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Abbott's babbler

Upcoming

- Development of SPI and Drought Indices Map from BMD Model for Micro Level Agriculture Water Management
- EIA for Economic Zone-4 at Sonadia-Ghotibhanga Islands, Moheskhali, Cox's Bazar
- Feasibility Study for Development of Grid Network in Southern Area

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the CEGIS NEWSLETTER
Quarterly Newsletter of the Center for Environmental and Geographic Information Services (CEGIS)

Joint Cooperation Programme between Bangladesh and the Netherlands

(from left) Engr. Md. Waji Ullah, Executive Director, CEGIS; Mr. Bram de Vos, Managing Director, WUR; H.E. Mr. Harry Verweij, Ambassador, EKN; Mr. Md. Rokon Ud-Doula, Additional Secretary, MoWR; Mr. Peter de Vries, Water Management Expert, EKN; Mr. Maarten Smits, Managing Director, Deltares; and Prof. Dr. M. Monowar Hossain, Executive Director, IWM are seen in the occasion

Joint Cooperation Programme (JCP) - a new initiative for long term knowledge sharing and capacity building between Bangladesh and the Netherlands has been initiated through a formal signing ceremony held at the Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) Auditorium on Tuesday, 18 June 2019. JCP is a four-year research program, funded by the Embassy of the Kingdom of the Netherlands in Bangladesh (EKN) and to be implemented by the Center for Environmental and Geographic Information Services (CEGIS), the Institute of Water Modelling (IWM), Wageningen University and Research (WUR) and Deltares.

The JCP has two pillars which are Pillar 1: Knowledge Cooperation and Pillar 2: Meta-modeling for Delta Planning. The work packages under Pillar 1 are WP-1: Management, WP-2: Communication and Outreach, WP3: Knowledge cooperation and development and WP4: Training and transfer of tools. The work packages under Pillar 2 are WP1: Model development, testing and validation and WP2: Training and model application. JCP includes 5 knowledge projects related to the WP3 of Pillar 1 such as App Based Information services to support BDP 2100 Implementation; Dredging and sediment management for restoring dry season flow of Old Brahmaputra river; Innovative Plan and Design of Regulators for Polders; Urban water quality management; and Water-food Nexus: Make it real.

Engr. Md. Waji Ullah (Executive Director, CEGIS); Mr. Bram de Vos (Managing Director, WUR); H.E. Mr. Harry Verweij (Ambassador, EKN); Mr. Md. Rokon Ud-Doula (Additional Secretary; Ministry of Water Resources, GoB); Mr. Peter de Vries (Thematic Expert Water Management, EKN); Mr. Maarten Smits (Managing Director, Deltares); Prof. Dr. M. Monowar Hossain (Executive Director, IWM) were present during the signing ceremony.

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Natural Resource Survey for Ecosystem based Development, Management and Conservation of the Saint Martin's Island

Md. Sharif Hossain Sourav, Ecology, Forestry and Biodiversity Division

Saint Martin's is a small Island (5.9 sq km) situated in the Northeastern part of the Bay of Bengal and is the only place in Bangladesh where coal colonies are found. This picturesque island is a natural treasure that has an important ecological value as one of the few remaining nesting places in the region for several species of globally threatened marine turtles, as well as being a flyway and wintering site for migratory birds of the East Asian Australasian Region. The coral bed areas of the island contain many unique invertebrate and algal communities which are found nowhere else in Bangladesh and supports distinctive biodiversity of the whole area. At least 68 scleraclinian coral species were recorded from the island belonging to 22 genera. The sub-tidal rocky habitat also supports a low diversity coral reef-associated fauna and flora. A total of 234 species of fishes, 152 species of algae, 191 species of mollusk, 175 species of plants, 120 species of birds, 40 species of crabs, 28 species of reptiles, 20 species of mammals, 4 species of frogs etc. have been recorded from the Saint Martin's Island (Thompson et al 2010).

