Year 23: Issue 82
October-December 2024

the CEGIS NEWSLETTER

Safeguarding Environment for Future

Upcoming

- Design, Monitoring, and Supervision Consulting Services for the DPHE Component, Cox's Bazar under Emergency Assistance Project (EAP)
- Pioneering Efforts in River Identification and Conservation Initiatives

Inside

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Bangladesh's Bold Blueprint: Unveiling the Future of Loss and Damage at COP29

Syeda Rizwana Hasan, Honorable Adviser, Ministry of Environment, Forests, and Climate Change, delivered speech as chief guest at the event (Right) and Mr. Malik Fida A Khan, Executive Director of CEGIS, delivered the keynote presentation (Left)

COP29, held in Baku, Azerbaijan, from November 11 to 22, 2024, marked a pivotal moment in global climate governance by emphasizing frontline nations in climate finance discussions. Under the theme "Investing in a Livable Planet for All," leaders, scientists, and activists focused on tripling climate finance for developing nations by 2035, phasing out fossil fuels, and operationalizing the Loss and Damage Fund to support countries facing climate-induced disasters.

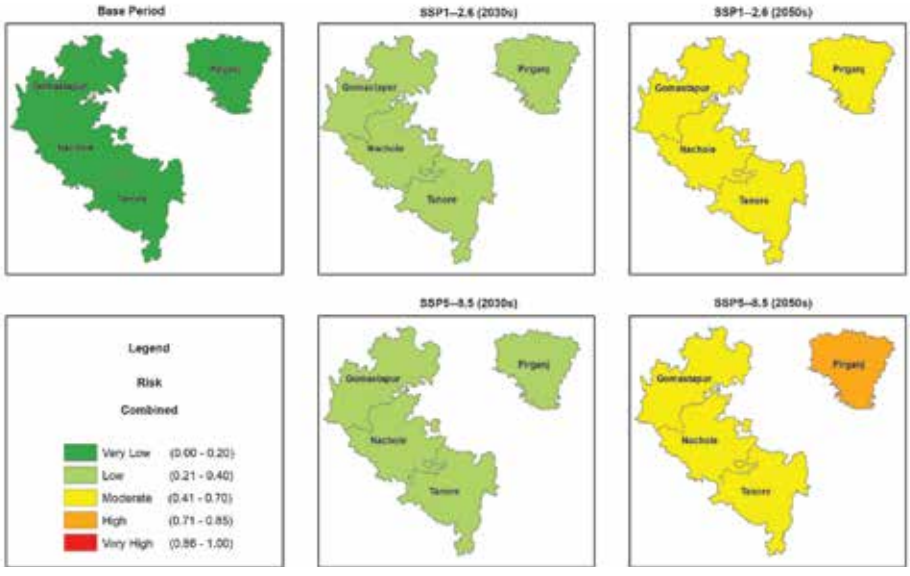
Throughout the conference, the tension between ambition and pragmatism was evident. Key achievements included finalizing the rules under Article 6 of the Paris Agreement and pledging to increase climate finance to USD 300 billion annually by 2035. However, the gap between promised funds and actual needs—over USD 1.3 trillion a year—poses a significant challenge, particularly for vulnerable nations like Bangladesh.

For Bangladesh, COP29 was a platform of hope and a mirror reflecting the country's vulnerabilities. Leaders welcomed the operationalization of the Loss and Damage Fund, crucial for addressing damage from rising sea levels and intensifying floods that regularly disrupt livelihoods at home. However, it was on November 18, 2024, that Bangladesh indeed took centre stage when the Department of Environment (DoE), in collaboration with the Center for Environmental and Geographic Information Services (CEGIS), officially unveiled its "National Framework for Loss and Damage Assessment and Accessing International Climate Finance." During a special session at the Bangladesh Pavilion, the Executive Director of CEGIS, Mr. Malik Fida A Khan, presented the framework's guiding principles and innovative methodologies. His keynote speech highlighted how the framework systematically separates "loss" (irreversible harm) from "damage"

Cont'd on page 3

Assessment of Climate Risk Vulnerability in the Barind Tract and Haor Wetland Area for Implementing Ecosystem-Based Adaptation (EbA)

CEGIS has conducted a significant study entitled "Vulnerability Impact Assessment in the Barind Tract and Haor Wetland Area." This assessment offers critical insights into the climate vulnerability and adaptation strategies pertinent to these essential regions of Bangladesh. Coordinated by the Department of Environment (DoE) and guided by support from UNEP, this study aims to enhance resilience in two of the country's most vulnerable areas considering escalating environmental challenges.



