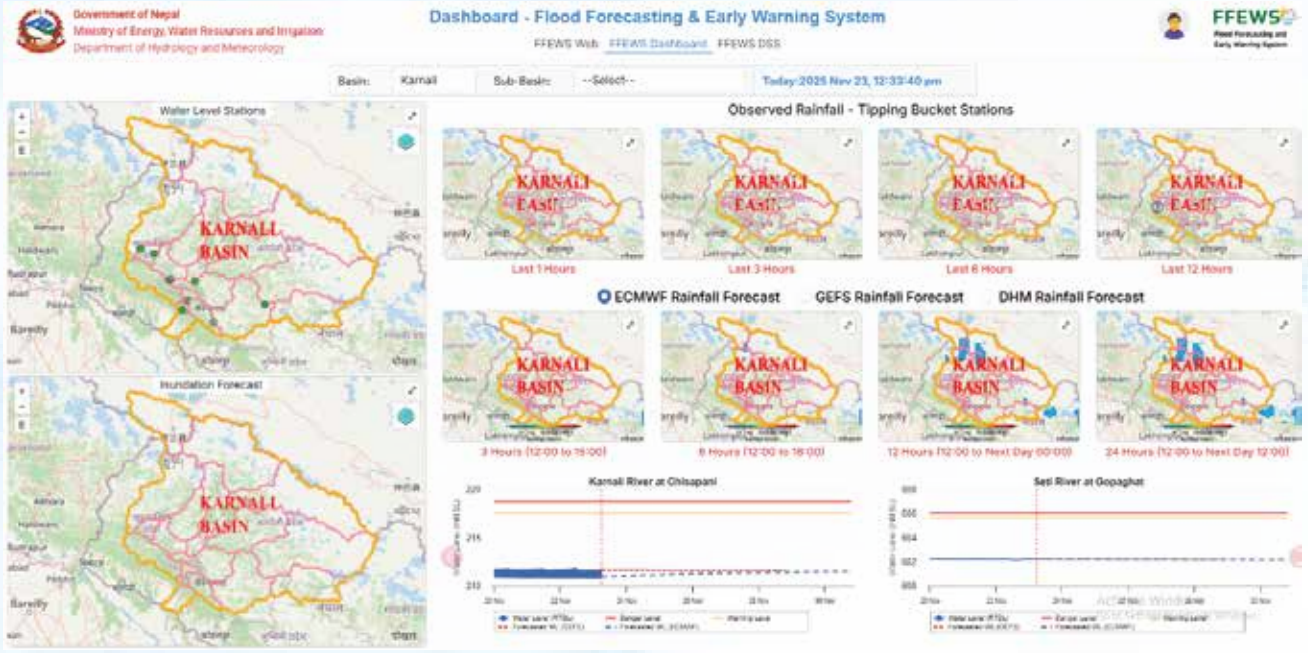
Flood Forecasting Experience in the International Arena

In 2024–2025, IWM developed an advanced impact-based Flood Forecasting and Early Warning System (FFEWS) for the Karnali and Narayani river basins in Nepal in collaboration with the Department of Hydrology and Meteorology (DHM). These basins are highly flood-prone due to their steep Himalayan topography, complex geomorphology, monsoon-driven extreme rainfall, and rapid snowmelt contributions. The combination of narrow valleys, flashy hydrological response, shifting river channels and high sediment loads results in frequent flash floods and short lead times for preparedness. In the downstream plains, population pressure, expanding settlements and critical infrastructure further amplify exposure and vulnerability, underscoring the need for advanced forecasting and anticipatory action.

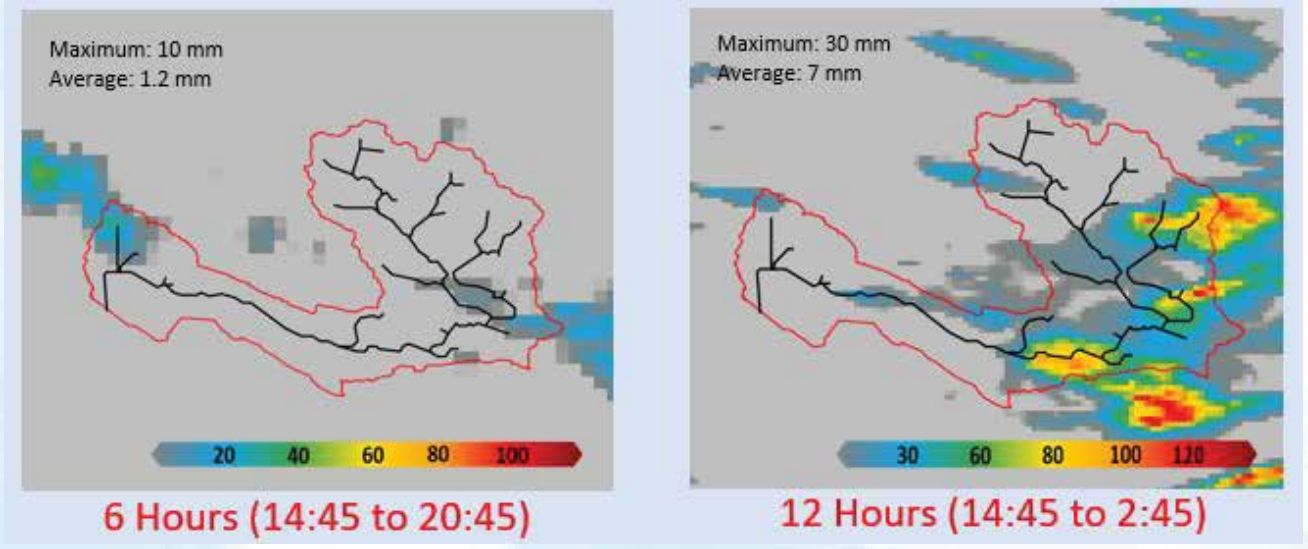
The FFEWS integrates state-of-the-art hydrological (HEC-HMS) and hydraulic modelling (HEC-RAS 1D and 2D), real-time model updating and automated operational workflows to deliver reliable, impact-oriented flood forecasts. The system utilizes both satellite-based and ground-based observations, along with numerical weather prediction outputs, to generate high-resolution deterministic and ensamble forecasts that support anticipatory decision-making. Forecast products enable disaster management agencies, local authorities and communities to implement early protective measures well before flood peaks arrive.



At the core of the system is an intelligent, web-based platform featuring interactive GIS maps, hydrograph visualization tools, a dynamic forecast dashboard and comprehensive administrative functionalities. A robust Decision Support System (DSS) supports scenario simulations, impact assessment, risk mapping and rapid dissemination of alerts through SMS, email, mobile notifications and social media channels.



This initiative demonstrates IWM's strong commitment to innovation, evidence-based decision-making, and strengthening regional flood forecasting and climate adaptation capacities across transboundary Himalayan basins.

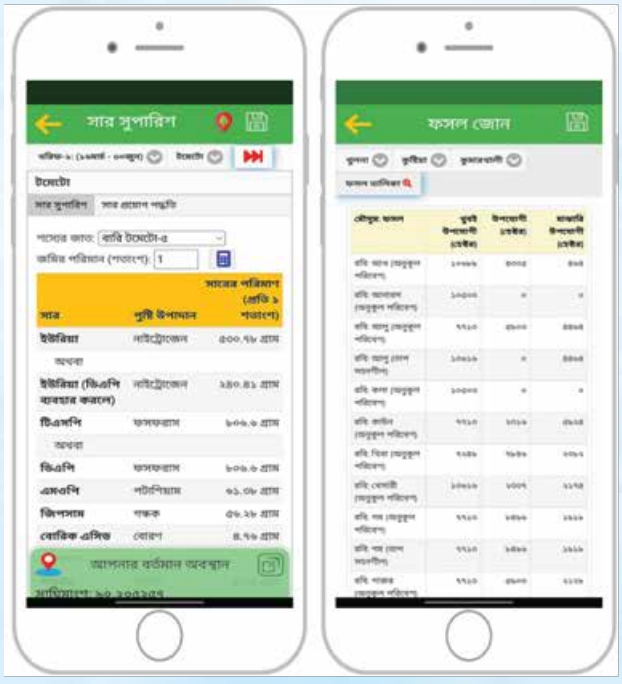


ICT, GIS & Remote Sensing Division (ICT)

Use of Information Technology in Land and Water Management

Development of the "Khamari" Mobile Application for Farmers:

The IWM has developed a cutting-edge mobile application named "Khamari" for the Bangladesh Agricultural Research Council (BARC), designed to enhance the technological capabilities of farmers and policymakers, thereby driving the transformation and modernization of Bangladesh's agricultural sector. Leveraging IWM's advanced technological expertise and innovative capacity, the "Khamari" app utilizes sophisticated soil and climate data to assist in determining the most suitable crops for any given piece of land.



Furthermore, the app offers scientifically based guidance on optimal fertilizer usage and application techniques, ensuring the highest crop yield at the lowest cost. By using the "Khamari" app, farmers are empowered to select the most economically viable crops for their land, leading to increased agricultural productivity and enhanced income generation. Field-level trials have confirmed that this app enables farmers to achieve higher yields while reducing fertilizer usage, contributing significantly to soil health preservation, maintaining environmental balance, and enhancing climate resilience.

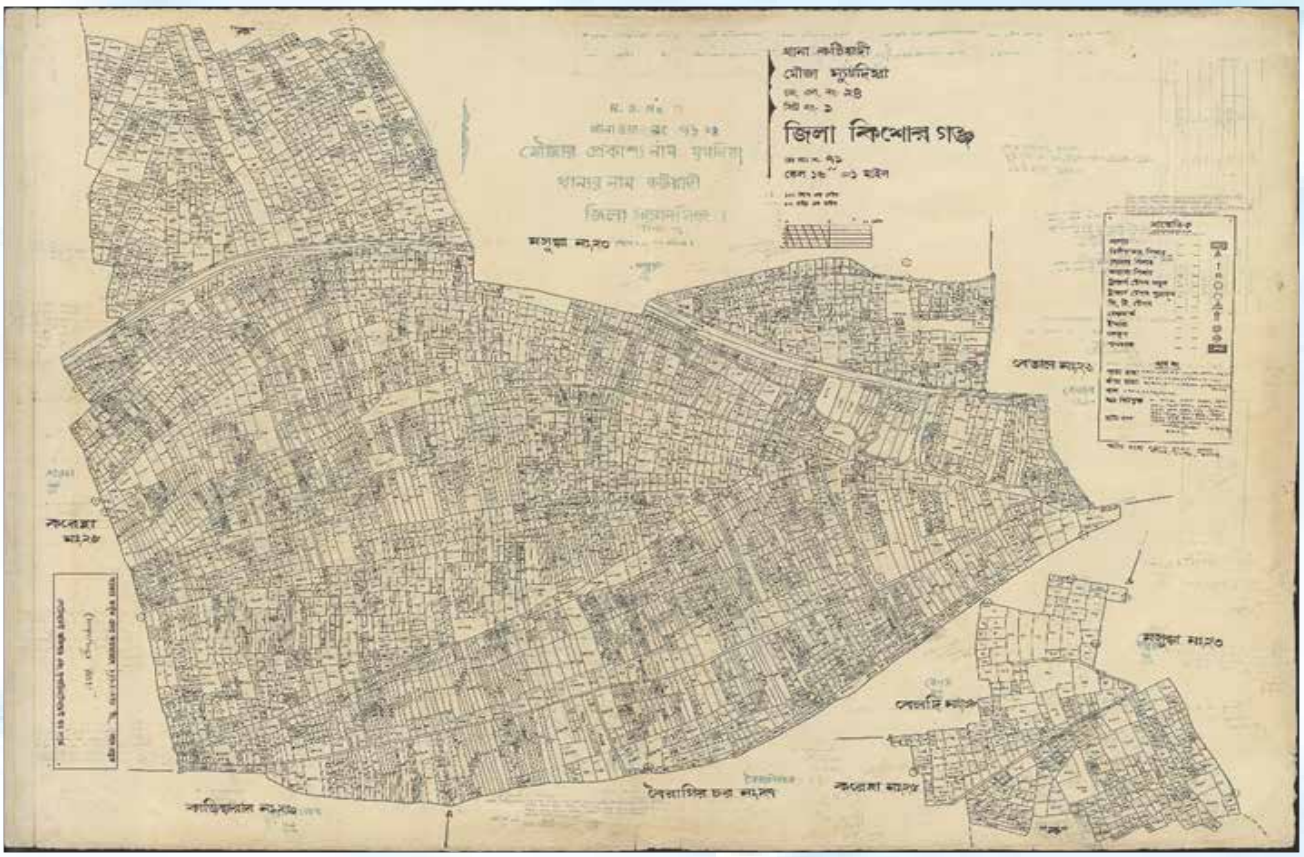
According to an analysis by BARC, if the "Khamari" app is implemented across the entire cultivable area of Boro (5.06 million hectares) and Aman (5.7 million hectares) rice, it has the potential to generate over 17,000 crore BDT in financial benefits annually from these two major seasonal crops alone. This revolutionary innovation by IWM, under the auspices of the BARC project, not only encourages sustainable agricultural practices but also stands as a testament to the government's commitment to modern, information technology-driven food security, rural economic development, and the realization of an environmentally sustainable and climate-resilient future. The development is further continuing to incorporate more features like crop intensity map, fertilizer demand, agriculture land use priority etc.

National Digital Land Zoning Project

Under the scope of this project, the IWM has developed a sophisticated, web-based Geographical Information System (GIS) application for the Ministry of Land. This innovative application integrates mouza (administrative units) and plot-based data with satellite imagery for land use classification. The primary goal of this initiative is to ensure the accurate, sustainable, and planned use of land, while minimizing the risks associated with arbitrary or conflicting land uses.

The National Digital Land Zoning Project aims to provide a comprehensive, data-driven framework for managing land resources in a systematic way which include:

Ensuring Proper Land Use: The project focuses on promoting optimal land use through accurate mapping and classification. It helps prevent misuse or unregulated land occupation, ensuring that each land parcel is utilized in accordance with its most suitable purpose. The classification system includes land types such as agricultural, residential, industrial, forests, water bodies, road



Before Digitization

networks, tea gardens, coastal areas, and charlands (riverine islands or sandbanks). Each type is identified and categorized based on real-time satellite imagery and mouza-level data.