The Island is scenic and offers a range of tourist attractions and has been a destination of a huge number of tourists. But unfortunately, unregulated tourism has become detrimental for the health of this unique ecosystem and posing great threat to local biodiversity and its sustenance. Unless tourists visiting St. Martin's Island quickly adopt ecologically responsible behavior, the unique flora and fauna of the Island that has experienced tragic changes over the last two decades will continue to be degraded.

Corals are illegally extracted from the island and are facing a risk of extinction for different anthropogenic activities along with other natural phenomena more precisely the negative impact of climate change. Although, corals have been degrading worldwide and efforts for its conservation are also taking place in different parts of the world. In line with the effort of the international community, Bangladesh Government is also strongly committed to conserve the only coral resources of the country. Accordingly, Department of Environment (DoE) is mandated for conserving corals and its associated resources as reflected in its ECA, 1995 (including all amendments) and specifically declaration of Saint Martin's Island as Ecologically Critical Area (ECA) 1999, which obligates to conserve corals of the country. Some efforts have already been taken in the past to conserve the biodiversity of the island, with prime focus on corals.

At present, considering the long-term vision of the Saint Martin's Island (SMI here after) biodiversity conservation, corals in particular, DoE has initiated a further effort to conserve the island's biodiversity through initiating a project on "Ecosystem based development, management and conservation of the Saint Martin's Island" with a holistic approach which will integrate a wide range of issues varying from ecologic to socio-economic.

The present project component "Natural Resource Survey and other related activities" is an effort to collect in-depth required information in order to be able to plan conservation actions vis-a-vis developing a Conservation Management Plan (CMP) for the island to be implemented subsequently for ensuring sustainable conservation of the island's resources.

St. Martin's Island, Cox's Bazar - a unique biodiversity

Initial Environmental Examination of Gas based Combined Cycle Power Plant Project

Eva Chowdhury and Pronab Kumar Halder, Power, Energy and Mineral Resources Division

According to International Monitory Fund (IMF) and World Bank, Bangladesh is among the three fastest growing economies which has achieved the status of lower middle income country from least developed country in the world. Therefore, the Government of Bangladesh now aims to achieve the status of a 'middle-income country' by 2021 and that of a 'high-income country' by 2041, given the fact that electricity plays a vital role in social and economic development.

All the projects related to power generation which have been completed as well as the proposed ones, most of them fall under the 'Red' category under the Environment Conservation Rules (ECR) 1997, and needs both Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) studies for site clearance certificate and Environment clearance approval/certificate from the Department of Environment (DoE) respectively. CEGIS is the center of excellence under the Ministry of Water Resources has been providing all the aforementioned services required by the DoE of Bangladesh. It has recently completed IEE study of three Gas based Combined Cycle Power Plant Projects for different power generation entities like Electricity Generation Company of Bangladesh (EGCB), Rural Power Company Limited (RPCL) and Bangladesh Power Development Board (BPDB) sponsored by Marubeni Power System Ltd. of Japan. One of them is 600MW (±10%) Gas based Combined Cycle Power Plant owned by BPDB and situated at Siddhirganj existing Power Plant complex. RPCL is also going to construct Gas based Combined Cycle Power Plant with a rated capacity of 2x(600MW±10%) situated on the left bank of Meghna River at Gajaria. Moreover, EGCB has also planned to construct a 2x(600 MW ±10%) Gas Based Combined Cycle Power Plant at Sonagazi of Feni District. In all the

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Contract Signing for Different Studies

Alliances form Wageningen Environmental Research, IWM, CEGIS, and Deltares are seen in the contract signing event of the Inception of JCP Bangladesh - the Netherlands