Combined Climate Risk Map of Barind Area

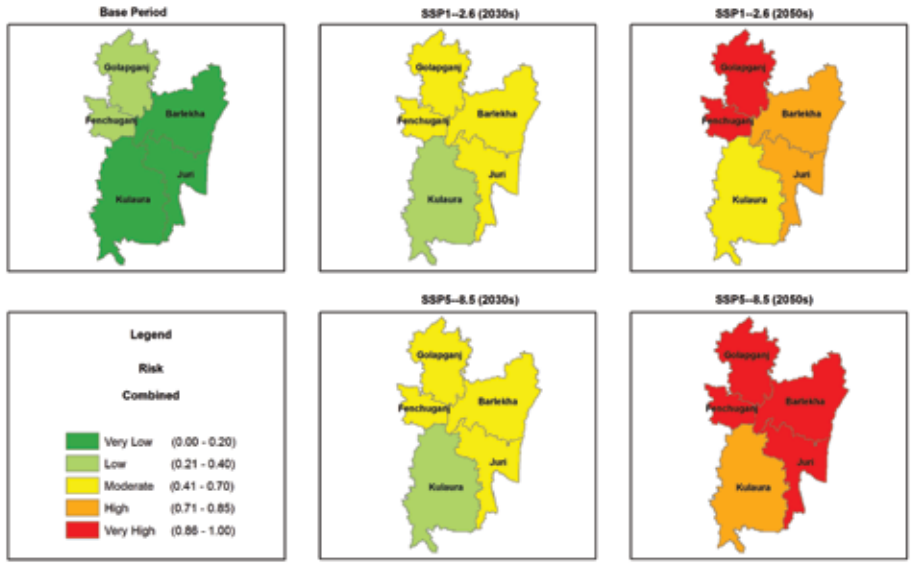
The study covers multiple upazilas, including Gomostapur and Nachol in the Chapai Nawabganj District, Tanore in the Rajshahi District, and Pirganj in the Rangpur District within the Barind Tract, as well as Barlekha, Juri, and Kulaura in Moulvibazar District and Fenchuganj and Golapganj in Sylhet District, all situated in the Haor wetlands of Bangladesh. These regions have been identified as climate stress hotspots in the Bangladesh Delta Plan 2100 and the Bangladesh National Adaptation Plan (2023-2050), facing distinctive challenges. The Barind Tract is prone to frequent droughts, whereas the Haor region experiences devastating flash floods.

A comprehensive nine-step approach was employed to conduct this study, which included extensive data collection through household surveys, focus group discussions, and key informant interviews utilizing KoboToolbox.

Climate projections reveal a concerning outlook for both regions based on two scenarios (SSP1-2.6 and SSP5-8.5) and two distinct time frames (the 2030s and 2050s). The projections encompass changes in maximum and minimum temperatures and alterations in rainfall patterns during pre-monsoon and monsoon seasons.

For the Barind Tract, significant increases in maximum and minimum temperatures are anticipated by the 2050s, along with predicted changes in rainfall patterns that may lead to pre-monsoon and monsoon rainfall variations. Similarly, the Haor region faces rising maximum and minimum temperatures, with rainfall projections indicating greater variability and different trends for pre-monsoon rainfall under the SSP1-2.6 and SSP5-8.5 scenarios, while monsoon rainfall is expected.

This study's Climate Risk and Vulnerability Assessment (CRVA) mapping reveals alarming projections for the regions under consideration. By 2050, in the high-emission scenario (SSP5-8.5), Pirganj Upazila is expected to encounter high climate-related risks, whereas other upazilas are projected to experience moderate risks. The situation is particularly dire in the Haor region; even under a low-emission future (SSP1-2.6), Golapganj and Fenchuganj Upazilas are projected to face very high climate risks by 2050. Under the high-emission scenario (SSP5-8.5), all upazilas in the Haor study area, except Kulaura, are expected to face severe risks. Factors



Combined Climate Risk Map of Haor Area

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Contract Signing for Different Studies

During the 4th quarter of the year 2024 (October to December), CEGIS has signed 11 (Eleven) contracts with different organizations and clients. The contract titles with clients and dates of signing are given below:

