Year 18: Issue 62
October-December 2019

*Fruits of Passur Tree*

## Upcoming

- Rainstorm Flow Assessment Investigation
- Environmental Studies for Transmission Lines
- Dredging monitoring at Outer Bar of Mongla Port
- World Wetlands Day 2020

## Inside



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# the CEGIS NEWSLETTER

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


## High Delegation visit to Budapest Water Summit 2019 from the Ministry of Water Resources, GoB


Water, which has always played vital role in shaping the human civilization however, has recently been victim to numerous crises leading to scarcity problems all around the globe. To address the pressing issue of water related disasters as well as to minimize adverse impacts of water scarcity, the International Water Summit 2019 (BWS 2019) held in Budapest adopted the motto of "Preventing Water Crises".

A four member High Delegation led by the Hon'ble State Minister, Ministry of Water Resources (MoWR), Government of the Peoples' Republic of Bangladesh (GoB) also included other prominent members from the ministry. The delegation members are Mr. Zaheed Farooque, Hon'ble State Minister, MoWR, Mr. Mahmudul Islam, Additional Secretary, Ministry of Water Resources, Mr. Malik Fida A Khan, Executive Director (In-charge), CEGIS and Member, National River Conservation Commission, Mr. Md. Shafiqul Islam, Assistant Private Secretary to the Hon'ble Minister of State, MoWR.

The BWS 2019 included 11 sessions. Delegation members attended the various technical sessions of the summit which covered crucial topics related to prevention/aversion of water crises altogether, possible transboundary means of water resources management amongst of crucial riparian states, synergy between knowledge and application in shifting the scale in favor of communities vulnerable to water crises etc.

The team made visits to the South-Pest Wastewater Treatment Plant of the Budapest Sewage Works Pte. Ltd. and met with the International Project Manager Dr. Balint Tombor in presence of other plant individuals. The team appreciated the tremendous effort the plant management team is putting forth and urged them to send a technical team to Bangladesh to quickly expedite process related to establishment of similar state-of-the-art wastewater treatment facilities in urban cities of the country.

The team organized a meeting with the Deputy Director, Mr. Andras Fronto of the National Agricultural

Cont'd on page 2

# App based information Services to Support Implementation of Bangladesh Delta Plan 2100

*K. H. Razimul Karim, Geographic Information System Division*

Bangladesh is a rapidly growing country and expected to achieve the middle-income status by 2021. In pursuit of development, the government of Bangladesh took a pro-active approach in addressing major challenges related to adaptive delta management and sustainable development. The government has approved the Bangladesh Delta Plan 2100 with the aim to ensure water and food security, as well as economic progress.

The Knowledge and Information Portal was developed during preparation of the Bangladesh Delta Plan 2100 to provide information services to support the planners and decision makers in participatory and interactive planning and decision-making processes. In addition to that, the development of an App based information services is in progress to support the implementation of the Bangladesh Delta Plan 2100 under the project Joint Cooperation Program for Bangladesh.

At the development phase, a mockup design of the app has been developed to visualize the app user interface of the information services to implement Bangladesh Delta Plan 2100. Mockup answered stakeholders questions/quires and supported development team to finalize the design. It has developed for sharing information among the stakeholders. Stakeholders can perceive, interact and communicate with mockup more easily and effectively. Thus, they can involve themselves to discuss in various improvements in User Interface (UI) design, logo, icons, color scheme, outlook and feel of the app. The mockup includes buttons, menus, sub-menus and features, which illustrates the connections between different screens and navigation path through the app. The mockup presents information as map, chart, table and text format. A number of spatial and non-spatial data layers are beign used for developing the mockup. It describes general usability and allows user to involve in the designing process.


*Dashboard of the App*

Presently, the App development is in progress. The user will get location specific critical decision-making information in their pockets. The mobile app will generate table, chart and map for providing information to the stakeholders. The main interface is under development, which will help to access each module of the app. The app comprises of seven functional modules such as Delta Plan 2100, Water Resources, Agriculture, Environment & Disaster, Socio Economic, Spatial Planning & Landuse and Climate. The first version of the app is being released in the first quarter of 2020. The app will be updated and upscaled in a multi-platform interface allowing users to use this app in any smart mobile phone.

**Morphological Study of Madhumati River ... (Cont'd from page 4)**

River Bank shifting along the Transmission Line of Madhumati River have been predicted to be 15 to 50 m at right bank and 5 to 25 m at left bank for the year 2019 to 2050. River Bank shifting at upstream (950 m) of the Transmission Line at left bank of Madhumati River has been predicted as 30 to 250 m for the year 2019 to 2050. River Bank shifting at downstream (850 m) of the Transmission Line at right bank of Madhumati River has been predicted as 40 to 180 m for the year 2019 to 2050. Using Lacey's equation the scour depth for the study river has been calculated. Along the river crossing towers between NAP 22 and NAP 23, the calculated scour depth is 16.34 m from HFL. Along the river crossing towers between NAP 22 and NAP 23, the calculated scour level is (-)12.04 m (PWD) at Madhumati River.