During second quarter of the year 2019 (April-June), CEGIS has signed 11 (eleven) contracts with different organizations and clients. These contracts are signed mainly for establishing communication and network connection, settlement mapping, environment compliance monitoring, feasibility study, route survey, topographic survey, IEE and RAP, morphological study, developing climate resilient documentation etc. The titles of the studies with date of signing are: i) "Establishing communication and Network connection between the servers of the National Water Resources Database (NWRD) of Water Resources Planning Organization (WARPO) and Department of Bangladesh Haor and Wetlands Development (DBHWD)" with Department of Bangladesh

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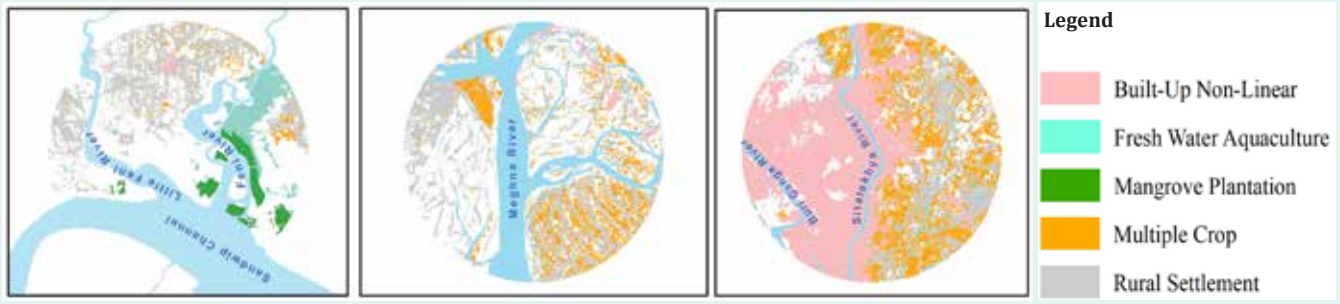
Initial Environmental Examination... (Cont'd from page 2)

Sonagazi, Feni **Siddhirganj, Narayanganj** **Gajaria, Munshiganj**



Landuse of Proposed 3 Power Plant Sites

projects, CEGIS has been chosen to conduct the IEE for obtaining site clearance certificate and approved Terms of Reference (ToR) of EIA study from DoE as per the Environmental Conservation Act. 1995 and subsequent amendments. Around 3000 MW electricity will be added to the national power grid to be produced from these three power plant projects cumulatively. This will help immensely in industrialization and thereby improve the socio economic condition and accelerate the economic growth of the country. It can also be mentioned that these projects are expected to greatly supersede the power production efficiency and significantly reduce the environmental pollution and hence reduce ecological health risks if the management prescription recommended in the IEE by CEGIS is being followed and monitored on regular basis.

Drainage Modeling and Design... (Cont'd from page 7)

be constantly monitored and regulated through a separate control tower. Design of this structure is completed and implementation will be started soon. Once implemented, this structure alone will significantly reduce the tidal flooding of Halishahar and Agrabad Regions.

Second phase of the model is simulated using exactly the same inputs with the exception that the design cross-sections are used instead of surveyed sections. This provides the required cross-checking for the designed khal sections as well as the required High Flood Level used to design the bridges/culverts, khal-side road etc. Model outputs are also being used in designing road-side drainage for waterlogged portions of the city that would greatly reduce storm water recession times and thus decrease flood durations. The system, when will be fully in operation will ensure storm water runoff into secondary/primary khals through ample side drains and smooth conveyance into the Karnaphuli in conjunction with timely operation of regulator gates to control tidal influx and will thus provide the city from water logging for a durable and long-term period, keeping in mind the future expansion of the business capital of Bangladesh.

Strive for Excellence

Md. Shibly Sadik, the professional under Water Resources Management Division of CEGIS has successfully completed his PhD on 25 March 2019 from the renowned Kyoto University of Japan and resumed his service in CEGIS. He was a recipient of Japan Government Scholarship (MEXT Scholarship). He enrolled in the Department of Civil and Earth Resources Engineering of Kyoto University under supervision of Professor Hajime Nakagawa. Dr. Sadik's research mainly focused on disaster management and disaster risk reduction science. The title of his dissertation was "Characterization, Diagnostic Analysis and Assessment of Progress of Community Recovery after Cyclone Aila in Bangladesh." During his PhD tenure, he published several scientific papers in renowned international journals, contributed in two books and presented his findings in several international and national conferences.