1) Environmental and Social Impact Assessment and Resettlement Action Plan for Madunaghat-Bhulta 765kV Transmission Line Project with GOPA-International Energy Consultants GmbH on 02 October 2024; 2) Maintenance dredging through optimization all over Bangladesh for the year 2024-25 with Bangladesh Inland Water Transport Authority (BIWTA) on 07 October 2024; 3) Socio-ecological assessment of the state and trends within the watersheds for the formulation of a community-based watershed management plan for Cox's Bazar with Food and Agriculture Organization (FAO) on 09 October 2024; 4) Design, Monitoring, and Supervision Consulting services for the DPHE Component, Cox's Bazar under Emergency Assistance Project (EAP) with Department of Public Health Engineering (DPHE) on 15 October 2024; 5) Formulation of a Loss and Damage Framework, Conducting Preparatory Works for Accessing L&D Finance, and Assessing Climate Change Driven Internal Displacement in Coastal Areas in Bangladesh with Department of Environment (DOE) on 23 October 2024; 6) Feasibility Study for River Management and 'Capital and Maintenance' Dredging for Navigation, Tourism, Wetland Ecosystem, Irrigation, Landing Facilities, Drainage Congestion Improvement and Erosion Vulnerable Area Assessment in the Brahmanbaria, Chadpur and Cumilla districts of Bangladesh with Bangladesh Inland Water Transport Authority (BIWTA) on 06 November 2024; 7) Demonstration Report on Surface and Groundwater Resources for Waste to Energy Power Plant Project in North Dhaka, Bangladesh with CMEC Bangladesh on 18 November 2024; 8) Action Research Program on Polders of the Future: Sustainable In-polder Water Management and Resilient Livelihood in Polder 31 with Netherlands Enterprise Agency (RVO) on 06 December 2024; 9) Scoping Study on Integrated Water Resources Management and Related Policy Analysis as well as Opportunities of Climate-Resilient Public Service Provision in Naogaon and Satkhira Districts, Bangladesh with WaterAid Bangladesh 08 December 2024; 10) The 2nd Round Survey for the Impact Evaluation of the Dhaka MRT Line 6 for the Empirical Research on the Social and Economic Impacts of Infrastructure Projects (The 2nd Round) with ALMEC Corporation on 08 December 2024; 11) "Baseline Study" of Resilient Homestead and Livelihood Support to the Vulnerable Coastal People of Bangladesh (RHL) Project with Palli Karma-Sahayak Foundation (PKSF) on 22 December 2024.

Dr. Md. Jashim Uddin, Additional Managing Director of Palli Karma-Sahayak Foundation and Mr. Motaleb Hossain Sarker, Deputy Executive Director (Operations) of CEGIS with other professionals from both organisations were present in the contract signing ceremony on the Baseline Study of RHL Project

Bangladesh's Bold Blueprint ... (Cont'd from page 1)

(reparable impacts) and leverages both immediate assessments—within days of a disaster—and long-term assessments that evaluate broader socio-economic consequences over months or even years.

The unveiling event drew notable dignitaries, including Syeda Rizwana Hasan, Adviser to the Ministry of Environment, Forests, and Climate Change, who underscored the urgency of global collaboration. She championed the call for accessible, equity-focused climate finance, underscoring that frontline nations cannot cope with the escalating climate crisis on their own. Dr. Farhina Ahmed, Secretary of the Ministry of Environment, Forest, and Climate Change, and senior officials from the Department of Environment echoed her sentiments. They conveyed a clear message: real solutions depend on substantive collaboration, transparent financing, and innovative approaches prioritizing human well-being and economic development.

Bangladesh's homegrown Loss and Damage (L&D) Framework is significant for its holistic approach to economic and non-economic losses. Unlike many international efforts focusing mainly on infrastructure and agricultural damage, this framework includes Non-Economic Loss and Damage (NELD) related to cultural heritage, psychological well-being, and community cohesion. It promotes stakeholder engagement by incorporating input from local communities, NGOs, and the private sector to inform decision-making. The L&D Framework also prioritizes climate-induced events, ensuring accurate documentation and response to recurring disasters like cyclones, river erosion, and salinity intrusion.

As COP29 concluded, Bangladesh demonstrated resilience by promoting a tailored Loss and Damage Framework highlighting its vulnerabilities. This approach garnered targeted support and inspired other climate-vulnerable nations to adopt similar strategies. Despite ongoing funding and emission reduction challenges, Bangladesh's proactive stance reveals an important lesson: when frontline countries lead with innovation and inclusivity, they enhance their resilience and guide the global community towards a more sustainable future.

Gazi Md. Riasat Amin
Water Resources Management Division

Renovation of Chandpur Irrigation Project

The Chandpur Irrigation Project (CIP) is a successful flood control, drainage, and irrigation project. Its 5.0 km south of Chandpur town and covers 6 Upazilas in the Chandpur and Laxmipur districts. The CIP controls floods, provides irrigation during the dry, and offers drainage during the monsoon. The project infrastructure includes a pumping station, a navigation lock, 12 drainage regulators, a 100 km flood control embankment, a 58 km main canal, and 476 km of secondary canals.