Data-Driven Decision Making: The system produces detailed, geospatially referenced maps and information that serve as powerful decision-making tools for both national and local administrations. These maps assist in planning and managing land use at multiple levels, from policy formulation to day-to-day operations. The GIS-based application provides easy access to up-to-date land use data, enabling the government to make informed decisions regarding development and resource management.

Support for National Planning: The project plays a critical role in national-level planning, particularly in urbanization, infrastructure development, and environmental conservation. By classifying and monitoring land usage patterns, it helps align land resources with broader national development goals. It also contributes to the government's objectives of achieving sustainable urban growth, agriculture-based development, and environmental protection by guiding the allocation of land for specific purposes.

After Digitization

Prevention of Arbitrary Land Use: A central objective of the project is to prevent arbitrary or conflicting land use. By providing a clear, data-supported classification system, it helps minimize disputes over land ownership, illegal encroachments, and improper zoning. The system brings transparency for both government agencies and the public, clarifying legal and permissible land uses, and thus strengthening governance and dispute resolution.

Irrigation, Groundwater & Wetland Management Division (IGW)

Wetland and Environmental Conservation & Management

Arial Beel: Safeguarding a Living Wetland Landscape

Arial Beel, located in the floodplain of the Padma River across parts of Sreenagar and Sirajdikhan upazilas of Munshiganj district, Dohar and Nawabganj upazila of Dhaka

Arial Beel serves as a vital Ecosystem

district, is an ecologically rich wetland that plays a vital role in agriculture, fisheries, biodiversity conservation and groundwater recharge. The Arial Beel, located on the left bank of the Padma River, has lost much of its natural connectivity due to construction of Sreenagar-Dohar roads, and encroachments that have blocked or narrowed most of the connecting khals. Many khals are further obstructed by

A mesmerizing display of tradition: Arial Beel's famous oversized Sweet Dress is a showstopper

illegal occupations such as cross dams for fish farming, narrow culverts, bamboo bridges, weeds, and waste dumping. These have also caused pollution, and health hazards in surrounding communities, highlighting the urgent need to restore water flow and ecological balance. Despite its ecological and economic importance, Arial Beel is now experiencing serious degradation due to excessive use of pesticides and fertilizers, siltation, encroachment and other anthropogenic pressures, leading to declining ecosystem services and livelihood challenges. To address these issues, the Department of Bangladesh Haor and Wetlands Development (DBHWD) engaged IWM to undertake a comprehensive study on livelihoods and integrated management of land and water resources of Arial Beel.

The study covers the assessment of hydrology, hydromorphology, hydrogeology, biodiversity, and socio-economic conditions as well as evaluation of connectivity between rivers, khals, and Arial Beel; identification of dredging and re-excavation needs; modelling of water balance, hydrodynamics, and groundwater flows; and development of strategic action and investment plans. The study involved extensive primary data collection and field investigations covering multiple

Base Map of the Study Area

disciplines to ensure a comprehensive assessment of Arial Beel. A total of 244 km^2 of topographic survey was conducted along with 1,508 nos. of cross-section surveys of canals and rivers. Eight water level gauges were installed and monitored for 12 months, complemented by discharge measurements at the same locations. Soil investigations included 20 nos. of samples for laboratory analysis, 10 nos. of exploratory drillings, and installation of four observation wells for continuous groundwater level monitoring, alongside 10 nos. of seepage and percolation measurements. Water quality assessments comprised 40 nos. of surface water and 40 nos. of groundwater samples for quarterly. Ecological and agricultural studies included 40 nos. of agricultural surveys, 40 nos. of terrestrial vegetation surveys, 49 nos. of aquatic vegetation surveys, 40 nos. of fisheries surveys, and 40 nos. of biodiversity surveys. Socio-economic data collection involved 1,200 nos. of household surveys, 35 nos. of Focus Group Discussions (FGDs), 31 nos. of Participatory Rural Appraisals (PRAs), 15 nos. of Public Consultation Meetings (PCMs), and 10 nos. of Key Informant Interviews (KIIs), ensuring broad stakeholder

engagement and inclusive representation of community perspectives.

Hydrological assessments and stakeholder consultations highlight the need to restore connectivity of Arial Beel with Padma River. Major proposed interventions include constructing H20 loading bridges and regulators to reopen blocked khals, re-excavating canals, CC block pitching at offtake and other vulnerable area and constructing RCC bridges. Additional measures such as re-excavation of khas land ponds (dengas). Also, the biological interventions such as establishment of fish sanctuaries, afforestation, and eco-village development has been proposed to balance

A haven for fish, supporting biodiversity and providing income for local fishermen.

ecological restoration with livelihood improvement. Biogas plants and sustainable farming practices have also been recommended to reduce pollution and strengthen community resilience.

The following actionable recommendations are put forward to restore and protect Arial Beel:

- An **"Integrated Arial Beel Management Committee"** has to be formed to ensure coordinated planning, implementation, and monitoring of conservation and development activities in the area.
- Arial Beel has to be declared **"Wetland-based Protected Area"** through gazette notification to ensure long-term conservation and sustainable management.
- All the activities of the proposed intervention are interconnected which is proposed to be implemented in an integrated way to get proper benefit of the project.
- Reopen the natural canals to restore water connectivity between Arial Beel and the Padma River, which is crucial for wildlife movement and water exchange.
- Reduce all forms of pollution.
- Re-excavate existing water bodies and restore fish migration routes.
- Illegal enforcement and obstruction of flow has to be strictly controlled.
- Water hyacinth infestation, a persistent issue in the area, should be thoroughly addressed during the dry season as part of the khal re-excavation activities to restore water flow and ecological balance.
- Plant native trees like Hijol and the Red Silk-Cotton Tree (Bombax malabaricum) to create natural shelters and feeding grounds for birds.
- Engage local communities in biodiversity monitoring and stewardship through awareness and training.
- Identify and protect potential sanctuary zones within the beel, especially deep pools and breeding grounds.
- Regulate harmful fishing practices and gear use, such as current nets and china chai.
- Promote Integrated Nutrient Management (INM) and balanced fertilization to reduce dependency on chemical fertilizers.
- Adopt Integrated Pest Management (IPM) practices to minimize agrochemical usage and environmental harm.
- Introduce and promote Good Agricultural Practices (GAP) for environmentally sound and safe food production.
- Promote Conservation Agriculture (CA) techniques to enhance soil health and resilience.
- Implement Climate Smart Agriculture (CSA) technologies and practices to adapt to climate variability.
- Strictly regulate land encroachment, soil removal, and unauthorized development in the beel.
- Promote crop diversification, especially the introduction of high-yielding and climate-resilient varieties.
- Control and gradually replace water-intensive and ecologically harmful species such as Eucalyptus with environmentally friendly alternatives like Albizia, Acacia, and Tamarind, which support better water quality and aquatic biodiversity.
- Promote sustainable use of vegetation resources through community forestry and fuelwood alternatives.

Evaluation and Updating of Master Plan for Haor Area 2025

The Haor region of northeastern Bangladesh, covering Sunamganj, Sylhet, Habiganj, Moulvibazar, Kishoreganj, Netrokona, and Brahmanbaria, is a unique wetland system characterized by bowl-shaped depressions that transform into vast water bodies during the monsoon. As the country's largest freshwater ecosystem, it sustains rich aquatic biodiversity, fisheries, agriculture, and millions of livelihoods, contributing substantially to national food security and ecological balance. Recognizing its

National Workshop on the Results of the Integrated Survey Project for the Evaluation and Updating of Master Plan for Haor Area 2025

importance, the Master Plan for Haor Areas was first prepared in 2012. However, climate change, ecological degradation, socio-economic shifts, and policy reforms have made updating the Plan essential.

The region faces growing climate risks, including flash floods, erratic rainfall, shifting river courses, and dry-season

Stakeholder Consultation Workshop on Integrated Survey Project for the Evaluation and Updating of Haor Master Plan 2025

water scarcity, all of which threaten agriculture, ecosystems, and livelihoods. Biodiversity is declining due to habitat loss, overfishing, wetland degradation, and pollution. To address these challenges, the Updated Master Plan aligns with the Bangladesh Delta Plan 2100, National Adaptation Plan 2023–2050, National Water Policy 1999, and other national frameworks.

The Updated Plan aims to conserve ecological balance, promote climate-resilient agriculture and fisheries, support diversified livelihoods, strengthen nature-friendly infrastructure, and establish integrated Haor management. It covers sectoral priorities, including water, agriculture, fisheries, biodiversity, forestry, transport, education, health, tourism, and governance. A comprehensive assessment process included public consultations, FGDs, KIIs, household surveys, and detailed analyses of agriculture, fisheries, aquatic vegetation, biodiversity, land use, hydrology, climate projections, and carbon stocks. Mathematical modeling (MIKE 11 HD, rainfall–runoff models) and climate scenarios (CMIP6, ISIMIP) informed future water and climate risks, while sectoral studies covering agricultural practices, fisheries resources, aquatic and terrestrial vegetation, and biodiversity and wetland conservation, added substantial value to the Master Plan by strengthening its scientific and strategic foundation.

Findings reveal severe dry-season water shortages, with 5,177 km of canals drying up and disrupting connectivity. Flash floods and climate variability undermine boro rice production, heightening food security risks. Biodiversity assessments recorded 86 fish species and 40 aquatic plant species, all showing declining trends. Habitat degradation and pollution from sources such as the Ollipur industrial zone have critically harmed fish stocks and wetlands. Despite ecological decline, economic units and employment increased over the past decade, though unevenly across locations.

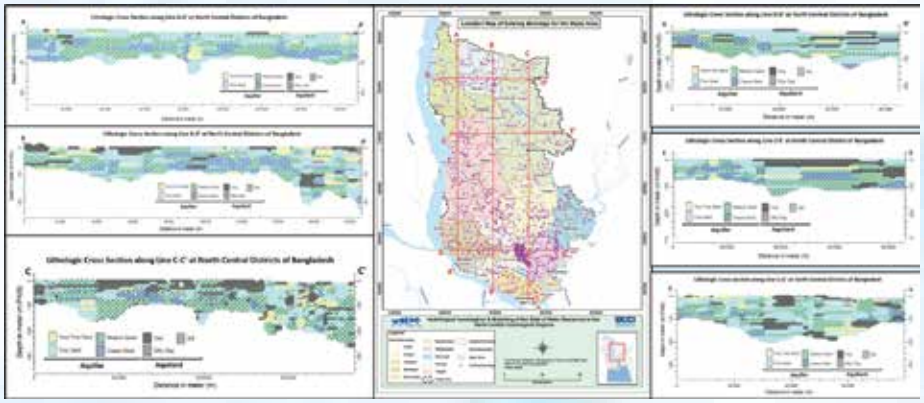
Evaluation of implemented projects (2013–2023) shows mixed outcomes. Infrastructure investments improved livelihoods, submersible embankments enhanced crop production, nonetheless hindered fish migration, while a few roads obstructed water flow. Conversely, fish sanctuaries, canal re-excavation, ECA management, and habitat restoration projects benefited both ecosystems and communities.

The Updated Master Plan envisions **"A biodiversity-rich, environmentally balanced, climate-resilient, and self-reliant Haor region"** and sets four strategic goals: environmental balance, sustainable livelihoods, nature-based infrastructure, and integrated management. The Plan emphasizes nature-based solutions such as canal re-excavation, wetland restoration, eco-friendly infrastructure, real-time monitoring, climate-resilient crops, diversified livelihoods, community-based fisheries, and sustainable tourism. Social sectors such as education, health, housing, energy, and transport are addressed through flood-resilient schools, mobile clinics, solar mini-grids, green villages, and improved navigation.

An Investment Plan outlines 104 projects across short-, medium-, and long-term horizons with a total budget of BDT 5,183,333 lakh. Key risks include institutional weaknesses, data gaps, climate uncertainties, and unequal benefit distribution. If effectively implemented, the Plan is expected to deliver major gains: improved flood control in 213,000 ha, expanded irrigation in 330,000 ha, restored navigability along 1,863 km of waterways, increased food production by 270,620 MT, and an additional 70,390 MT of fish largely enhancing resilience, food security, and livelihoods across the Haor region.

Groundwater Resource Management

To ensure the effective enforcement of the Bangladesh Water Act 2013 and the Bangladesh Water Rules 2018, an ongoing study of WARPO implemented by IWM has been formulated to develop a comprehensive and sustainable water resource management plan for the 10 districts within the north-central hydrological region of Bangladesh. The districts are Dhaka, Mymensingh, Gazipur, Narayanganj, Tangail, Manikganj, Sherpur, Munshiganj, Narsingdi, and Jamalpur, are central to the country's water resource management strategy. The primary objective is to implement the provisions of the Bangladesh Water Act 2013 and the Bangladesh Water Rules 2018 effectively within these areas.