International Training on Bangladesh Meta-model Development

Md. Mostafizur Rahman, Quality Management and Publication Division

The Bangladesh Meta-model is a decision support model to support the formulation, analysis and evaluation of alternative projects and programs for implementation of Bangladesh Delta Plan 2100. It is a fast, integrated and collaborative modeling to support development of operational investment strategies for the regional and thematic delta programs. To make the development of Bangladesh Meta-model successful, a two week long training program was organized at Deltares, Delft, the Netherlands from dated 13 to 25 May 2019 organized by Deltares under the project of Joint Cooperation Program (JCP), a long-term knowledge sharing and capacity building program between Center for Environmental and Geographic Information Services (CEGIS), Institute of Water Modeling (IWM), Bangldesh, Deltares and Wageningen University & Research, the Netherlands funded by the Embassy of the Kingdom of the Netherlands (EKN) in Dhaka, Bangladesh. The main objective of this training was to train up the professionals of CEGIS along with those of IWM and Support to Implementation of Bangladesh Deltaplan (SIBDP) to deal with meta-model development process and to support decision-making within the framework of the Bangladesh Delta Plan. A total of 11 participants attended in the training, five from CEGIS, five from IWM and one from SIBDP. The training covered the topics are (i) Meta-model for IWRM Planning in Bangladesh (ii) End-user Participation for development of meta-model (iii) Python for Meta-modelling (iv) Conceptual meta-modelling, knowledge rules and data flows (v) Group session: a) Model engine and b) Dashboard/database development and (vi) Field visit.

Participants from CEGIS, IWM and SIBDP of the Training Program

Contract Signing... (Cont'd from page 3)

Haor and Wetlands Development (DBHWD) on 01 April, 2019; ii) "Urban Informal Settlement Mapping Phase-II" with Habitat for Humanity International, Bangladesh on 16 April, 2019; iii) "Environment Compliance Monitoring of 2x660 MW MSTPP" with Bharat Heavy Electricals Limited (BHEL) on 13 April, 2019; iv) "Joint Cooperation Programme (JCP) Bangladesh - the Netherlands" with Wageningen Environmental Research, Deltares and Institute of Water Modeling (IWM) on 11 April, 2019; v) "Feasibility Study, Route Survey, Topographic Survey, IEE and RAP of Southwest Grid Network Expansion Project (Phase-2)" with Power Generation Company of Bangladesh (PGCB) on 24 April, 2014; vi) "Improving empirical evidence and analytical support on investments in Coastal Resilience in India and Bangladesh" with Deltares/WB on 15 May, 2019; vii) "Hydrographic/Digital Topographical Survey in Kangsa (Netrokona District) and Korotoa-Atrai Rivers (Dinajpur District) with Bangladesh Inland Water Transport Authority (BIWTA) on 30 May, 2019; viii) "Morphological study of Madhumati River Crossing of the Mongla-Gopalgonj 400 kV Transmission Line (TL) with Kalpataru Power Transmission Ltd. on 30 May, 2019; ix) "Developing Climate Resilient Documentation Report (CCRIP)" with Local Government Engineering Department (LGED) (MSC_CCRIP) on 03 June, 2019; x) "Engineering Service for Underground Substation Project at Gulshan, Dhaka (Topographic Survey)" with TEPCO Power Grid, Inc. (TEPCO) on 03 June, 2019; and xi) "Procurement of Real Time Dredging Monitoring System (RTDMS) and Required Hardware and Software" with Bangladesh Inland Water Transport Authority (BIWTA) on 12 June, 2019.