Charbagadi Pump House under Chandpur Irrigation Project

The project is facing significant challenges with its 45-year-old pumps, substations, and electrical supply lines. The old pumps have reached the end of their lifespan, and their sudden failure will cause irrigation problems and water scarcity and negatively impact the area's agriculture, fisheries, environment, and overall socio-economic condition.

BWDB has launched a project to restore the CIP. CEGIS was tasked to conduct a feasibility study in three segments: Water Management and Civil Works, Pumps and Electro-mechanical Works, and Environmental and Social Impact Assessment. BUET assessed the physical condition of the pumps and pump house.

The study assessed various infrastructure development interventions, including pump replacements, overhauling, installation of a Motor Control Center and SCADA, rehabilitation and renewal of electrical system, building a sub-station, re-excavation of irrigation canal, dredging of intake and outfall canals, and construction of regulators and a retired embankment.

Rehabilitation of the Chandpur Irrigation Project is expected to increase crop production by 60,655 metric tons, and fish production by 228 metric tons, contributing a total of BDT 1,865.6 million to the national GDP.

Potato harvesting at Panpara Area (top), Soybean Field in the Study Area at Daspara (bottom)

Md. Ashraful Alam
Agricultural and Fisheries Division

Assessment of Climate Risk Vulnerability ... (Cont'd from page 2)

influencing agricultural vulnerability include landholding, household assets, education, the adoption of stress-tolerant crops, and access to credit. Ecosystems are threatened by habitat loss, wetland degradation, pollution, and unplanned infrastructure development. Vulnerable groups within the Haor region comprise fishermen, marginal farmers, landless individuals, and women. Agriculture, predominantly characterized by Boro Rice cultivation, remains susceptible to floods, droughts, and unpredictable rainfall events. Flash floods, extreme temperatures, and storms endangered fisheries, while ecosystems are further exposed to flooding, erosion, deforestation, and agricultural expansion risks.

The study recommends a comprehensive set of Ecosystem-based Adaptation (EbA) strategies to address these challenges. For the Barind region, 39 Nature-based Solutions (NbS) have been identified, while 38 NbS have been proposed for the Haor region. These solutions span four critical sectors: Ecosystem and Biodiversity (16 solutions), Agriculture (28 solutions), Fisheries and Aquaculture (19 solutions), and Socio-economic (14 solutions). The strategies were formulated through a systematic process that included gathering local adaptation practices and reviewing national adaptation approaches as outlined in the National Adaptation Plan.

Specific recommendations for the Barind Tract include rehabilitating wetland areas, promoting cultivating drought-tolerant crops, implementing micro-irrigation systems, and developing alternative livelihoods. For the Haor region, strategies focus on planting native trees, restoring wetlands, conserving core Haor areas, implementing surface water irrigation systems, protecting settlements using indigenous techniques, forming resource user groups, and providing training to optimize resource use.

Laila Sanjida and Md. Hasan Sabit
Ecology, Forestry and Biodiversity Division

Monitoring and Evaluation Tool of Bangladesh Delta Plan- 2100

CEGIS is actively involved in developing the framework of Monitoring and Evaluation (M&E) tool and updating the knowledge portal for the implementation of the Bangladesh Delta Plan (BDP). In December 2024, a workshop was held to gather insights and suggestions from experts and relevant agencies to support this development.

The "Bangladesh Delta Plan-2100 Monitoring and Evaluation Tool Development" workshop took place on December 8, 2024, at the NEC Conference Room. The purpose of the event was to collect inshights and suggestions from representatives of different ministries and agencies, as well as experts, to establish the M&E framework and tools necessary for the successful implementation of the plan.

Stakeholder Consultation Workshop on BDP2100 Monitoring and Evaluation Tool Development

Ms. Aleya Akter, then Chief (Additional Secretary), General Economics Division (GED), welcomed the participants and gave the opening speech before the technical session began. Dr. Farhana Ahmed, Spatial Planning and ADM Expert at CEGIS, outlined the study's background, objectives, and the intended purpose of the M&E tool. Mr. Md. Monowar-ul Haq, Associate Specialist of Water Resources Management Division; Mr. Abul Kashem Md. Hasan, Director and Mr. Md. Anisur Rahman, Associate Specialist of Database, ICT and Systems Management Division as part of the expert team elaborated the detail concept of the M&E tool of BDP-2100.

Following that, an open discussion was held where the participants shared their insights and opinions. Some valuable suggestions such as the necessity of making the outputs and results of the project more understandable, standardizing the monitoring and evaluation indicators in accordance with the activities of the agencies – were provided by the workshop participants.

With the suggestions and recommendations, the technical team of CEGIS are working on developing the indicators and framework of the tool. The Monitoring and Evaluation Workshop highlighted the importance of collaboration between the agencies, detail planning including action plans, and effective mechanisms for developing the tool for the implementation of the plan.