Spatial Distribution of Lithologic Units with Representative Cross Sections for Groundwater Resource Assessment and Management

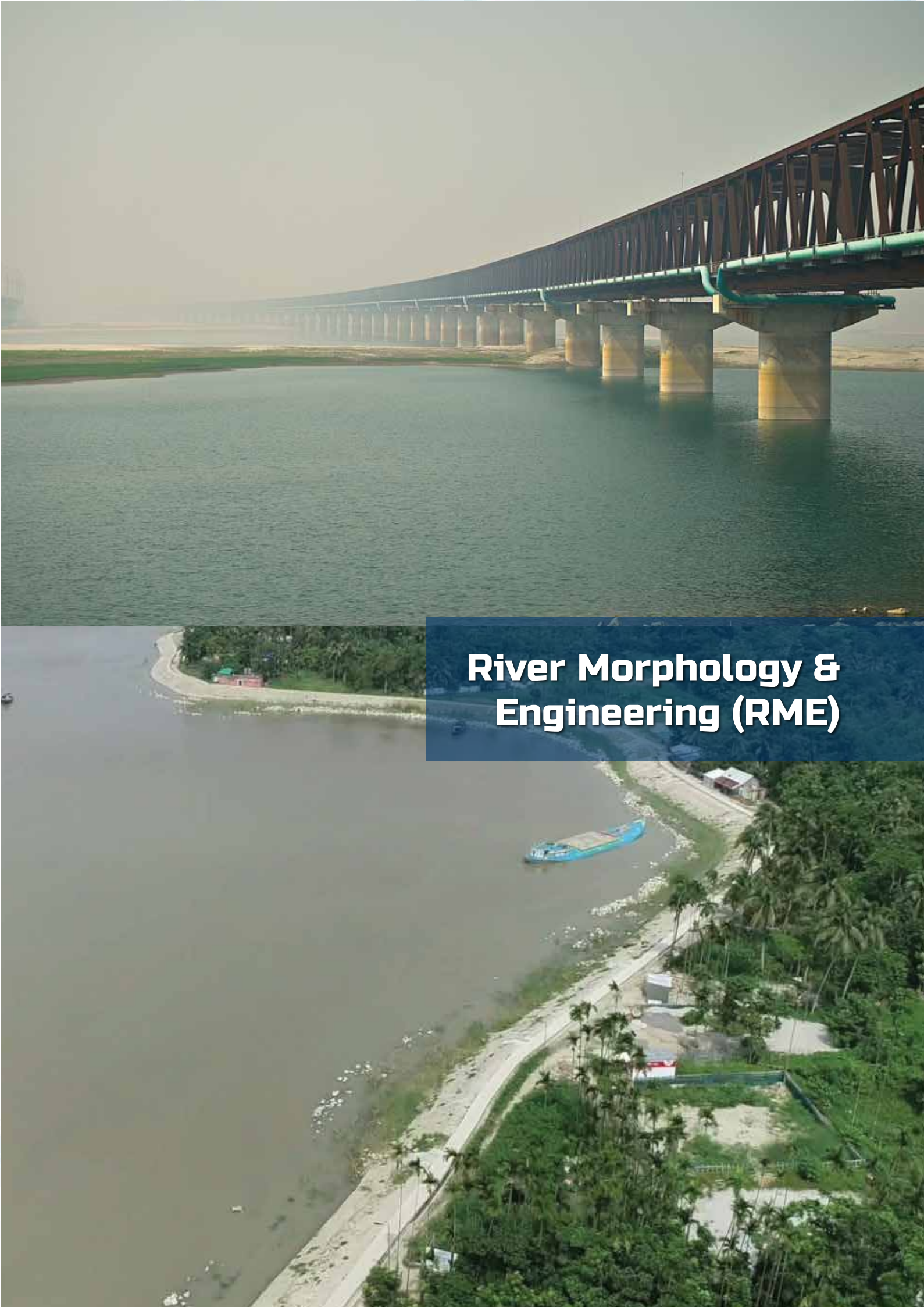
The project will involve an extensive survey and data collection on the hydrological systems of the regions, alongside advanced mathematical modeling of both groundwater and surface water resources. These assessments will aim to evaluate the availability, usage patterns, water quality, and future demand for water resources. Consultation with key stakeholders, including government bodies, local authorities, and community groups, will be a cornerstone of this process, ensuring that the management plan is both practical and inclusive. Based on the survey findings and stakeholder input, a detailed report on sustainable water resource management practices will be produced, tailored to the specific needs of each district.

Supervision of River Cross Section Survey Works

The project will also focus on identifying sustainable groundwater extraction practices, including the calculation of safe yield levels for groundwater sources. The analysis will identify water-stressed areas and establish guidelines for optimizing water extraction without depleting the resource. A critical part of the project will involve mapping the location of potential water bodies and aquatic habitats, ensuring their preservation as vital sources of potable water, in accordance with Section 2(5) of the Bangladesh Water Act 2013.

Furthermore, the project will promote the integrated management of surface water, groundwater, and rainwater, ensuring a balanced and sustainable approach to water extraction and use. Strategies will be formulated for the conservation of groundwater resources, including the implementation of water-saving technologies as well as the development of water-efficient agricultural practices. These strategies will align with national policy objectives to mitigate the impacts of climate change, safeguard water availability, and support the long-term sustainability of water resources management of the region.

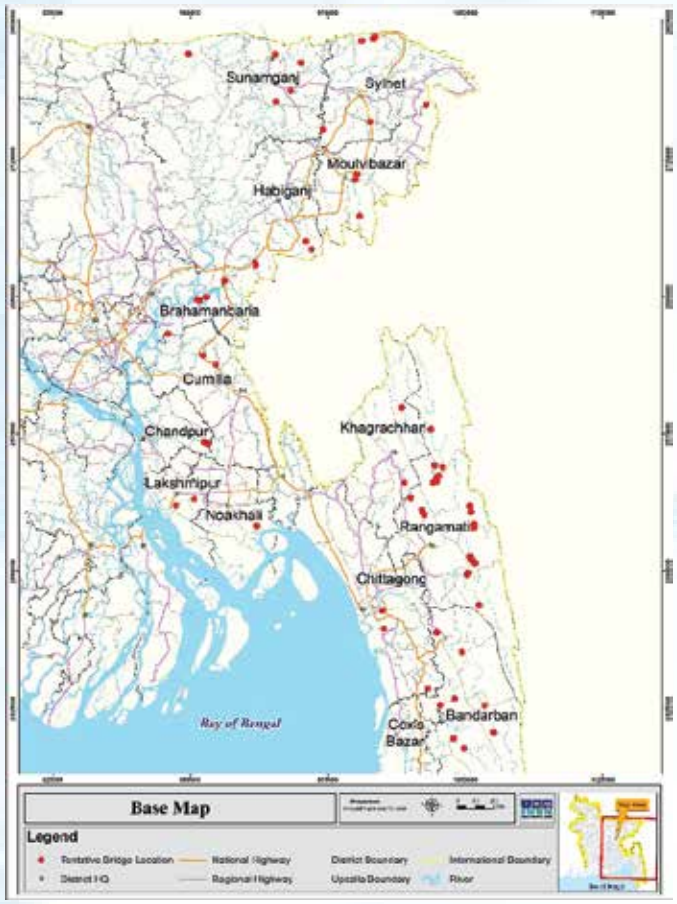
Supervision of River Water Level Data Collection & Monitoring

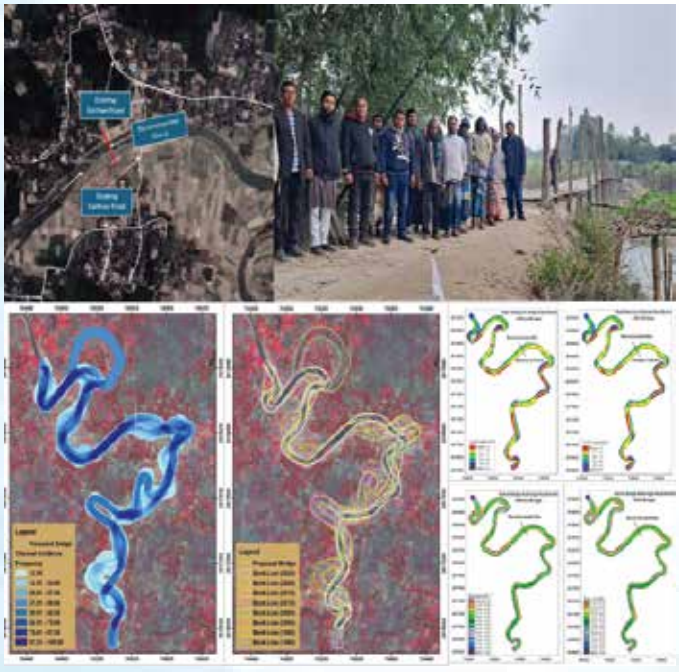


River Morphology & Engineering (RME)

Hydro-Morphology Study of Bridges under Chattogram and Sylhet Divisions for LGED

With a view to improving connectivity of remote and rural areas with Upazillas and Cities, the Local Government Engineering Department (LGED) planned to construct a good number of bridges at north-eastern areas and south-eastern hilly areas. Construction of these bridges will be expected to reduce travel time and establish linkage between growth centers, facilitate marketing of agricultural/industrial products and flourish the huge tourism potentiality within Chattogram and Sylhet divisions. Implementation of this project will thus contribute to the overall development of the national economy as these two regions are lacking proper transportation facilities due to adverse topographical hindrances such as haors/baors and hills/hillocks. The Institute of Water Modelling (IWM) has been engaged by LGED to conduct a detailed hydro-morphological study of the rivers where around 87 bridges will be constructed. IWM mobilized its engineers to analyze the hydrological and morphological conditions of the study rivers and conducted 1D/2D mathematical models to determine the hydraulic design of the proposed bridges. Suitable locations of the proposed bridges have been worked out combining model simulations results and historical hydro-morphological data analysis as well as discussion with important stakeholders including local people, LGED offices and BIWTA regulations. IWM recommended required bank protection works for proposed bridges where necessary along with outline design of the protection works on the study rivers. IWM also recommended a sustainable layout of the proposed bridges which will not affect the riverine environment and have minimal impact of the waterbodies where the propseod bridges would be constructed. Moreover, IWM assessed the long term impacts of the propsoed bridges over the morphological processes of the study rivers and stability of the riverbanks also. IWM started the study on October 2023 and submitted all the Final Reports to LGED by June 2025.

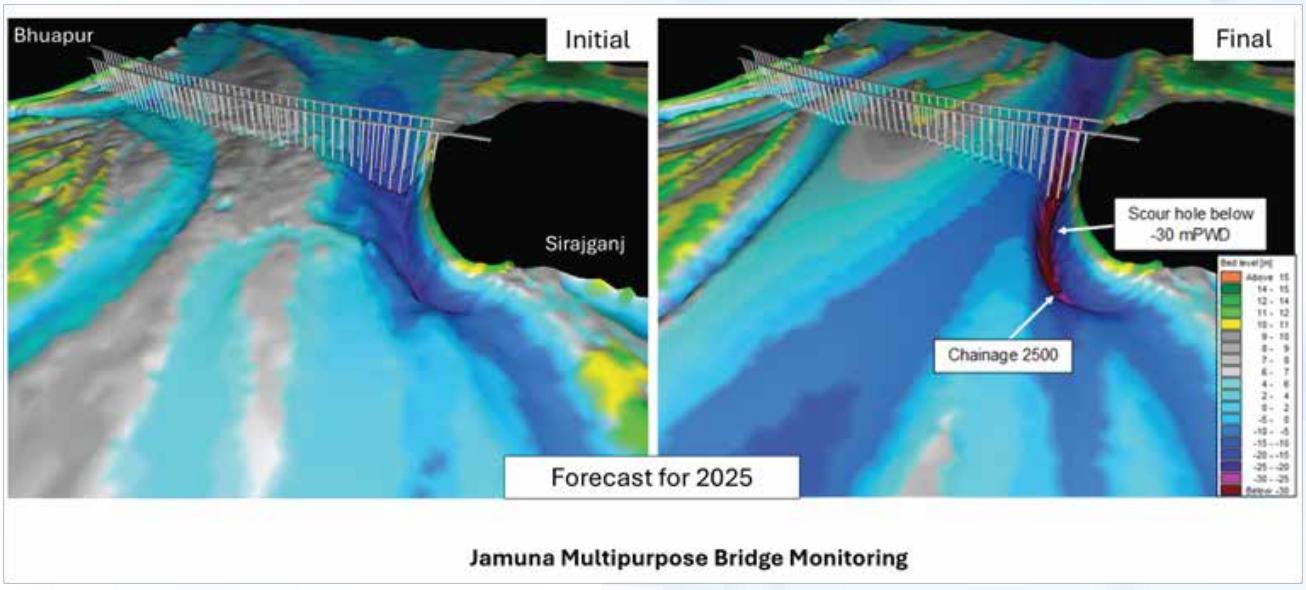




River Training Works and Management

Involvement in National Mega Projects

IWM has played a crucial and comprehensive role in the successful implementation of two of Bangladesh's landmark mega projects: the Jamuna Multipurpose Bridge and the Padma Multipurpose Bridge. The institute's involvement has been pivotal in riverbank erosion forecasting and inundation forecasting, providing daily and long-term predictions on riverbank erosion, changes in the riverbed (scour), and potential flood risks along the river systems. These forecasting services have enabled proactive planning and the timely implementation of mitigation measures, helping to ensure the safety and structural integrity of these critical national infrastructures.



Jamuna Multipurpose Bridge Monitoring

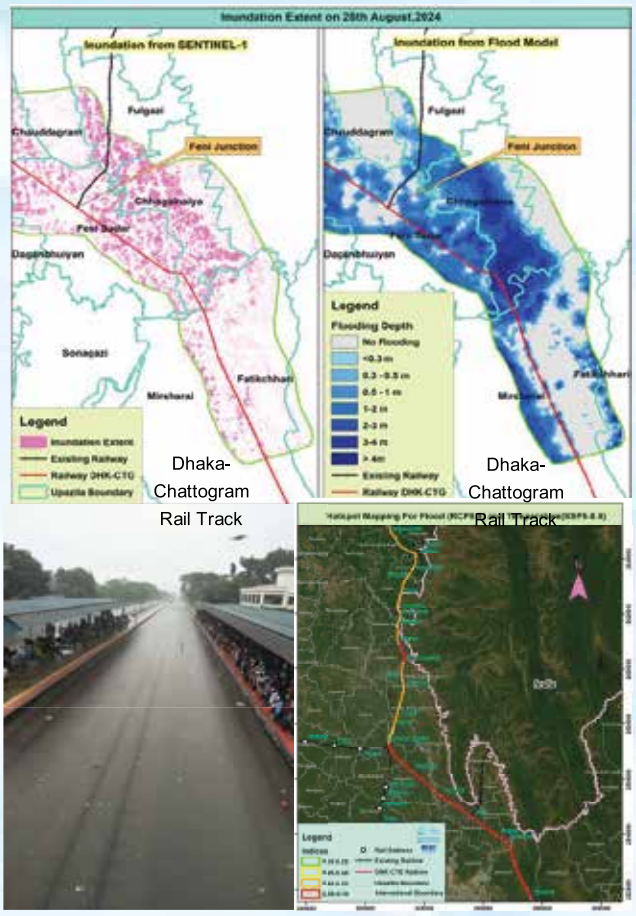
Additionally, IWM's expertise in river training works, including the construction and reinforcement of embankments, groynes, and other river protection structures, has been vital in stabilizing the riverbanks and preventing erosion, which could potentially impact the safety of bridges. The institute has also contributed to hydro-morphological studies, offering valuable insights into the river's behavior and how it interacts with these massive structures.