Joint Cooperation Programme ... (Cont'd from page 1)

All four directors spoke at the event, emphasizing the importance of the international cooperation, and the need to address current development related challenges in Bangladesh. More than 80 participants attended the event. Various government departments namely the Planning Commission and General Economic Division (GED), the Bangladesh Water Development Board (BWDB), the Department of Environment (DoE), the Department of Agricultural Extension (DAE), Bangladesh Inland Water Transport Authority (BIWTA) and many other government and non-government organizations related to the implementation of the Bangladesh Delta Plan 2100 will be involved.

New Faces

Md. Touhidur Rahman joined CEGIS in April 2019 as a Research Consultant under Research, Development and Training Division. He has completed his Bachelor of Urban and Regional Planning (BURP) from BUET with Honours (3.78 out of 4.00) in October 2018 and pursuing M.Sc. in Environmental Economics. He is passionate in developing his career in the field of Environment and Research. His aim is to become an environmental expert at international level but also wants to serve his country. He has participated in different workshops/trainings which include Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), River Morphology, Ecological Value Assessment etc.

Eva Chowdhury joined CEGIS in April 2019 as a Research Consultant, under Power Energy and Mineral Resources Division. She has completed BS and MS in Environmental Management from North South University, Dhaka. She has completed her BS Internship with CEGIS and MS Internship with IFPRI (International Food Policy Research Institute). She is very much keen to enrich her knowledge, learn about new issues and gather experience in the field of environmental management. Her areas of interest are assessing environmental impacts, environmental management plan and social development. She has recently participated in a training program on Python Language Program for climate data modelling at BUET.

CEGIS Environmental Lab: Acoustic Doppler Current Profiler

Rafiqul Alam, Water Resources Management Division

The Acoustic Doppler Current Profiler (ADCP) manufactured by "TELEDYNE RD INSTRUMENTS" is calibrated, tested and inspected according to TRDI factory specifications. The calibration, measurement and testing of the ADCP were carried out by TRDI to standards established by the TRDI.

The main function of this ADCP is to continuously measure of velocity and discharge in rivers, streams or canals or sea over a range of depth (0.4m to 60m). It can measure current profile from bank to bank, bathymetry and boat speed simultaneously. ADCP measures water currents with sound, using a principle of sound waves called the Doppler Effect. ADCP works by transmitting "pings" of sound at a constant frequency into the water. (The pings are so highly pitched that humans and even dolphins can't hear them.)

As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument.

An ADCP is a hydro acoustic current meter similar to sonar, used to measure water current velocities over a depth range using the Doppler effect of sound waves scattered back from particles within the water column.

The Doppler Effect is the change in frequency or wavelength of a wave for an observer moving relative to the wave source. Scientists use the instrument to measure how fast water is moving across the entire water column. An ADCP anchored to the seafloor can measure current speed not just at the bottom, but also at equal intervals all the way up to the surface. The instrument can also be mounted horizontally on seawalls or bridge pilings in rivers and canals to measure the current profile from bank to bank or shore to shore, and to the bottoms of ships to take constant current measurements when the boats move.

The River Ray ADCP

ADCP can be used for water resources applications, hydro-morphological or any hydrographical studies of projects where discharge and velocity are needed for study. This instrument is used for monitoring of rivers, streams or water ways in safe navigation, flood protection and civil engineering works or environmental monitoring program, river engineering works/river training works. In CEGIS, this equipment can be used in the similar studies mentioned above. CEGIS used the ADCP for measuring discharge of Mongla-Ghosyakhali Khal Monitoring Project.