Dr. Farhana Ahmed
Research, Development and Training Division

Total Suspended Solids Analysis ... (Cont'd from page 6)

- Industrial wastewater is a significant contributor to TSS pollution in surface water bodies. As industries discharge large volumes of effluent containing complex pollutants, the resulting TSS affects water quality and poses challenges for wastewater treatment facilities. Thus, TSS analysis is indispensable for monitoring wastewater quality and is a valuable metric for determining the extent of pollution impacting natural waters.

Solid Forms

In natural waters, the composition can be categorized into total solids, dissolved solids and suspended solids.

- "Total solids" refers to the residual matter left after the complete evaporation of water, while
- "Total dissolved solids" include all the substances that remain in solution after filtration.
- "Total suspended solids" are particles that can be captured on a filtration medium, separated from the liquid phase.

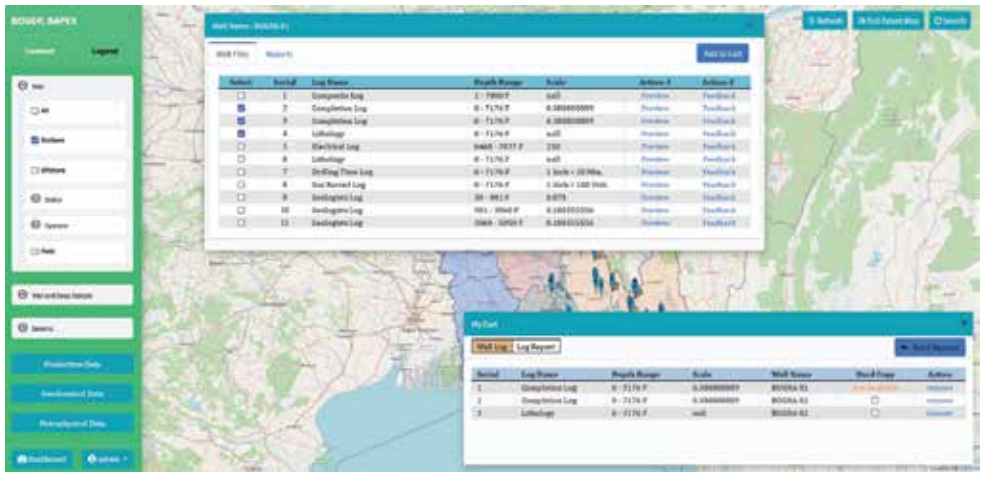
TSS analysis method

The laboratory analysis of TSS typically employs gravimetric methods, recognized as the most reliable and widely adopted approach for measuring suspended solids in water samples. This quantitative technique passes water samples through glass-fibre or cellulose ester membrane filters, effectively capturing the solid particles. After filtration, the residues collected on the filter are dried at a specified temperature until all moisture is removed. The dry residual mass is then weighed to determine the TSS concentration, facilitating objective assessments of water transparency and overall quality.

Understanding and monitoring Total Suspended Solids is crucial for environmental scientists, regulatory bodies, and policymakers dedicated to conserving and improving water quality and the integrity of aquatic ecosystems. Through systematic evaluation of TSS levels, it is possible to implement measures that protect human health and the environment.

Data Inventory Management System for BAPEX

Bangladesh Petroleum Exploration and Production Company Limited (BAPEX) is a state-owned company plays a pivotal role in exploring, developing, and producing oil and gas resources all over Bangladesh to meet the country's energy needs and enhance energy security. Because of the exploration work, the organization has generated a substantial amount of data and information, and this volume is increasing day by day. In May 2024, BAPEX appointed CEGIS to develop a GIS-based Data Inventory Management System (DIMS) with a view to managing such a large volume of data combining the spatial and attribute dataset on geological surveys, seismic surveys, wells, zones, wireline logs, reports, maps, lab analyses, production, workover, etc. The DIMS platform has an interactive map viewer that lets BAPEX officials and outside users submit requests for various categories of data using an interactive cart management system. The system has features that allow users to request both hard copies and soft copies of data. A higher authority can approve a request in a hierarchical manner using the online system. The system includes a feature that allows BAPEX Admin users to manage the inventory of hard copy data by barcoding each item. A quality checking (QC) and feedback feature has been integrated to the system, enabling users to share their opinions about the current condition, complications, any anomalies, or quality of the data. The admin users can view log reports, add or modify current data, manage users with access control, and additionally, import new data using the bulk-uploading feature of the DIMS system.