IWM's involvement in the recently inaugurated Jamuna Railway Bridge project further underscores its pivotal role. During the construction phase, IWM provided continuous technical support through detailed studies supported by advance survey and regular assessments. Moreover, IWM is actively engaged in ensuring the safety and stability of the bridges during the ongoing monsoon season through a combination of real-time monitoring, forecasting, and on-site evaluations. The ongoing efforts to monitor erosion and inundation risks ensure that river dynamics are effectively managed, and the infrastructure remains secure and operational throughout changing weather conditions.

Climate Risk & Adaptation Interventions for Bangladesh Green Rail Transport Project

As part of its commitment to achieving the Sustainable Development Goals (SDGs), the IWM is actively engaged in the design and development of climate-resilient and environmentally sustainable infrastructure for the Dhaka–Chattogram Railway Corridor under the initiative titled **"Climate Risk & Adaptation Interventions for Bangladesh Green Rail Transport Project."** This initiative integrates advanced hydrological modeling, climate change adaptation strategies, and eco-friendly engineering practices to create infrastructure capable of withstanding climate variability, flooding, and other environmental challenges. The overarching objective is to establish resilient transport networks that ensure long-term sustainability while minimizing the environmental footprint of national infrastructure development.

The Dhaka–Chattogram railway corridor is one of Bangladesh's most critical transport routes, serving as a lifeline for both freight and passenger movement across the southeastern region of the country. However, this vital corridor is increasingly exposed to a range of climate-induced hazards, including riverine floods, storm surge inundation, shoreline erosion, and extreme temperature events. These threats pose serious risks to the operational continuity of Bangladesh Railway and could significantly impact the country's long-term economic growth.



To address these challenges, the project aims to spatially identify and classify climate risk hotspots along the Dhaka–Chattogram rail corridor by integrating multi-hazard layers with field validation data obtained from recent (2025) site visits. Additionally, the project will propose probable green and green–grey adaptation solutions designed to enhance the corridor's resilience. The resulting identified hotspot zones will serve as a critical decision-support tool for Bangladesh Railway, policymakers, and development partners, enabling them to prioritize location-specific adaptation measures and guide future infrastructure investments. Ultimately, this initiative supports the development of a climate-resilient railway system under both current and projected climate scenarios, contributing to the broader vision of Bangladesh's Green Rail Transport transformation.

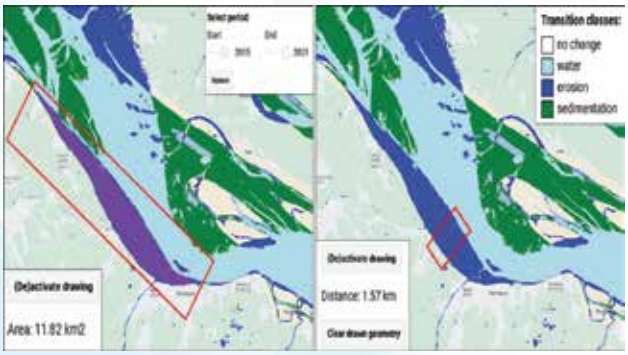
Modernization and Innovative Applications in River Management

In an effort to enhance the effectiveness of river management through a data-driven, proactive, and sustainable approach, the Institute of Water Modelling (IWM) along with Deltares has developed the Bangladesh Erosion Monitor Tool. This advanced tool harnesses satellite imagery and machine learning algorithms to predict riverbank erosion, allowing for timely identification of high-risk areas.

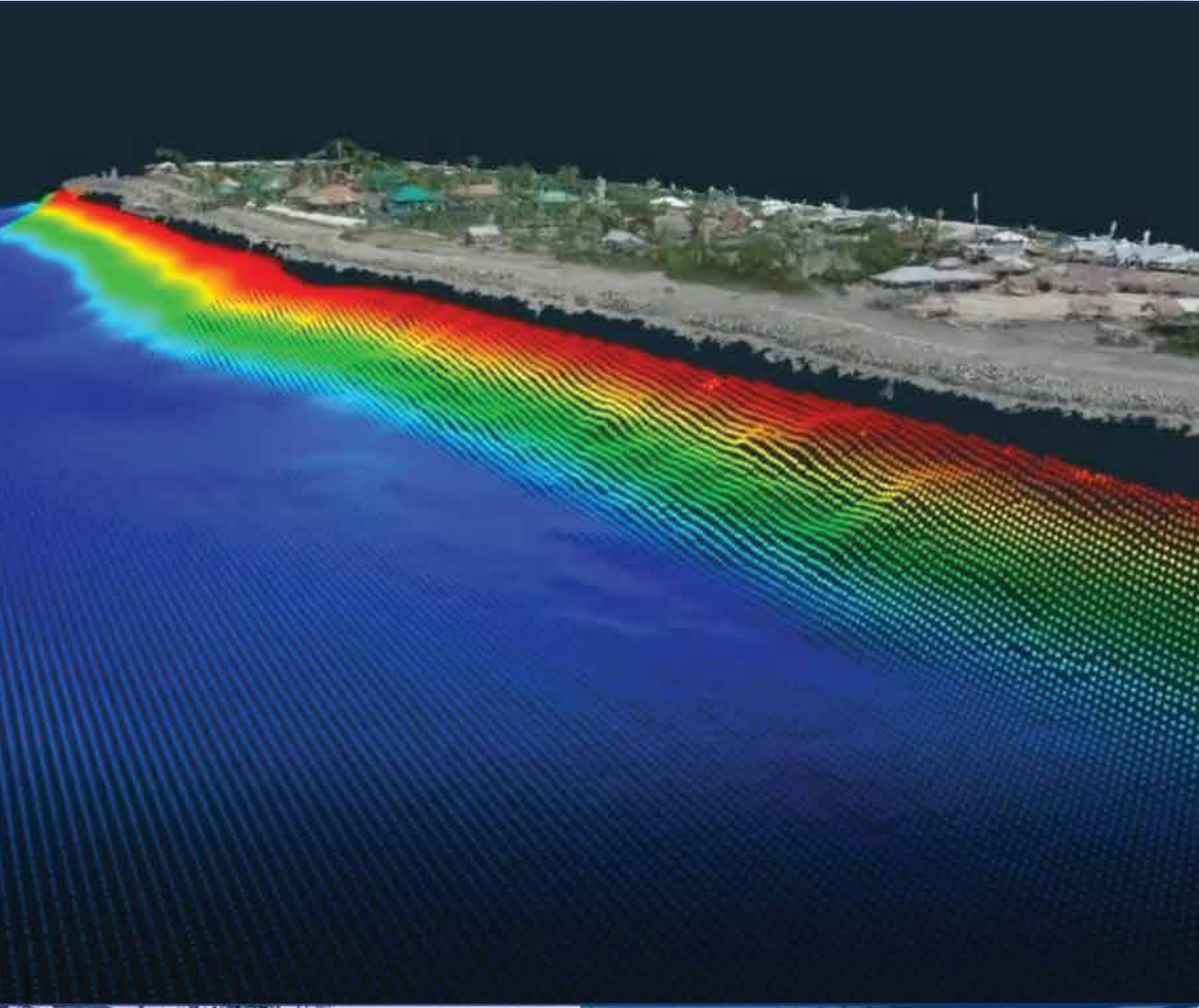
By doing so, it strengthens early warning systems and facilitates more effective, data-driven decision-making to implement proactive mitigation strategies, reducing the vulnerability of communities and infrastructure.

In addition to this, IWM also operates as the Sentinel Asia Data Analysis Node (DAN), contributing significantly to disaster management by analyzing satellite data to assess the impact of natural disasters such as floods, landslides, and other environmental hazards. Through this role, IWM helps assess the extent of damage to affected areas and populations, providing critical information that aids in rapid response and resource allocation during disaster events.

These cutting-edge initiatives reflect IWM's commitment to leveraging technological innovations, emphasizing adaptive design, continuous monitoring, and integration of satellite-based data systems. By utilizing these advanced technologies, IWM is not only ensuring the sustainability and resilience of large-scale infrastructure but also fostering the sustainable development of water resources in regions that are vulnerable to climate change and natural disasters. This forward-thinking approach plays a pivotal role in strengthening proactive disaster management, improving water resource governance, and ensuring the long-term viability of ecosystems and infrastructure in the face of growing environmental challenges.



Erosion Monitoring



Survey and Data Division (SDT)

Survey and Data Collection

Assistance in Jamuna Railway Bridge Construction

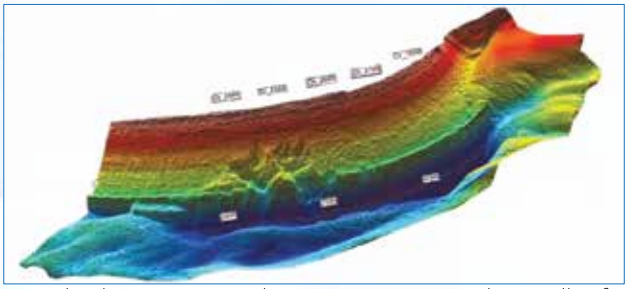
IWM has partnered with two Japanese companies to assist in the construction of the Jamuna Railway Bridge. IWM engineers utilized a range of advanced survey equipment, including multi-beam echo sounders, RTK (Real-Time Kinematic) GPS, total stations, and automated hydrographic surveying systems. The multi-beam echo sounder, in particular, was employed for precise underwater mapping and bathymetric surveys, providing detailed measurements of the riverbed topography. This allowed for accurate assessment of the riverbed's elevation and shape, critical for determining the suitability of the foundation and guiding embankments.

The engineers conducted essential tasks such as hard rock dumping for the guide embankment, using multi-beam echo sounders to measure and verify the depth and location of the dumped material. Pre- and post-dredging surveys were also carried out using the multi-beam. Riverbed Geometry after Hard Rock Dumping under water using Multibeam Echosounder system, ensuring accurate volume calculation and monitoring of any changes to the riverbed structure. RTK GPS was employed to achieve high-precision positioning for verifying the alignment and elevation of the dumped hard rock.

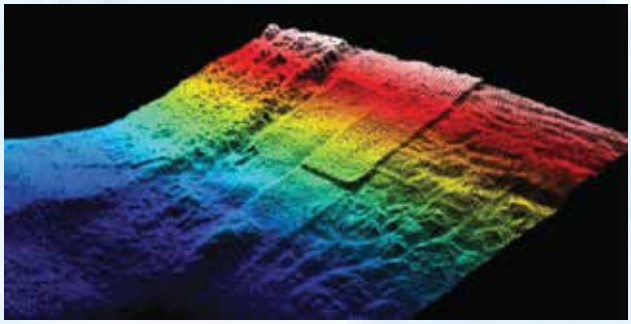
Additionally, the engineers carried out scour-depth monitoring at the piers of the Jamuna Rail Bridge as well as the existing Jamuna Bridge, east and west guide bunds. Using Hypack software, prepared detailed bathymetric charts, contour maps, and spot-level maps by integrating all survey data to present a comprehensive view of the surveyed area. The multibeam survey data were also used to calculate the volume of dredged material, ensuring accurate measurement, removal, and proper placement.

These surveying efforts are vital for overcoming the challenges presented by the Jamuna River's dynamic flow, sediment transport, and frequent flooding. The precision of topographic and hydrographic surveying, supported by cutting-edge equipment like multi-beam echo sounders, plays a crucial role in maintaining the stability of infrastructure such as the Jamuna Railway Bridge in the face of these environmental complexities.

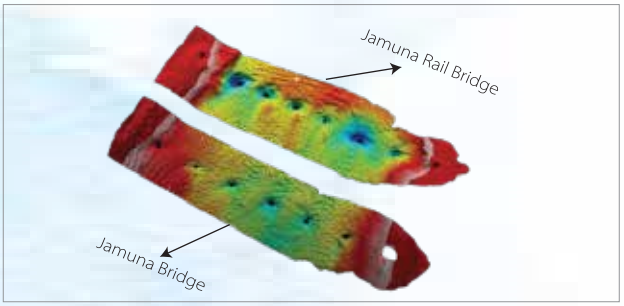
Dumping Berge at Jamuna Rail Bridge



Riverbed Geometry under water at West Guide Bundh of Jamuna Rail Bridge using Multibeam Echosounder



Riverbed Geometry after Hard Rock Dumping under water using Multibeam Echosounder



Riverbed Geometry under water at Bridge Pier of Jamuna Rail Bridge and Jamuna Bridge using Multibeam Echosounder

Procurement of Modern Equipment for Strengthening Survey Division

To address the ever-growing demands of survey work and stay in line with the rapid advancements in technology, IWM continuously updates its equipment. This ongoing investment in cutting-edge technology allows IWM to enhance the precision and effectiveness of its survey capabilities across various projects. Every year, the organization procures state-of-the-art tools to maintain its leadership in the field of water and environmental modelling.

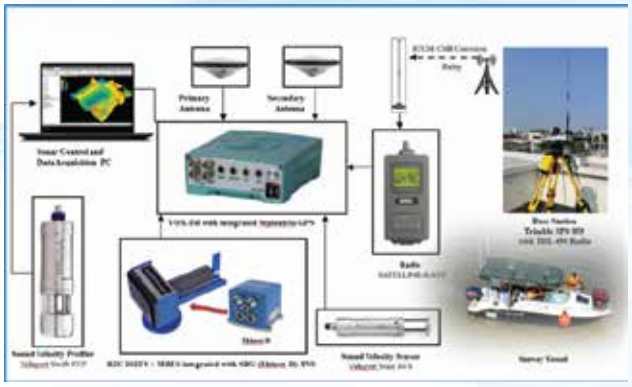
In the year, notable acquisitions included one Multibeam Echo Sounder, UAV based LiDAR, twelve RTK GPS units, and four Automated Weather Stations. These tools are integral to performing accurate surveys and analyses in challenging environments. The primary goal behind IWM's acquisition of such advanced equipment is to address the increasing challenges posed by climate change, which is having a significant impact on our climate, weather patterns, crops, and crop production. These technologies support IWM's efforts to monitor, assess, and mitigate the effects of climate

change on water resources and the environment.