Nature: Abbotii, the feathers after infancy day

Md. Sharif Hossain Sourav, Ecology, Forestry and Biodiversity Division

Abbott's babbler

Habinagar, a village, placed along the belt of Arial Khan around six km north from Barisal City and the Kirthonkhola Rivers. While staying in the village, the first morning started with the song of Oriental Magpie Robins, while noon with the sweet song of spotted dove and the evening came to end with the night journey of thousands of Rose-ringed parakeets. The darkness of every night finished with mixed calls of starlings, owls and owlets with short intervals. I was surrounded with lots feather with extraordinary attractive colors. This was my early days of life, while I am still remembering from my memory, also remembered my pet cat Mini, pet dogs Bagha, Tommy and the surrounding wilderness. The reflection of blue feather of kingfisher had submerged every ponds of my village where the roofed turtles enjoyed their life without any threats. The black chicks and their beautiful mother Water hen traveled smoothly in the marshlands. The egrets, heron along with other common water birds were busy to catch the fishes the stumpy fen.

I am still a bit confusing, which bird I have first seen. It might me Common Tailor bird, or white-breasted water hen or the Abbots Babbler. The Abbots babbler was very close to me adjacent to our wooden made house. There was plenty of date palm, cocoanut trees around the house. One day I had found a tiny nest of this bird. The nest was carefully placed in a low date palm tree near our house. The nest with tiny eggs. The clutch size was 5 eggs which were bright salmon with dark blotches and red lines. The cup shaped nest was made of dry leaves, soft sticks, fiber, spider nest etc. I used to observe the incubation from the window of my room.

Every year I used to see the nest of this bird along with other species. The villagers, elders too could not tell me the name of this bird.

Many years later, during bird watching at Kaptai National Park I observed a pair of abbotii moving in an open space of a hill stream. They were in an affectionate mood. Abbott's babbler (*Malacocincla abbotti)* is widely distributed along the Himalayas in South Asia and extending towards the forests of Southeast Asia. Abbotti love to live in the understory of broadleaved evergreen forest, forest edge, secondary growth and scrub of villages. Due to ruin of secondary growth, it is rarely observed in the villages of Bangladesh.

Degradation, Deforestation and Erosion of Jhau Plantations along the Cox's Bazar Beach

Mohammad Shahidul Islam, Remote Sensing Division

Over the last three decades, a total of 415 ha Jhau plantations were established in three forest ranges: Cox's Bazar, Inani and Teknaf Ranges Chittagong Coastal Forest Division to stabilize the sandy beaches and to develop coastal green-belt to maximize resilience of the coastal communities. The achievement of the investment and efforts for Jhau plantation depends on the survival of the same in the coastal region. From time series analysis of satellite images (2004 -2018) it appears that many of the patches of Jhau plantation along the coastal belt were severely degraded or eroded. Figure-1a, Figure-1b, and Figure-1c show how the Jhau plantation near Khurushkul Union of Cox's Bazar have been degraded severely between 2004 and 2018. The degradation of Jhau Plantation near Inani is shown in Figure-2. There was high density of Jhau Trees in 2009 (Figure-2a) but gradually decreased by 2018 (Figure-2b and Figure-2c). Figure-3a, Figure-3b, and Figure-3c show how the Jhau plantation near Cox's Bazar Paurashava has been eroded between 2006 and 2016. Based on preliminary findings from satellite image analysis, DoE showed interest to find out the causes of degradation, deforestation and erosion of Jhau plantation. In this regard, CEGIS was engaged to carry out the study.

a. 2004: High dense Jhau Trees *b. 2015: Low dense Jhau Trees* *a. 2018: Very low dense Jhau Trees*

Figure-1: Degradation of Jhau Plantation at Khurushkul Union, Cox's Bazar

a. 2009: High dense Jhau Trees *b. 2015: Low dense Jhau Trees* *c. 2018: Low dense Jhau Trees*

Figure-2: Deforestation of Jhau Plantation at near Inani, Jalia Palong Union, Ukhia Upazila, Cox's Bazar

a. 2006: Jhau Tree Plantation *b. 2011: Matured Jhau Trees* *c. 2016: Erosion of Jhau Plantation*