Data Inventory Management System for BAPEX for BAPEX

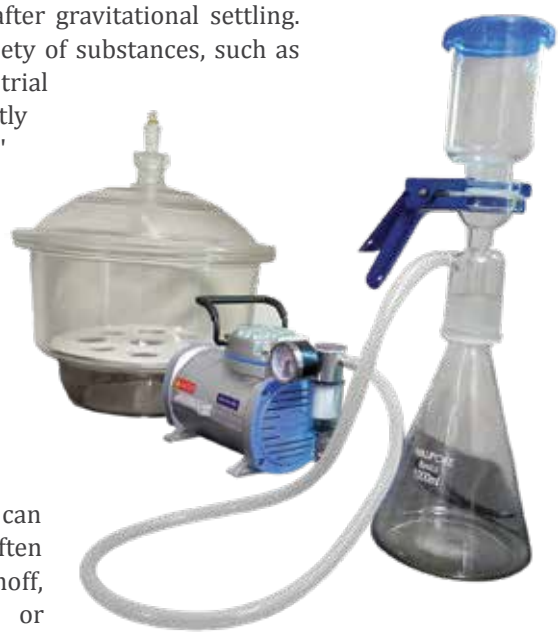
Md Anisur Rahman
Database, ICT and System Management Division

Total Suspended Solids Analysis in CEGIS Environmental Lab

TSS is a critical parameter used in environmental monitoring and water quality assessment, reflecting the concentration of organic and inorganic particles that remain suspended in water after gravitational settling. These particles include a variety of substances, such as silt, sand, algae, and industrial waste, which can significantly influence aquatic systems' physical, chemical, and biological properties.

Monitoring TSS levels is vital for several reasons. The mains are as follows:

- Evaluating the overall quality of water in both natural and artificial environments is essential.
- High TSS concentrations can indicate pollution, often originating from urban runoff, industrial discharges, or agricultural practices, impacting the health of water bodies and the organisms that inhabit them.
- TSS serves as a key indicator of water quality in drinking water treatment, where increased levels can complicate purification processes and pose risks to human health.



TSS Instrument (Vacuum Pump and Filtration Unit)

TSS Implications

- The implications of elevated TSS levels are profound. Increased suspended solids lead to heightened water turbidity, obstructing sunlight penetration into water and reducing photosynthesis in aquatic plants. This decrease in photosynthetic activity can result in diminished oxygen production, contributing to hypoxic conditions detrimental to fish and other aquatic organisms. Consequently, this can increase mortality rates among these populations and disrupt the balance of aquatic ecosystems.

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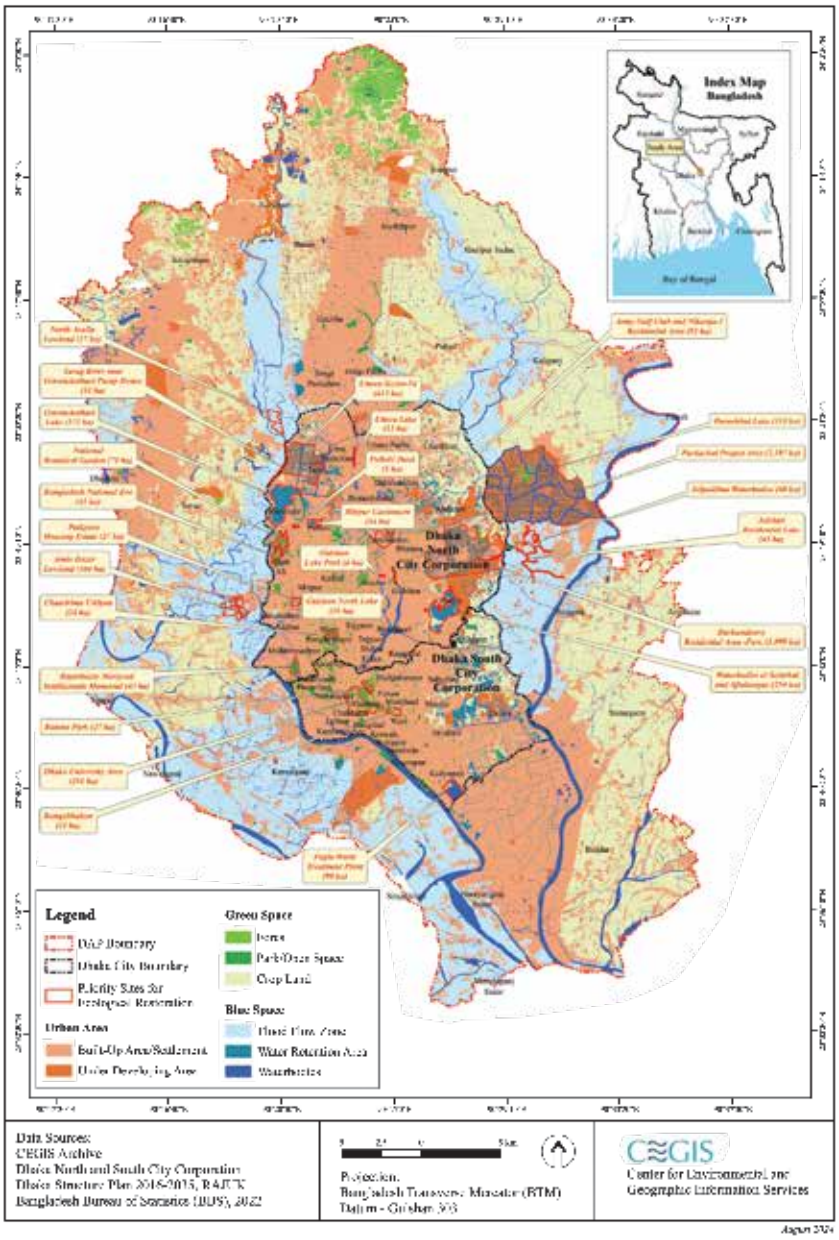
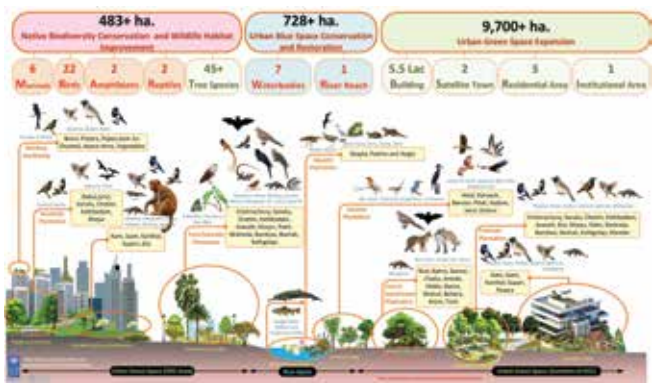
Spatial and Temporal Changes in Dhaka City's Urban Ecosystem, Landscape and Biodiversity Over the Past 100 Years