Multibeam Echo Sounder: A highly sophisticated sonar system designed for underwater surveying; it transmits numerous sound pulses toward the seafloor or riverbed and captures the returning echoes to create precise 3D maps of underwater topography. The multibeam echo sounder was first used at the Jamuna Railway Bridge, where it helped create detailed bathymetric maps of the riverbed. It is now being deployed in the Matarbari Port area, where it provides essential data for marine infrastructure and environmental assessments. IWM has procured three sets of multibeam systems: R2 Sonic (Model 2022-V Plus), Teledyne Reson (Model T20-R), and Teledyne Odom (Model MB2). The detail specification of the R2 Sonic (Model 2022-V Plus) is given below:

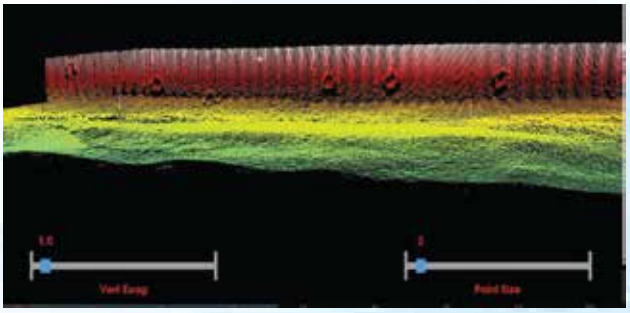
R2 SONIC (Model 2022-V Plus):

The R2SONIC Sonic 2022-V Series Multibeam Echosounder is a compact and advanced wideband sonar system designed for high-resolution hydrographic, dredging, and



Overview of R2 Sonic (Model 2022-V Plus) system

construction-related bathymetric surveys. For precise motion compensation, the system is integrated with an SBG Ekinox-D inertial navigation unit (INS), providing roll and pitch accuracy of 0.015°, enhanced heading stability, and strong resilience against temporary GNSS outages ensuring consistent data quality in dynamic field conditions. The Sonic 2022-V operates over a 170–450 kHz selectable frequency range, with an optional extension up to 700 kHz, and supports Ultra-High Density (UHD) data acquisition with up to 1024 soundings per ping. Additional capabilities include dynamic focusing, roll and pitch beam stabilization, and user-controlled swath coverage between 10° and 160°, making the system highly effective for detailed seabed mapping in complex environments. Advanced features such as TruePix™ compressed water-column imaging and multispectral backscatter modes further enhance the system's versatility and suitability for a wide range of IWM survey applications. The underwater 3D view geometry at the jetty of the Matarbari port is given



3D view geometry at the jetty of the Matarbari Port

below:

RTK GPS Units (Real-Time Kinematic GPS):

The GPS units provide precise, real-time positioning with centimetre-level accuracy, making them essential for geospatial surveys that require highly accurate coordinate tracking. They ensure reliable data collection for environmental monitoring, construction activities, and water-management planning. The twelve CHEC NAV RTK GPS devices acquired by IWM significantly improve survey precision across diverse land and water terrains an important advantage as changing weather patterns and shifting climates continue to influence land use and water resources. The specifications of the recently

Topographic Survey using CHCNAV i93 at Matarbari

procured visual RTK-GPS model, CHCNAV i93, are presented below.

The CHCNAV i93 is an advanced visual IMU-RTK GNSS receiver that delivers fast, centimetre-level accuracy for high-precision surveying. Combining full-constellation GNSS tracking, an internal IMU and dual-camera visual measurement, it enables efficient 3D mapping and accurate stakeout even in challenging environments. With tilt compensation up to 60°, strong connectivity options, and long battery life, the i93 is a robust and versatile tool that enhances IWM's capability in land and hydro-spatial surveys. The picture of the Topographic Survey using CHCNAV i93 at Matarbari is given below

Automated Weather Stations: These weather stations are fully automated systems designed to collect real-time meteorological data. They monitor a variety of environmental factors, including temperature, humidity, wind speed, atmospheric pressure, and rainfall. The data from these stations is vital for understanding local weather conditions, which is crucial for hydrological studies, climate monitoring, and water resource management. As climate change leads to more

Automated Weather Stations

Together, these technologies empower IWM to conduct high-quality, precise surveys and environmental assessments, which are vital for successful water management, infrastructure projects, and climate adaptation strategies. They play a crucial role in helping IWM address the challenges posed by climate change and ensure sustainable management of water

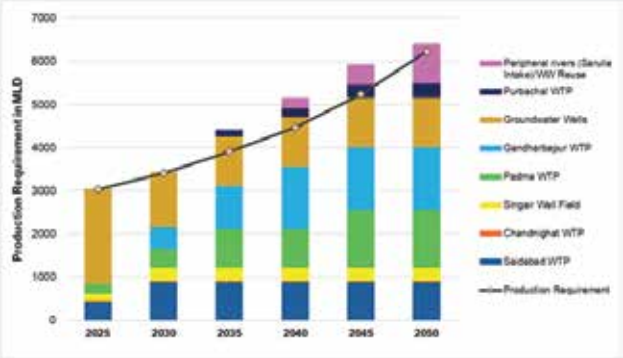
Water Supply, Sanitation & Urban Water Management (WSU)

Water Supply and Sanitation

Updated Water Supply Master Plan for Dhaka City (2025)

In 2014, with support from IWM, Dhaka WASA (Dhaka Water Supply and Sewerage Authority) developed the first Water Supply Master Plan to meet the city's growing water demands and achieve the Sustainable Development Goals (SDGs). Following this rapid urbanization, population growth, climate change, and new infrastructure plans made it necessary to update the master plan. IWM supported DWASA in developing the updated Water Supply Master Plan of 2025, aligning with national policies, global frameworks, and Bangladesh's vision for future development.The main goal of the updated Master Plan was to reduce Dhaka's dependence on groundwater, aiming for at least 70% of the water supply to come from surface sources over the next decade, as well as promoting sustainability in the water supply sector by incorporating demand management, wastewater reuse, and smart water city approaches.

The master plan projected Dhaka's water requirement to increase steadily from around 3,000 MLD in 2025 to over 6,200 MLD by 2050. Across the timeline, a clear strategic shift has been outlined, moving from groundwater-dependent



supply towards surface water–based supply, in consistency with DWASA's long-term policy. Utilizing water from peripheral rivers, once they are restored, and reusing wastewater (preferably for non-potable use)have been perceived as a long-term solution.As per the master plan, by the target year 2050, groundwater usage can be reduced to 23%, with the remaining 77% of water demand being met through surface water sources and wastewater reuse.

The master plan outlines several key strategies to meet the rising demand for water across residential, industrial, and commercial sectors and improve service delivery:

1. **Smart Water City Transformation:**

   The plan envisions Dhaka becoming a Smart Water City by prioritizing wastewater reuse, water conservation through the use of modern fittings and faucets, demand management through implementing IDT Increasing Block Tariffs(IDF), and using advanced technology like real-time monitoring, leak detection, and smart meters to improve water management and reduce NRW.

2. **Utilize Surface Water and Promote Reuse/Recycling of Treated Wastewater:**

   The plan outlines a pathway for meeting up to at least 70% of water demand using surface water sources of major rivers like the Padma and Meghna. It encourages the reuse and recycling of treated wastewater for non-drinking purposes such as car washing, landscape, gardening, and industrial use, reducing pressure on potable water sources.

3. **Monitoring Water Quality:**

   Continuous monitoring of water quality ensures safe drinking water by regularly testing the water supply throughout the distribution network.

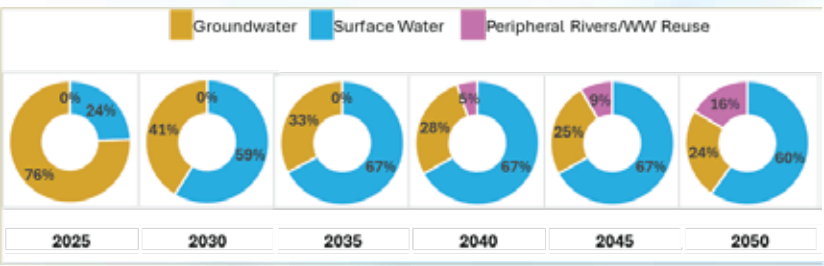
4. **Equitable Access:**

   The plan aims for equitable access to water, expanding services to underserved areas, and ensuring all citizens, regardless of income, have access to clean water. It also emphasizes public welfare by expanding the service for water ATM's and water fountains in public places.

5. **Climate Resilience and Disaster Preparedness:**

   The Master Plan includes climate resilience measures, ensuring infrastructure can withstand extreme weather events and managing water resources during droughts and floods.

In summary, the Updated Water Supply Master Plan 2025 aims to ensure a sustainable, reliable, and climate-resilient water supply for Dhaka, meeting both current and future demands while promoting equity and smart water management.

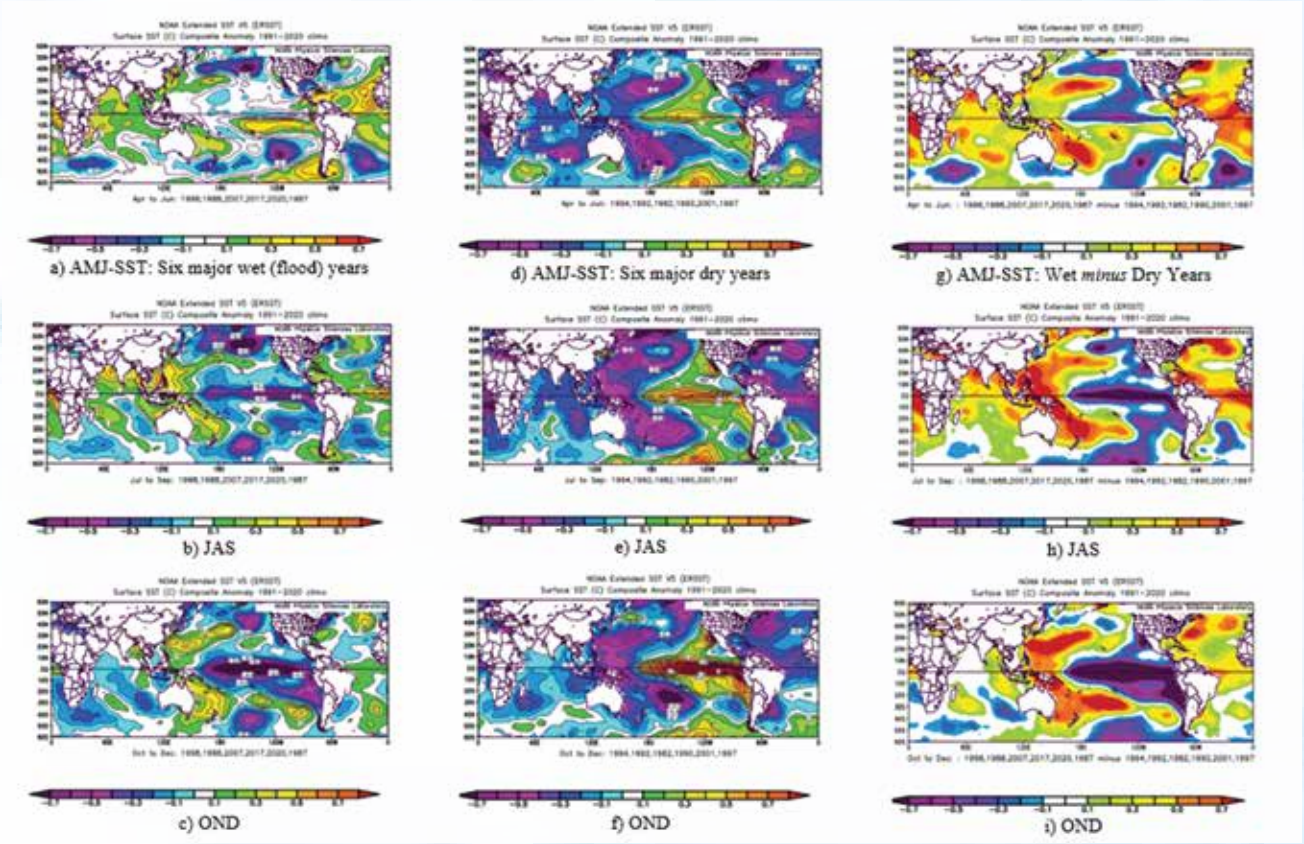


Research, Innovation & Development Unit (RID)

Environmental and Climate-Related Research in Bangladesh

Impact of Seasonal Floods and Tropical Climate Variability:

This research, funded by IWM and conducted in collaboration with Dr. Rashed Chowdhury from Arizona State University, aims to assess the impact of tropical climate variability on Bangladesh's environmental systems, focusing specifically on seasonal floods and the country's broader climate resilience. The study examines critical climate drivers such as El Niño-Southern Oscillation (ENSO), Indian Ocean



Seasonal average SST anomaly (Wet-Dry)

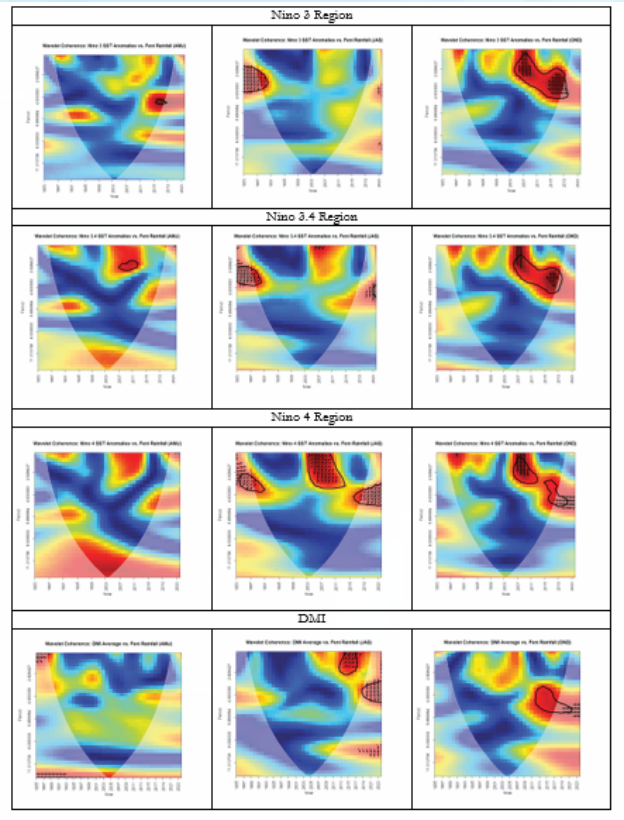
Dipole (IOD), and Madden-Julian Oscillation (MJO), which influence temperature, rainfall, flooding, and cyclonic activity in Bangladesh.