Figure-3: Erosion of Jhau Plantation at near Bahar Chara, Cox's Bazar

Drainage Modeling and Design of Hydraulic Structures for Mitigating Waterlogging in Chattogram City

Md. Monowar-ul Haq, Climate Change and Disaster Management Division

The diverse hilly terrain of Chattogram provides natural benefit when it comes to gravity drainage system. However, this blessing is short lived due to human interventions and mismanagement. Undulating terrain also translates into some hectic drainage congestion as flow passages are obstructed. The resulting drainage bottlenecks, Chattogram City is facing in recent times is twofold. On one hand, obstruction of flow passage is causing water logging in major locations of the city. Moreover, being a coastal hydrology subject to tidal influence, lower parts of the city are regularly experiencing tidal water logging on a daily periodic basis. Being adjacent to the Bay of Bengal, the lower parts of the city is now facing periodic waterlogging caused by high tides, which is further aggravated due to the loss of conveyance capacity of the major khals of the city.

3D view Design of Mohesh Khal Regulator

To alleviate the drainage problems of Chattogram City, major work components under this project as devised by CEGIS involves, in chronological order, Topography and Cross-section Survey of underlying drainage network of the city as well as regulator and bridge/culvert locations followed by Soil Investigation at selected intervals for retaining walls; Topo survey of bridge/culvert, regulators etc. Utilizing the survey data, detailed Drainage Model has been developed for the city that simulates flow through the primary drainage network using a selected and predefined design storm event. Using the model generated design discharge along with survey and soil data, design for required khal sections along with earthwork excavation, retaining wall along the khal banks, tidal regulators, bridge/culverts etc. have been completed.

Drainage modeling works have been divided into two components. Firstly, a Coastal Hydrodynamic Model has been simulated using Delft3D for the river system encompassing Chattogram City namely, Karnaphuli and Halda with a small portion of the Eastern Bay of Bengal. The Bay was taken into account to simulate the tidal influx into the Karnaphuli River which in turn, at the current virgin state, enters the city through the major khal systems. Downstream boundary for the model has been taken from the Bay of Bengal Model developed by CEGIS using Delft3D Flexible Mesh Suite. Upstream discharge boundary for the model was taken just at the upstream of Kalurghat and the bathymetry for Karnaphuli was generated using River Cross-section data. The model simulates the tidal nature of the river and its interaction with the Bay and provides tidal water levels at required locations along the river, at primary khal outfalls such as Chaktai, Noa, Mohesh etc. The main hydrodynamic model for simulating the existing drainage conditions in Chattogram has been developed using the SOBEK Suite. Pre-processing for model development involved frequency analysis of 30-year daily Rainfall data for the BMD Chattogram Station whereby a 1-day rainfall event of 511 mm with an unprecedented Return Period of 200 years was deemed suitable for designing the hydraulic structures of the city, consideration the magnitude of the project and consequent high life expectancy of designed structures. Hydrologic catchment area was then delineated for the major khals using primarily a high resolution Digital Elevation Model (DEM) in combination with satellite imagery and existing landuse within the city area. Each and every project-bound primary khal was then schematized within the model domain and the rainfall and catchment data were inserted as underlying computational entities.

The model was calibrated for the Karnaphuli River using Tidal Water Level data generated from the Coastal Model. Upstream river boundaries for both Karnaphuli and Halda as well as downstream river boundary for Karnaphuli and sea boundary for Moheshkhali Khal outfall was set using tidal water levels produced from the Coastal Model. Measured cross-section data was used for the primary khals and cross-section for Karnaphuli was generated using the 3D bathymetry from the Coastal Model. First phase of the model was simulated mimicking the year of the design storm event; and the generated flow within varying reaches of the khals at designated chainage locations as per surveyed sections, were used to design appropriate khal sections to allow for ample conveyance. This khal sections designed is to be implemented in the field through earth excavation work and maintained through construction of 128 km of retaining wall along both banks of the khal wherever it is presently non-existent/not required.