Dhaka, the capital of Bangladesh, has witnessed continuous population growth, rapid urbanization, economic development, and significant environmental, spatial, and temporal changes over the past century. Especially since independence in 1971, the growth of urban infrastructure within Dhaka City has resulted in a gradual decline in green cover and wetlands, and an increase in surface temperatures, evaporation, and air pollution. As a result, the city is gradually becoming uninhabitable for local residents.

Identifying the spatial and temporal changes in Dhaka's urban environment, landscape and biodiversity and balancing all the regulators are crucial to maintain ecosystem balance and build an eco-friendly city. To assess the changes, expansions, and additions or reductions that have taken place in the urban environment, landscape, and biodiversity of Dhaka City over the past century, the UNDP, Bangladesh has initiated efforts to develop a comprehensive Action Plan aimed at enhancing the city's environment and biodiversity. Accordingly, CEGIS has been assigned to carry out the research on behalf of UNDP. The main objectives of this research are to: provide an overview of changes in Dhaka's urban environment, biodiversity, and landscape over the past 100 years; map the past and present state of urban ecosystem and biodiversity loss; identify opportunities, challenges, and potential for restoration; and, ultimately, prepare a Strategic Action Plan for urban ecosystem and biodiversity restoration aligned with existing sectoral and urban plans. The plan proposes 19 projects under three programs, prioritizing 23 sites to enhance Dhaka's greenery, protect and restore wetlands and conserve biodiversity. The estimated cost is about 314.5 million USD. Successful implementation will create a livable, eco-friendly Dhaka for its residents.