The ENSO phenomenon refers to the fluctuating sea surface temperatures and atmospheric pressure in the equatorial Pacific, affecting global weather patterns, including those in South Asia. The IOD is a significant climate driver in the Indian Ocean, influencing rainfall distribution and often causing droughts or floods in Bangladesh. The MJO, a recurring atmospheric pattern, can impact the intensity of monsoons and the occurrence of cyclones, influencing both seasonal flooding and the long-term climate outlook.

Using a combination of international climate models and local data analysis, this research evaluates how these climate drivers affect Bangladesh's climate systems. By analyzing both global and local data, the study provides insights into how these broad climatic forces translate into local weather patterns, extreme events, and ultimately, the country's climate resilience.

The findings from this research will be vital in shaping green and climate-resilient development strategies for Bangladesh. By understanding the influence of these climate drivers on local weather systems, the study aims to inform disaster management strategies and provide the data needed to plan for future climate-resilient infrastructure, sustainable agriculture, and water management. This research will allow Bangladesh to build systems that are green, environmentally sustainable, and resilient to the growing challenges posed by climate change.

Moreover, this study will contribute to climate adaptation strategies that promote both sustainability and resilience. As the effects of climate change increase, this research



Wavelet coherence of the SST anomalies of Niño 3, 3.4,4, and DMI with the rainfall of Feni.

supports the country in reducing its vulnerability to natural disasters, including floods, droughts, and cyclones. With actionable insights derived from both global models and localized data, the study will enhance Bangladesh's capacity to integrate climate resilience into development planning, ensuring that future economic growth and infrastructure are better equipped to withstand the impacts of climate change.

Ultimately, this research embodies a crucial step toward green and climate-resilient development for Bangladesh. By providing science-backed data, it will guide the country's transition toward a more sustainable and adaptable future, where development is both environmentally responsible and capable of enduring the challenges of an evolving climate. This approach not only aims to reduce the risks posed by climate change but also ensures that development projects do not compromise the country's long-term environmental and social well-being.

Challenges of Safe Water in South-West Coastal Region. Learning from Gabura, Padmapukur and Way Forward

The study, funded by the Ministry of Water Resources, is focused on addressing the safe water crisis in the southwestern coastal regions of Bangladesh, particularly in Gabura and Padmapukur, Satkhira. These areas face severe water scarcity due to several intertwined environmental and infrastructural issues. One of the main challenges is salinity intrusion, which results from rising sea levels and tidal surges, contaminating freshwater sources and making them undrinkable. Additionally, arsenic contamination of

Groundwater Sampling from Ghar Kumarpur, Padmapukur, Satkhira

groundwater remains a significant health concern, as exposure to arsenic can cause various diseases, including cancer. The region is also frequently hit by cyclones and storm surges, which further degrade water quality by mixing freshwater sources with saltwater and debris. Compounding these issues is the lack of proper infrastructure for water treatment, storage, and distribution, which leaves communities reliant on unsafe water sources such as ponds.

To assess these challenges, the study employs a comprehensive methodology, including household surveys, key informant interview, participatory rural appraisal, water quality testing, and GIS mapping. Household surveys will gather information on water usage patterns and the specific challenges faced by local residents in accessing safe drinking water. Water quality testing will be carried out to measure the levels of harmful contaminants such as salinity and arsenic in both surface and groundwater sources. GIS mapping will help identify the distribution of water sources and contamination levels, providing critical data for targeted interventions.

The study is exploring the potential of rainwater harvesting as a sustainable alternative water source. This method could significantly reduce reliance on saline groundwater, especially during the monsoon season when rainfall is abundant. The feasibility of other alternatives, such as small-scale desalination units and groundwater recharge techniques, will also be assessed. By offering these alternatives, the study aims to improve the availability of safe drinking water and reduce the health risks associated with waterborne diseases.

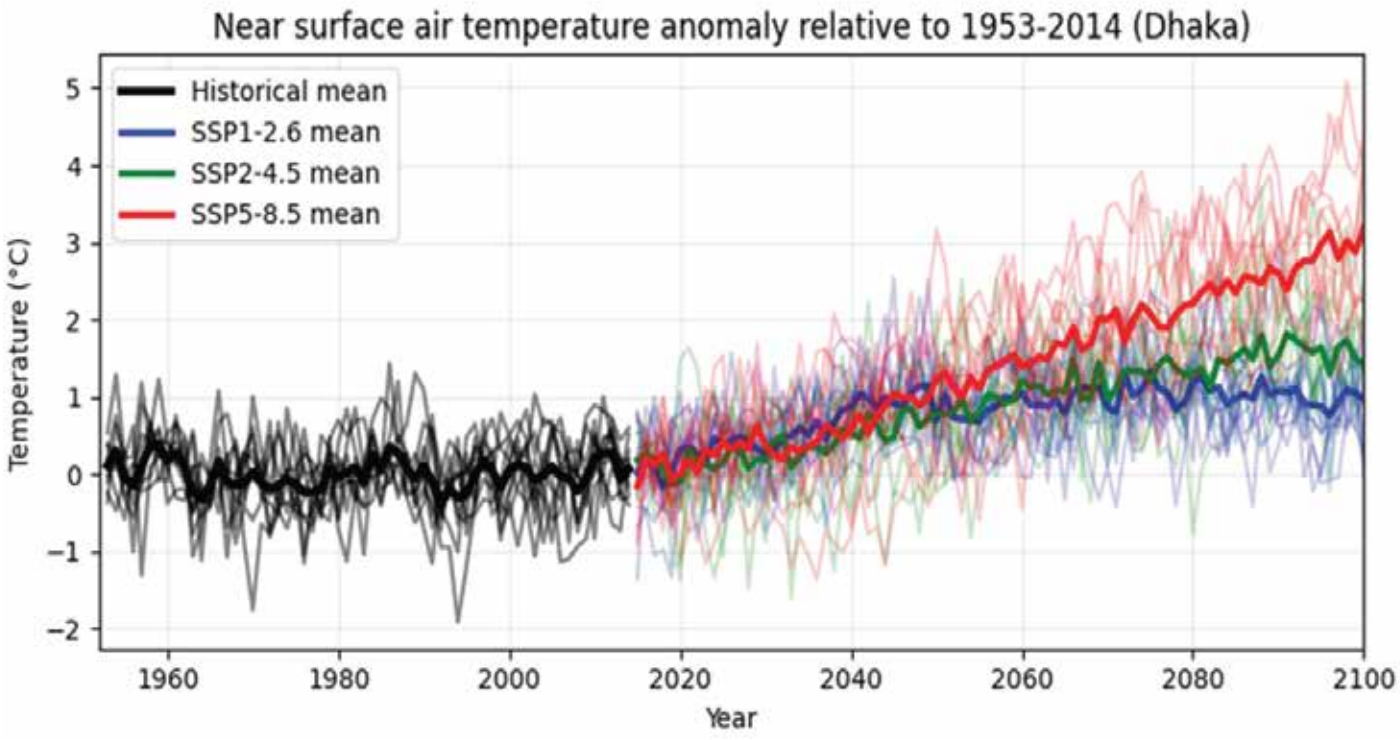
Discussion with Women at Parshemari Bondhu Foundation Water Outlet, Gabura, Satkhira

Beyond the technical aspects, the study also aims to raise awareness among local communities about safe water practices, water treatment methods, and the benefits of using alternative water sources. This initiative is aligned with Sustainable Development Goal 6 (SDG-6), which focuses on ensuring access to clean water and sanitation for all, and contributes to the broader goals of Delta Plan 2100, which seeks to address long-term water management challenges in the delta region. The outcomes of this research will provide essential data that can inform policy decisions and guide future projects aimed at improving water access and infrastructure in coastal Bangladesh. Through these efforts, the study hopes to ensure that local communities can access clean, safe water, thereby improving their health and quality of life despite the ongoing environmental challenges.

Impact Assessment of Wind Power Projects on Birds and Bats

This comprehensive survey, carried out by the IWM under the Sustainable and Renewable Energy Development Authority (SREDA), focuses on evaluating the potential effects of the proposed wind power plants on local wildlife, specifically birds and bats. The research aims to assess how the construction and operation of the wind turbines could impact their habitats and migration patterns. It further investigates the risks involved and provides necessary recommendations to minimize these environmental threats. This includes suggestions for local community engagement, habitat preservation, and the development of conservation strategies to protect these species.

The study also emphasizes the role of renewable energy, such as wind power, in reducing reliance on traditional, non-renewable sources. By expanding the use of environmentally friendly energy alternatives, especially in rural regions, the research highlights the importance of integrating wind power as a key part of the country's sustainable energy plan. This transition aligns with the global push towards achieving Sustainable Development Goal 7 (SDG-7), which focuses on ensuring access to affordable, reliable, sustainable, and modern energy for all. Through these efforts, the study offers vital guidance for the growth of the renewable energy sector and its integration with biodiversity conservation.



Climate Change and Environment Unit (CCE)

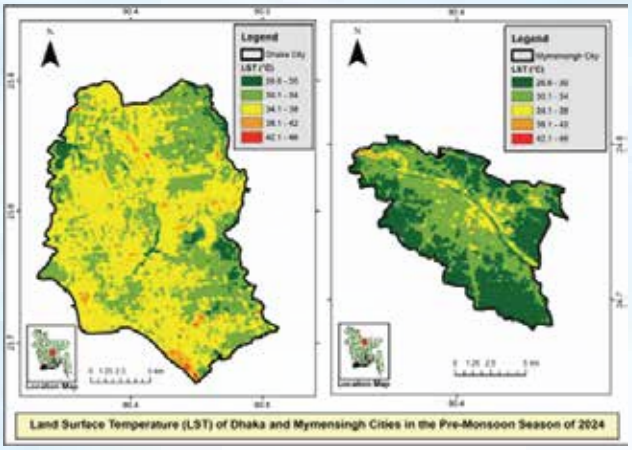
Urban Heat Island (UHI)

Urban Heat Island (UHI) refers to the phenomenon where urban areas experience significantly higher temperatures than their surrounding rural regions due to dense built-up structures, limited vegetation, reduced waterbodies, and various human activities. This is particularly important for rapidly growing cities like Dhaka and Mymensingh, where rising temperatures amplify health risks, reduce productivity, and affect overall urban livability.

To address these challenges, the Department of Environment (DoE) has launched a research project aimed at tackling the UHI effect. The Institute of Water Modeling (IWM) is playing a key role as a consultant for this project. The study provides a comprehensive assessment of UHI patterns across Dhaka and Mymensingh using historical climate analysis, primary data collection, land surface temperature (LST) mapping, microclimate modeling, and social surveys. Together, these components reveal how rapid urbanization, land use changes, and climate change are intensifying heat stress in both cities. Historically, Dhaka has shown higher temperatures than Mymensingh, particularly in the winter and pre-monsoon seasons. The exponential rise in population density, the loss of green and water spaces, and the proliferation of impervious surfaces have increased vulnerability to extreme heat. Primary data were collected from 37 indoor and outdoor monitoring stations placed across contrasting urban settings. A major comparison was made between low-income slum (Basti) areas (such as Pora Basti) and high-rise commercial or formal residential locations (such as Mirpur-1). The findings clearly show that Pora Basti consistently recorded higher daytime temperatures, frequently exceeding 40°C during warm months, whereas Mirpur-1 maintained a lower and more stable temperature profile. This difference is largely driven by GI sheet structures in slum (Basti) areas, which absorb and re-radiate heat rapidly, combined with continuous exposure to direct sunlight.

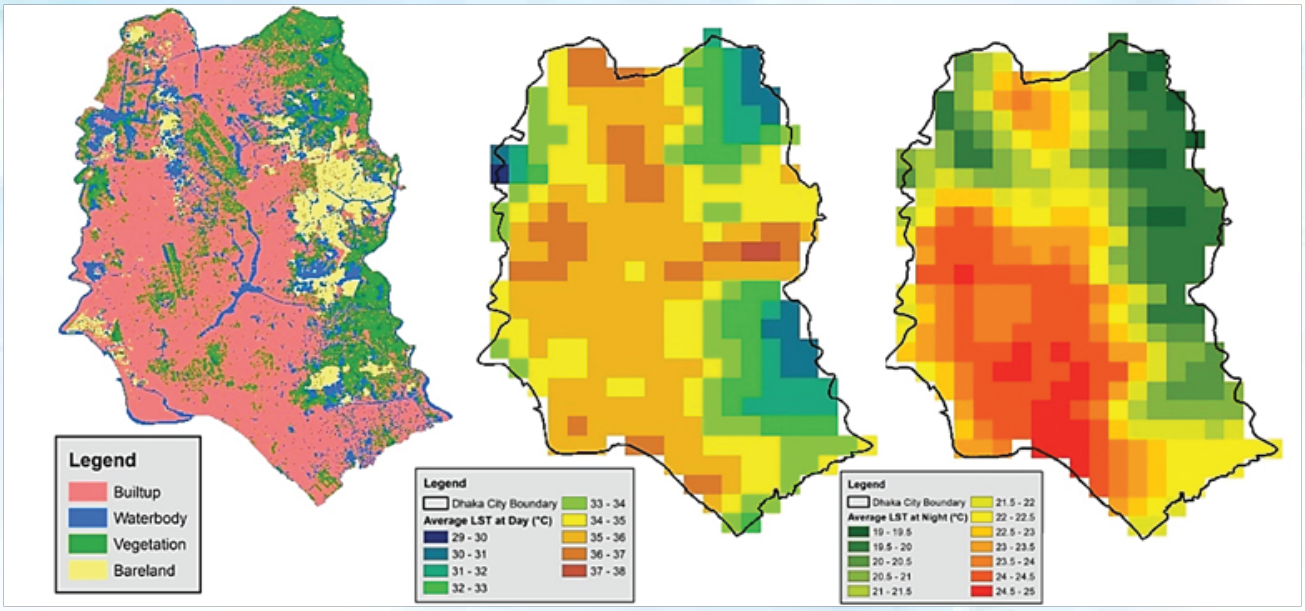
Night-time temperatures showed the opposite pattern: highly urbanized areas retained more heat at night due to the thermal mass of concrete structures, while GI sheet structures cooled faster, resulting in lower night-time temperatures in Pora Basti. Humidity patterns also varied, with basti areas showing greater variability and more extreme peaks during the hot and wet seasons. Together, these differences reveal dual vulnerabilities: extreme daytime heat in low-income settlements and persistent nocturnal heat in densely built, high-rise areas.