Model generated discharge as well as tidal water levels are used in designing tidal regulators at 6 khal outfalls, namely Mohesh, Moriumbibi, Tekpara, Kolabagicha, Firingi Bazar and Kumar. Among these, the Mohesh Regulator is a structure of massive proportions with 12-vents, each with size 1.5m x 1.8m. It also houses a separate 33m navigation lock with 6m width to allow passage for water vessels to and from the Karnaphuli River. The regulator will also sport a pump house with 3 submersible 5 cumec pumps to drain out upstream city-side flood water for the extreme time of high-tide and consequent gate-lock period. All these functions will

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Technical Exposure Visit to Panama City and Panama Canal under Chattogram City Waterlogging Project

A high delegation consisting of personnel from the project, "Re-excavation, Renovation and Development of Khals for Mitigating Waterlogging Problems of Chattogram City" made a five days visit to Panama City, Panama. The delegation consisted of personnel from the Chattogram Development Authority (CDA), the 34 Engineer Construction Brigade of Bangladesh Army, led by Mr. Malik Fida A Khan, Deputy Executive Director (Operations) and Project Team Leader from CEGIS. Home to the Panama Canal, Panama City, is a logistics and offshore banking and financial services hub, as well as a centre of international maritime trade and commerce.

The GoB funded mega project involves complete overhaul of the city's existing drainage infrastructure so that it can cope with the current as well as future high intensity storm events as well as increased tidal water levels brought by climate change. This is to be made possible through canal excavations, lining of canal banks with retaining walls, building of regulators at canal outfalls into rivers etc. The project involves the construction of a tidal regulator at Mohesh Khal, a massive 12-vent Regulator that also houses a separate 33m long navigation lock and separate pump house for draining excess storm water flow that accumulates at times of high tides.

The excursion comprised of observation of best engineering and monitoring practices in order to help better conceptualize solutions and increase efficiency in supervision and monitoring of the improved drainage and navigation systems to be implemented by the project. Founded in the early 1500s, Panama City is the capital of Panama and is also the country's largest city, housing approximately 900,000 population which extends over 1.5 million in the metropolitan area. The city became an international center for business and trade after opening of the Panama Canal, which had a huge impact on the country.

The delegation visited the Panama Canal, which is one of the oldest and busiest international trading routes and man-made navigation channel. Established in the early 1900s, the canal is an 82 km long artificial structure stretching from the Eastern Atlantic Coast to the Western Pacific Coast. It forms the major gateway and establishes waterway connection between the Pacific and the Atlantic coasts, saving ocean vessels 12,875 km of journey around the Southern tip of South America, Cape Horn.

The team then observed the Panama Resilient City Initiative, a concept that improves a city's ability to absorb, recover and prepare for economic, environmental, social and/or institutional shocks for promoting sustainable development, well-being and inclusive growth. This is done through development of the ability of the inhabitants, especially the vulnerable and poor to cope with unforeseen impacts and increase overall shock absorbance capacity. The delegation attended several meetings with relevant officials and technical persons, for the knowledge sharing and understanding the overall mechanism behind pioneering a climate resilient urban drainage system.

Being in close proximity to the Bay of Bengal, Chattogram faces the brunt of virtually of all modern climate change induced catastrophes and this project has taken up the challenge of tackling these events through unprecedented infrastructural refurbishment of the current drainage setup. Exposure visits like this, can go ways in preparing professionals in better understanding and designing a fully functional system that can drain out the excess storm runoff from within the city bounds whilst keeping the tidal flux at bay. As one of the 100 cities under the "Resilient City" initiative, Panama has made remarkable progress. Adopting similar innovative management in establishing linkage among the several integral cogs that govern the entire city management system, Chattogram can be developed as such, to ensure smooth functioning of day to day city operations and thus safeguard our business capital.

Navigation Lock at Panama Canal, Panama City