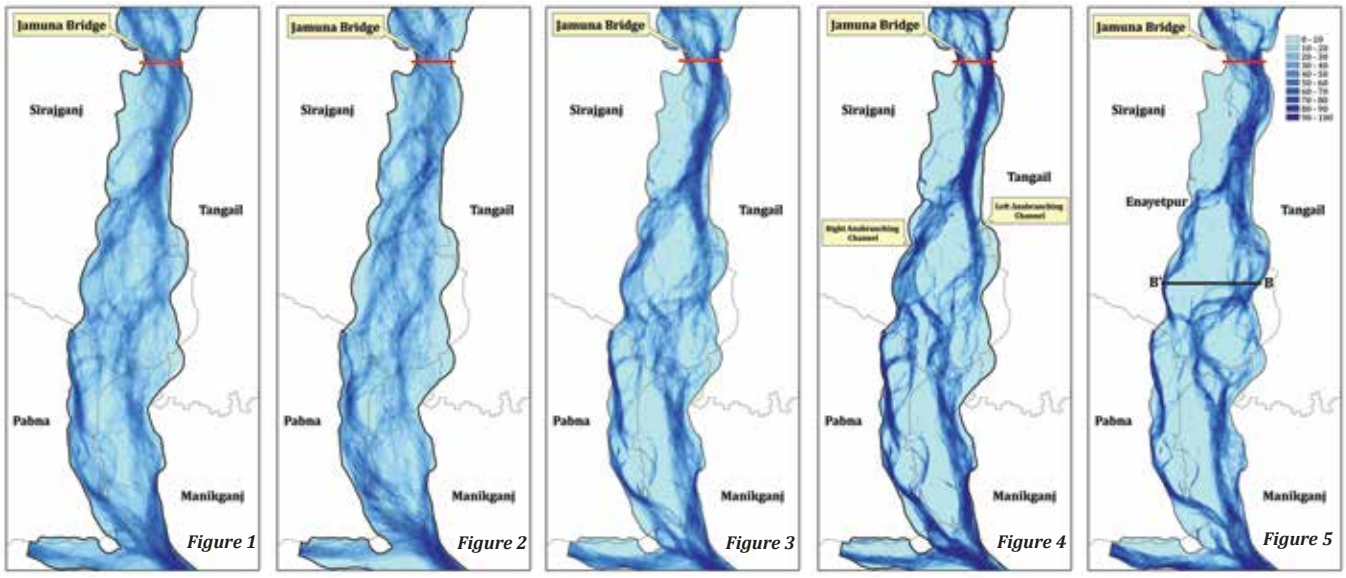


Proposed Strategic Action Plan framework and its various aspects

Md. Amanat Ullah
Ecology, Forestry and Biodiversity Division

Jamuna River: Channel Incidence Mapping

A comprehensive channel incidence map of the Jamuna River has been created to analyze changes in channel morphology downstream of the Jamuna Bridge. Dry season satellite imagery from 1973 to 2023 was systematically classified into land, sand, and water categories using advanced remote sensing techniques. The water segments of these images were then reclassified. Over the past five decades, water data has been analyzed using ArcGIS software. To enhance clarity, the frequency of channel incidence was categorized into ten distinct classes, each represented by a ten-unit interval. The assessment of a well-defined channel course over the past 50 years has been challenging, highlighting the dynamic and adaptive nature of the Jamuna River (Figure 1).

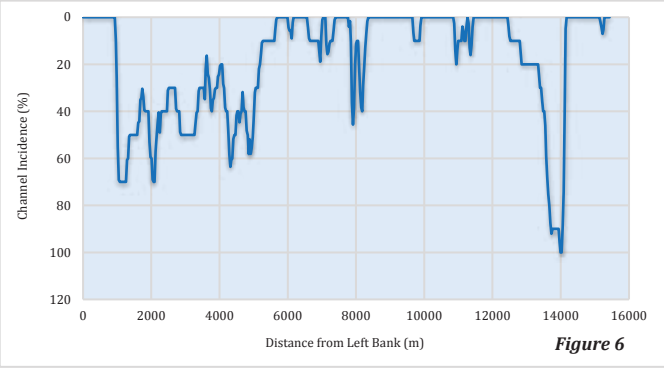


Jamuna River Channel Incidence Frequency (%) from 1973 to 2023

The channel incidence map for the entire study period has been organized into two segments: from 1973 to 2002 (Figure 2) and from 2003 to 2023 (Figure 3). During the initial period, the Lower Jamuna River, stretching from the Jamuna Bridge to its confluence with the Ganges River, displayed significant complexity, which complicated the identification of a clear channel path. In contrast, an analysis of the period from 2003 to 2023 revealed the presence of two distinct anabranching channels.

To further examine the characteristics of these anabranching channels, a decadal channel incidence map was created for the periods of 2003 to 2013 (Figure 4) and 2013 to 2023 (Figure 5). The assessment of these two time frames demonstrated differing behaviors of the channels: the right anabranching channel was notably more active from 2003 to 2013, whereas the left channel exhibited greater activity compared to the right channel during the 2013 to 2023 period. This observation suggests that the anabranching channels display distinct behavioral patterns over time.

The channel incidence map helps identify the optimal navigation route for improving dredging activities. For instance, when traveling from Manikganj to Enayetpur, using the navigation route through the right anabranching channel is preferable, as this route is more stable than the left anabranching channel, as shown in the graph of Section B-B' (Figure 6). Thus, a channel incidence map can significantly contribute to maintaining the navigation route for the long-term sustainability of the channel.



Channel Incidence Frequency (in percentage) at B-B' Section

Sudipta Kumar Hore
River, Delta and Coastal Morphology Division