A microclimatic modeling approach was used to assess how road orientation, building height, and overall urban form influence neighborhood-level heat distribution. Based on these insights, guidelines were developed emphasizing ventilation corridors, shading, and strategically placed green spaces to improve local thermal conditions.



Primary Data Collection in Dhanmondi, Dhaka

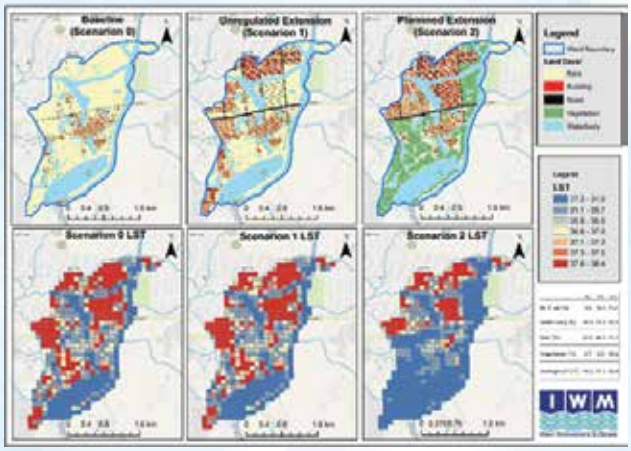
The LST component of the study evaluated both current and future temperature patterns based on land cover composition and projected urban growth. The analysis demonstrates a strong relationship between increasing built-up areas and rising LST, while vegetation and water bodies provide measurable cooling effects. Using



Impact of Land Cover (left) on daytime (middle) and nighttime (right) temperature distribution in Dhaka.

regression models linking LST and land cover, future scenarios were prepared for 2035 and 2050. Land use projections generated through CA-ANN modeling indicate rapid expansion of built-up areas, especially in eastern and western parts of Dhaka, under business-as-usual conditions

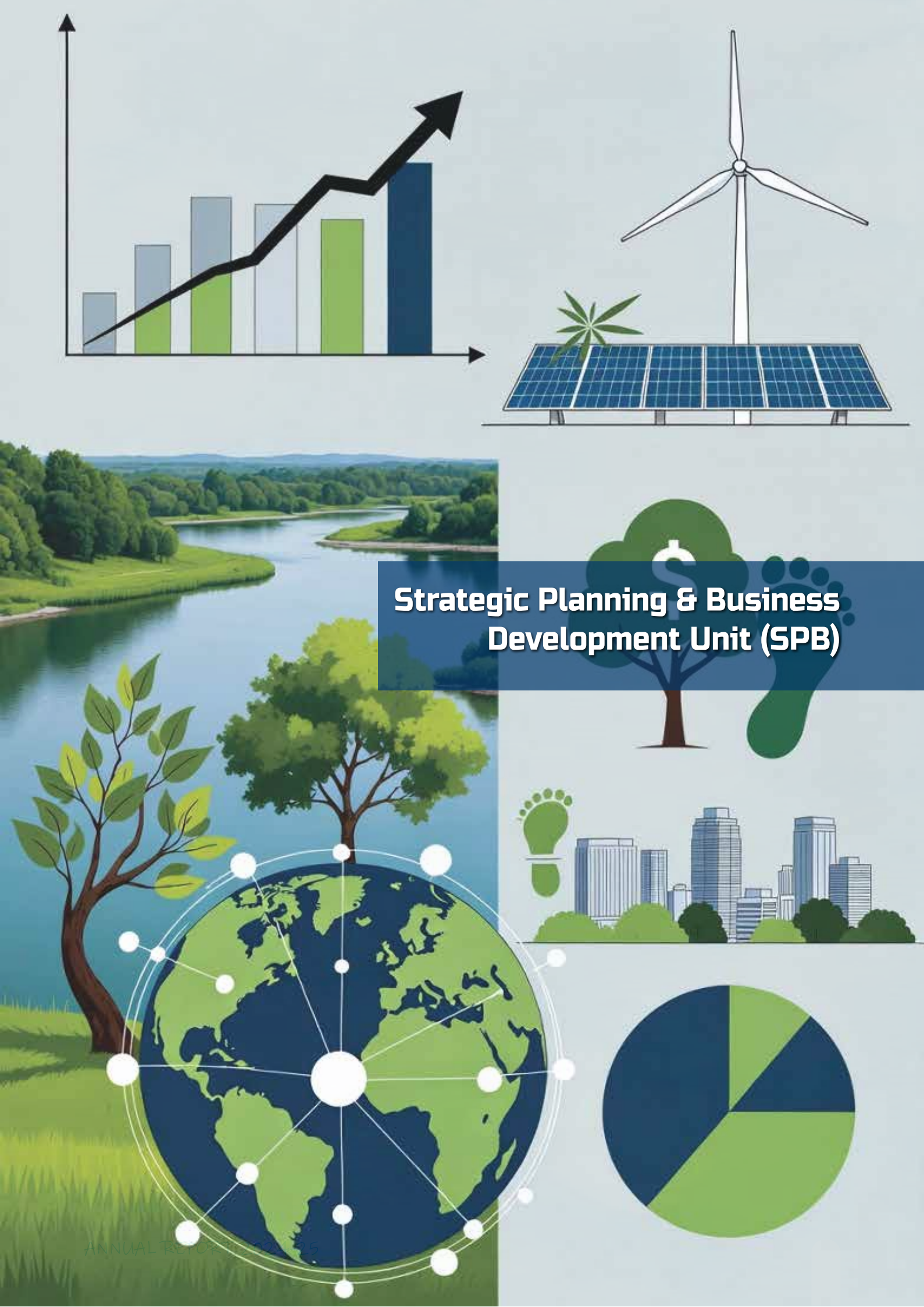
Scenarios that preserve water bodies, increase green zones, and redesign high-density wards show a clear reduction in LST. For instance, redevelopment strategies in Dhaka North City Corporation (DNCC) Ward 42 involving increased tree cover and waterbodies demonstrate measurable cooling benefits according to modeled outputs. Climate scenario modeling further shows that future temperature values will dramatically rise under high-emission pathways.



Land Cover and Corresponding Land Surface Temperature for Different Scenarios in DNCC Ward 42

The social survey covered 48 locations across 12 wards, focusing particularly on low-income communities. Environmental variables measured on-site included air temperature, humidity, wind flow, and local density characteristics. Survey results show that over 97 percent of respondents consider rising temperatures a serious problem, reflecting widespread concern among vulnerable groups. Heat-related health problems were common, with dehydration (36 percent), heat exhaustion (18 percent), and dysentery (18 percent) among the most frequently reported conditions. Participants also reported significant loss of working hours due to heat stress: nearly half indicated a loss of about two hours daily, while others reported losing three to four hours, directly affecting household income. The most requested coping interventions were drinking water stations and community cooling centers, alongside reliable electricity and health services

Overall, the findings highlight that rapid urbanization, limited green spaces, and projected climate change will continue to intensify heat stress in both Dhaka and Mymensingh. The study underscores an urgent need for coordinated planning interventions that prioritize cooling strategies, protect vulnerable communities, and enhance urban resilience. Implementing these measures now will be critical for safeguarding public health and improving overall livability.



Strategic Planning & Business Development Unit (SPB)

Strategic Development Planning and Management

Establishing a Regulatory Mechanism for Water Supply and Sanitation Sector:

In partnership with the Local Government Division (LGD), the Asian Development Bank (ADB) is supporting the development of a robust and comprehensive regulatory mechanism for the water supply and sanitation sector. This initiative aims to establish an effective framework that ensures water supply and sanitation services are safe, reliable, affordable, and environmentally sustainable. By promoting accountability, transparency, and inclusivity, the initiative seeks to enhance service quality and operational efficiency while ensuring equitable access for all segments of society. Ultimately, this effort will strengthen governance

and foster a fair, people-centered approach to water and sanitation service delivery across the country.

The project aims to design and implement a

comprehensive regulatory framework that will steer the sector toward continuous improvement and long-term sustainability, ensuring that services consistently achieve the highest standards of performance, accountability, and good governance. To achieve this vision, the Local Government Division (LGD) is being supported in establishing an inclusive Regulatory Mechanism that covers the guidelines, the creation of monitoring and oversight protocols, and the introduction of capacity-building programs to strengthen institutions and service providers. Beyond immediate regulatory measures, the project also prioritizes the development of structured policy guidelines that reflect both present needs and future aspirations. A central output is the creation of a clear, time-bound roadmap to guide sectoral reforms and strategic development over the coming years.

To assist in this transformative process, IWM has been appointed to provide technical and strategic support. IWM has worked closely with key stakeholders to gather valuable insights and feedback, resulting in the development of a comprehensive Regulatory Mechanism. This draft framework has undergone thorough review and has received approval from the National Steering Committee, marking a significant milestone in the establishment of a more effective, sustainable, and accountable regulatory environment in the water supply and sanitation sector. The approval paves the way for the implementation of a well-structured, inclusive, and future-proof regulatory system that will drive the sector's development and improvement for years to come.

Climate and Disaster Risk Financing and Insurance (Global Shield)

The 'Global Shield' initiative, launched under the leadership of G7 and V20 countries at COP27, aims to strengthen financial protection for climate-vulnerable nations through pre-arranged, index-based Climate and Disaster Risk Financing and Insurance (CDRFI) mechanisms. In the context of Bangladesh, the initiative seeks to establish a robust national framework that ensures rapid financial response and recovery support in the aftermath of natural disasters.

Since 5 October 2024, the Economic Relations Division (ERD) under the Ministry of Finance has formally led the in-country process (ICP), with IWM providing technical

Workshop on Global Shield against Climate Risks in Bangladesh

assistance and strategic guidance to the Global Shield Secretariat. IWM is playing a pivotal role in conducting a comprehensive review of existing national financial protection and risk assessment mechanisms, including stock take and gap analysis, to identify structural and operational deficiencies. This assessment will inform the preparation of a National Support Demand Note, highlighting Bangladesh's financial and technical requirements under the Global Shield framework.

To ensure coordinated stakeholder engagement and evidence-based recommendations, IWM has facilitated multiple bilateral consultations, advisory workshops, and focus group discussions (FGDs). These initiatives identify gaps in financial protection and risk management systems, provide actionable guidance for enhancing national resilience, and ensure the effective operationalization of the Global Shield initiative. Through these efforts, IWM is advancing climate resilience, sustainable risk financing, disaster preparedness, and strategic capacity building, positioning Bangladesh as a proactive leader in climate and disaster risk governance.

Carbon Credit Scheme Development & Capacity Building

Bangladesh, one of the world's most climate-vulnerable nations, is strategically positioned to unlock substantial economic, social, and environmental benefits through internationally recognized carbon credit projects. These initiatives not only generate verifiable carbon revenues but also strengthen resilience, create livelihoods, and drive sustainable development.

IWM is leading a multi-stakeholder consortium to develop a robust portfolio of Article 6-compliant carbon projects. Following rigorous technical evaluation, the National Article 6 Designated National Authority (DNA) Technical Committee has issued Non-binding Letters of Intent for the following flagship initiatives:

- Bengal Blue Carbon Initiatives (Mangrove Afforestation for Protecting Coastal areas and Sequestration of GHG)
- FARM2CARBON: Empowering Farmers through Horticultural Plantations and Climate Action
- Waste to Compost Project (Zero waste landfills Initiatives)
- Green Delta AWD Carbon Project (AWD and SRI project)

IWM will deliver end-to-end project development, including:Comprehensive baseline studies and carbon sequestration/removals assessments; Preparation of internationally compliant Project Design Documents (PDDs); Design and deployment of a cutting-edge digital Monitoring,

Reporting, and Verification (dMRV) platform for transparency and real-time data integrity; Ongoing coordination with the Department of Environment (DoE), relevant ministries, investors, consortium partners, and local stakeholders.

The Bengal Blue Carbon Initiatives restore vital mangroves, sequestering massive GHG while shielding coastal communities from cyclones and erosion, generating high-value blue carbon credits. FARM2CARBON promotes horticultural plantations, enabling smallholder farmers to earn additional income through verified carbon revenues alongside improved food security. The Waste to Compost Project diverts organic waste from overflowing landfills, reducing methane emissions and producing nutrient-rich compost for agriculture, creating jobs and cleaner cities. Meanwhile, Green Delta AWD Carbon Project introduces alternate wetting-drying (AWD) and System of Rice Intensification (SRI) techniques that slash methane emissions from paddy fields by up to 50%, conserve water, boost yields, and deliver affordable agricultural carbon credits. Together, these initiatives attract international climate finance, enhance resilience, reduce poverty, and position Bangladesh as a leader in tropical carbon markets.

Human Resource Development (HRD)

Human Resource Development

IWM's commitment to fostering a skilled workforce is evident in its continuous efforts to enhance professional development both internally and externally. The organization has integrated modern technology and practical learning into its training structure, ensuring that its personnel are equipped with the most up-to-date knowledge and skills. By offering a variety of specialized training sessions, IWM not only boosts the capabilities of its own workforce but also plays a pivotal role in elevating the technical expertise within the broader public and private sectors in Bangladesh.

Participants receiving training on GIS

The collaboration with international organizations, such as NAHRIM (Malaysia), exemplifies IWM's global outreach, promoting cross-cultural knowledge exchange and developing strategic partnerships that are crucial for addressing complex challenges in water management and other technical fields. The exchange of knowledge with international counterparts allows IWM to stay at the forefront of technological advancements and best practices, fostering a global network of expertise.

Practical session on data capturing by Drone

Furthermore, IWM is deeply invested in connecting with the future workforce. By providing internship and industrial training opportunities to students from prestigious universities like BUET, CUET, KUET, IUT, MIST, and Hong Kong University, the organization not only builds valuable relationships with the next generation of professionals but also ensures that these students are well-prepared to contribute meaningfully to their professional life. This initiative is a key component of IWM's long-term strategy to empower youth, providing them with hands-on experience and exposure to cutting-edge technology and methodologies.

Prof. Dr. Tanvir Ahmed of BUET conducting session on the training ESIA

In summary, IWM's human resource development initiatives are a blend of internal capacity building, external training, and international collaboration. Through its emphasis on empowering youth and collaborating with top-tier institutions, IWM is nurturing a highly skilled, innovative workforce capable of addressing emerging challenges. These efforts collectively contribute to the organization's goal of fostering sustainable growth and innovation within the knowledge-based economy of Bangladesh.

Major Trainings of 2024-2025

July 2024 • Training on Advanced Human Resource Management • Training on Introduction to ESIA for Young Professionals of IWM	**August 2024** • Training on Environmental Modelling and Environmental & Social Impact Assessment (ESIA)-3rd Run	**September 2024** • Training on Project Management • Training on Hydrographic & Topographic Survey and Processing • Training on Organizational Behavior
October 2024 • Training on Essential Perspective of Blue Economy • Training on 'Application of Mathematical Modelling and GIS Technology for Feasibility Study of Water Development Projects'	**November 2024** • Training on Building Resilience to Climate Change Strategies and Tools • Training on Satellite Based Survey and Mapping Using GPS for the Water Sector	**December 2024** • Training of Trainers – Climate Resilient Leadership Program • Training on Climate-Resilient Sanitation Safety Planning • Training program on "Climate Resilient Integrated Water Resources Management and Water-Energy-Food-Ecosystem Nexus
January 2025 • Training on Physical Modelling • Training on Water Resource Management • Training on IWM Central Store Management System	**February 2025** • Training on Training on Ground Water Modelling • Training on Bangladesh Flood-Variability and Predictability	**March 2025** • Training on Bangladesh Flood-Variability and Predictability
April 2025 • Training on Civil 3D • Training on Basic GIS	**May 2025** • Training on Terrasolid LIDAR Mapping Software • Training on Environmental Modelling and Environmental & Social Impact Assessment (ESIA)-4th Run	**June 2025** • Development of Floating Offshore Wind Farms

Some of the Major Events

Wetland and Environmental Conservation & Management Arial Beel: Protecting a Vital Wetland Ecosystem

Arial Beel, one of the country's most vibrant wetland landscapes located along the Padma floodplain, is facing rapid ecological decline due to disrupted water connectivity, heavy siltation, pollution, encroachment and unsustainable practices. To address these challenges, the Department of Bangladesh Haor and Wetlands Development (DBHWD) engaged IWM to conduct a comprehensive, multi-disciplinary study on the hydrology, environment, biodiversity, agriculture and socio-economic conditions of the area, along with an integrated management framework.

The study deployed extensive field investigations across 244 km^2, including detailed topographic and cross-section surveys, continuous water level and discharge monitoring, soil and groundwater assessments, water quality analysis, and biodiversity and socio-economic studies. Stakeholder engagement was a key component, with over 1,200 household surveys, 35 FGDs, 31 PRAs, and 15 public consultations.

Findings underscore the urgent need to restore natural hydrological connectivity between Arial Beel and the Padma River. Proposed interventions include reopening blocked khals through regulators and bridges, re-excavating canals and water bodies, stabilizing vulnerable banks, enhancing fish habitats, and introducing nature-based solutions such as afforestation, fish sanctuaries, eco-villages, and sustainable farming. Community-focused measures-including biogas plants, pollution control, climate-smart agriculture, and fisheries management-have also been recommended.

Key strategic recommendations include declaring Arial Beel a "Wetland-Based Protected Area," establishing an Integrated Management Committee, enforcing strict controls on encroachment and harmful practices, restoring migration routes, managing water hyacinth, promoting native vegetation, and involving local communities in conservation.

IWM's scientifically grounded roadmap aims to rejuvenate Arial Beel's ecology, strengthen its climate resilience, and secure sustainable livelihoods for the communities who depend on this invaluable wetland system.

National Workshop on Arial Beel on19 June, 2025

Evaluation and Updating of the Master Plan for Haor Area 2025

IWM Leads Scientific Assessment to Shape a Resilient Future for the Haor Region

IWM has completed a comprehensive evaluation and update of the Master Plan for Haor Areas (first prepared in 2012), responding to growing climate risks, ecological degradation, and shifting socio-economic conditions across the northeastern Haor basin. Spanning seven districts, the Haor region is Bangladesh's largest freshwater ecosystem and a critical source of biodiversity, fisheries, agriculture, and livelihoods. Updating the Master Plan was essential to ensure alignment with national strategies, including the Bangladesh Delta Plan 2100, National Adaptation Plan 2023–2050 and National Water Policy 1999.

IWM conducted extensive field assessments, data analysis, and stakeholder consultations to inform the updated plan. The study integrated household surveys, FGDs, KIIs, and participatory consultations with detailed analyses of agriculture, fisheries, aquatic vegetation, biodiversity, land use, hydrology, climate projections, and carbon stocks. Advanced mathematical modelling—using MIKE 11 HD, rainfall–runoff models, and CMIP6/ISIMIP climate scenarios—enabled robust evaluation of future hydrological and climate risks.

Key findings highlight severe dry-season water shortages, with more than 5,100 km of canals losing connectivity, and increased vulnerability of boro cultivation to flash floods and climate variability. Biodiversity is under pressure, with declining trends in 86 fish species and 40 aquatic plant species. Pollution hotspots, including the Ollipur industrial area, have further degraded wetland habitats. Assessment of projects implemented between 2013 and 2023 showed that submersible embankments and infrastructure improved agriculture and livelihoods but sometimes obstructed fish migration, whereas fish sanctuaries, canal re-excavation, and wetland restoration delivered strong ecological benefits.

The Updated Master Plan envisions "a biodiversity-rich, climate-resilient, and self-reliant Haor region," structured around four strategic goals: ecological balance, sustainable livelihoods, nature-based infrastructure, and integrated basin management. IWM's cross-sectoral approach emphasizes nature-based solutions-wetland restoration, canal re-excavation, eco-friendly infrastructure, community-based fisheries, climate-resilient crops, and green village development. Social sectors including education, health, housing, energy, transport, and tourism are addressed through flood-resilient schools, mobile clinics, solar mini-grids, and improved navigation.

An Investment Plan outlines 104 proposed projects with a total allocation of BDT 5,183,333 lakh across short-, medium-, and long-term phases. Effective implementation is expected to significantly enhance resilience—improving flood control across 213,000 ha, expanding irrigation coverage by 330,000 ha, restoring 1,863 km of navigability, and boosting food and fish production.

Through this rigorous and forward-looking update, IWM has provided a scientifically sound and actionable roadmap to safeguard the Haor ecosystem while strengthening livelihoods and climate resilience for the communities who depend on it.

On 30 June, 2025, National Workshop on the Results of the Integrated Survey Project for the 'Evaluation and Updating of Master Plan for Haor Area 2025'

Major MoU, Contract Signing and Workshops

IWM Signs MoU with Bangladesh Institute of Development Studies (BIDS)

Inception Report Workshop on Developing the Training Module for ToT on Delta Appraisal Framework (DAF) held at the Planning Commission. The workshop was graced by Dr. Monzur Hossain, Member (Secretary), GED, as the Chief Guest.

National Workshop on Marine Spatial Planning (MSP) Web-GIS held at CIRDAP. Ms. Farida Akhter, Hon'ble Adviser, Ministry of Fisheries and Livestock, who graced the occasion as the Chief Guest.

Regional Stakeholder Workshop on Blue Economy for Sustainable Development of Bangladesh at Cox's Bazaar, Chief guest Dr. Monzur Hossain, Member (Secretary), GED.

Contract Signing Ceremony for Detailed Feasibility Study for Integrated Development of Selected Stable Chars in the Meghna Estuary for Implementation under CDSP V and Erosion Management Plan at Boyer Char, Char Nangulia and Noler Char under Char Development and Settlement Project- Bridging.

IWM has signed a contact name : 'Survey of Climate Conditions (Contract-1), Hydrology and Hydraulics (Contract-2), and 1D Hydraulic Analysis (Contract-3) for the Preparatory Survey of Haor Area Resilience and Development Project (Phase 2)' with Nippon Koei Co., Ltd., Dhaka Office, a subsidiary of the renowned Japanese engineering corporation headquartered in Tokyo. The contract, signed in May 2025, marks the commencement of a comprehensive set of studies aimed at strengthening climate resilience in the Haor region of northeastern Bangladesh.

Field visit of IWM Professional on Assessment of Water Resources and Lowest Safe Aquifer Yield in 10 Districts of the North-Central Hydrological Region of WARPO Project. The project focuses on assessing surface and groundwater availability, use, quality and demand through detailed field investigations and mathematical modelling. It aims to generate comprehensive data, maps and information essential for implementing the Bangladesh Water Act 2013 and the Bangladesh Water Rules 2018. The initiative further contributes to creating an improved environment for sustainable water resources planning and management, enhancing water security and promoting efficient water use in alignment with the Bangladesh Delta Plan 2100.

A Validation Workshop on Water Supply Technologies in Climate-Risk Hotspots of Coastal Areas in the Barishal Region was held on 23 April 2025. The event was graced by Mr. Ehete Shamul Russel Khan, Additional Chief Engineer (Planning), DPHE, who attended as the Chief Guest. In addition, Ms. Rokeya Ahmed, TTL, World Bank, and S.M. Shahidul Islam, Superintendent Engineer, DPHE, were present as Special Guests. Many senior officials from IWM, AIIB (Asian Infrastructure Investment Bank), the World Bank, DPHE and the Pourashava Authority also attended the workshop, making the event both engaging and insightful.

A Stakeholder Consultation Workshop under the project "Coordination & Capacity Building Support to Institutions to Ensure Quality of Water in the Meghna River" was held at BEZA on 23 June 2025. Senior officials from IWM, DevCon, GIZ Bangladesh, DWASA, and BEZA participated, making the event highly engaging and insightful.

Field visit of IWM Professional on Assessment of Water Resources and Lowest Safe Aquifer Yield in 10 Districts of the North-Central Hydrological Region of WARPO Project. The project focuses on assessing surface and groundwater availability, use, quality and demand through detailed field investigations and mathematical modelling. It aims to generate comprehensive data, maps and information essential for implementing the Bangladesh Water Act 2013 and the Bangladesh Water Rules 2018. The initiative further contributes to creating an improved environment for sustainable water resources planning and management, enhancing water security and promoting efficient water use in alignment with the Bangladesh Delta Plan 2100.

National Seminar of Water Supply Master Plan for Dhaka City (Feb 2025) (1)

IWM participated in National Seminar of Restoration of Waterbodies for Sustainable Water Management (TA-6675 BAN) in Dhaka Watershed on 22 April 2025. Mr. Md. Rezaul Maksud Jahedi, Secretary, Local Government Division, MOLGRD&C grace the occasion as Chief Guest. Senior official of IWM, Pacific Consultants, ADB, DWASA were also present there.

Inception Workshop on Updating the Sewerage Master Plan for Dhaka City on February, 2025. Senior officials of IWM, DevCon, SEURECA-VEOLIA, UNICEF, DWASA were present there.

Member (Secretary), Agriculture, Water Resources and Rural Institutions Division of Planning Commission Visits IWM

Validation Worshop on Water Supply Technolgoes in Climate Risk Hot Spots of Coastal Areas in Khulna Region on April 2025

Dr. Md. Mustafizur Rahman, Member (Secretary) of the Agriculture, Water Resources and Rural Institutions Division under the Planning Commission of Bangladesh, paid an official visit to the IWM in April 2025, underscoring the institution's pivotal role in evidence-based water resource planning and sustainable development. Executive Director of IWM, Mr. S M Mahbubur Rahman, welcomes the High officials of Planning Commission with a flower bouquet. The visit served as a significant platform for engaging discussions on the importance of scientific modelling and research in shaping national strategies for agriculture and water resource management.

IWM Welcomes UDD Director to Strengthen Future Collaboration

In March 2025, S M Mahbubur Rahman, Executive Director of IWM, warmly welcomed Mr. M. Mahmud Ali, Director (Additional Secretary), Urban Development Directorate (UDD) with a flower bouquet and presented a commemorative souvenir. Mr. Ali and his team visited several IWM divisions and expressed their expectations for expanded collaboration in the future.

Chief Engineer of Roads and Highways Department (RHD) Visits IWM

Executive Director of IWM welcomes
Chief Engineer of Roads and Highways Department
with a flower bouquet

Mr. Syed Moinul Hasan, Chief Engineer of the Roads and Highways Department (RHD), paid an official visit to the IWM, underscoring the Institute's indispensable role in promoting evidence-based planning for resilient and sustainable infrastructure development in Bangladesh.

Mr. S M Mahbubur Rahman, Executive Director of IWM, along with members of the senior management of IWM, graciously received the delegation from RHD, comprising Mr. Shoaib Ahmed, Additional Chief Engineer and Md. Shahadat Hossein, Superintending Engineer at IWM Bhaban.

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