As per the study result, there are no Transmission towers lying in 90%, 50% and 20% vulnerable zone. Future is always uncertain. Considering the uncertainty and minimizing the risk, the lateral clearance of the proposed NAP 23 (left bank), the lateral distance of the tower should be 350 m from present left bank line or estimated scour depth should be followed for the NAP 23 (left bank) river crossing tower design.

**High Delegation visit ... (Cont'd from page 1)**

Research and Innovation Centre and discussed various aspects of current innovative agricultural practices in Hungary. The team met the Hon'ble Minister of the Ministry of Jal Shakti of India and exchanged views on common bi-lateral practices regarding countering water crises. They also met with officials from the United Nations Economic Commission for Europe (UNECE) Water Convention.

The delegation met the Hungarian Minister for Environment and Water and discussed topics on the MoU signed between Hungary and Bangladesh in 2016 which included Education, Development of Sewage System and Basin Level Water Resources Management. The delegation also met Frank Belitz, Principal Strategy and Policy Specialist, Asian Infrastructure Investment Bank (AIIB) and discussed on financial aspects of water resources management in Bangladesh including implementation phase of the Bangladesh Delta Plan 2100 (BDP2100). During these visits, the team from Bangladesh shared experiences on formulation and subsequent implementation of the Bangladesh Delta Plan 2100 and its implication in achieving the sustainable development goals through sound water resources management.

## Contract Signing for Different Studies

During the forth quarter of the year 2019 (October-December), CEGIS has signed 9 (nine) contracts with different other organizations and clients. The contract titles with date of signing are given below:

i) "Study on Developing Operational Shadow Prices for Water to Support Informed Policy and Investment Decision Making Processes" with Water Resources Planning Organization (WARPO) on 10 October 2019; ii) " Carrying out of Route Survey and Preparation of IEE, ESIA/ESMP and RAP of 230 kV Transmission Line from Sonagazi 50 MW Solar Power Plant to Mirsarai 230/33 kV (BEZA) Substation" with Electricity Generation Company of Bangladesh Ltd.(EGCB) on 13 October 2019; iii) "Environmental Impact Assessment (EIA) Study of Netrokona Economic Zone" with Bangladesh Economic Zones Authority (BEZA) on 24 October, 2019; iv) "Capacity Building Training on Climate Change Adaptation in the Water Sector" with Bangladesh Water Partnership (BWP) on 27 October, 2019; v) "Comprehensive Feasibility Study for Sustainable Restoration and Protection of Wetlands (Haor, baor, beels and connected rivers etc.) in different Hydrological Regions of Bangladesh" with Department of Bangladesh Haor & Wetlands Development (DBHWD) on 07 November 2019; vi) "Morphological Study of Sugandhya, Burirswar-Payra and Patuakhali River for fixing the alignment of 230 kV Transmission Line (TL) from Patuakhali to Barishal under PGCB" with Changshu Fengfan Power Equipment Co. Ltd on 11 November 2019; vii) "Study on the Effect of Climate Change on National and Regional Highways of Bangladesh and climate Resilient Design for Highways of the Coastal Region" with Roads and Highways Department (RHD) on 17 December 2019; viii) "Feasibility Study for River Management by Enhancing the Navigability, Minimizing Drainage Congestion, Wetland Ecosystem, Irrigation and Landing Facilities by Capital and Maintenance Dredging in Barishal Division" with Bangladesh Inland Water Transport Authority (BIWTA) on 19 December 2019; ix) "Conducting Strategic Environmental Assessment (SEA) for Conservation of South West (SW) Region of Bangladesh including the Sundarban" with Bangladesh Forest Department (BFD) on 31 December 2019.

*Contract Signing between CEGIS and BFD for Study on Strategic Environmental Assessment for Conservation of South West Region including the Sundarban*

**Training and Capacity ... (Cont'd from page 8)**

training program in CEGIS where Harvard Case Method was implemented. Five professionals from CEGIS and 9 from different govt. institutions participated in this 5-day long training program.

'Training on Fundamentals of Geographic Information System (GIS) and its Application in Minor Irrigation Activities' was organized under the 'Digitalization of Survey and Monitoring for Development of Minor Irrigation (Phase IV)' project from 30 November to 5 December. Twelve officials from BADC participated in this activity.

*A group photo of the participants in the training on Climate Change Adaptation in the Water Sector*

Two internal training sessions were also carried out on 18 and 19 December respectively. The first one was conducted by Quality Management and Publication Division for CEGIS professionals. This program was designed to familiarize the professionals with CEGIS report house style and template including guideline. The second one was a training program for professionals of Ecology, Forestry and Biodiversity Division. This session covered topics like Maximum Entropy Models (MaxENT) and Mapping Ecosystem Service. Dr. Shawkat Islam Sohel, Assistant Professor, North South University was the resource person of this workshop.

*A group photo with the participants of training on Fundamentals of GIS*

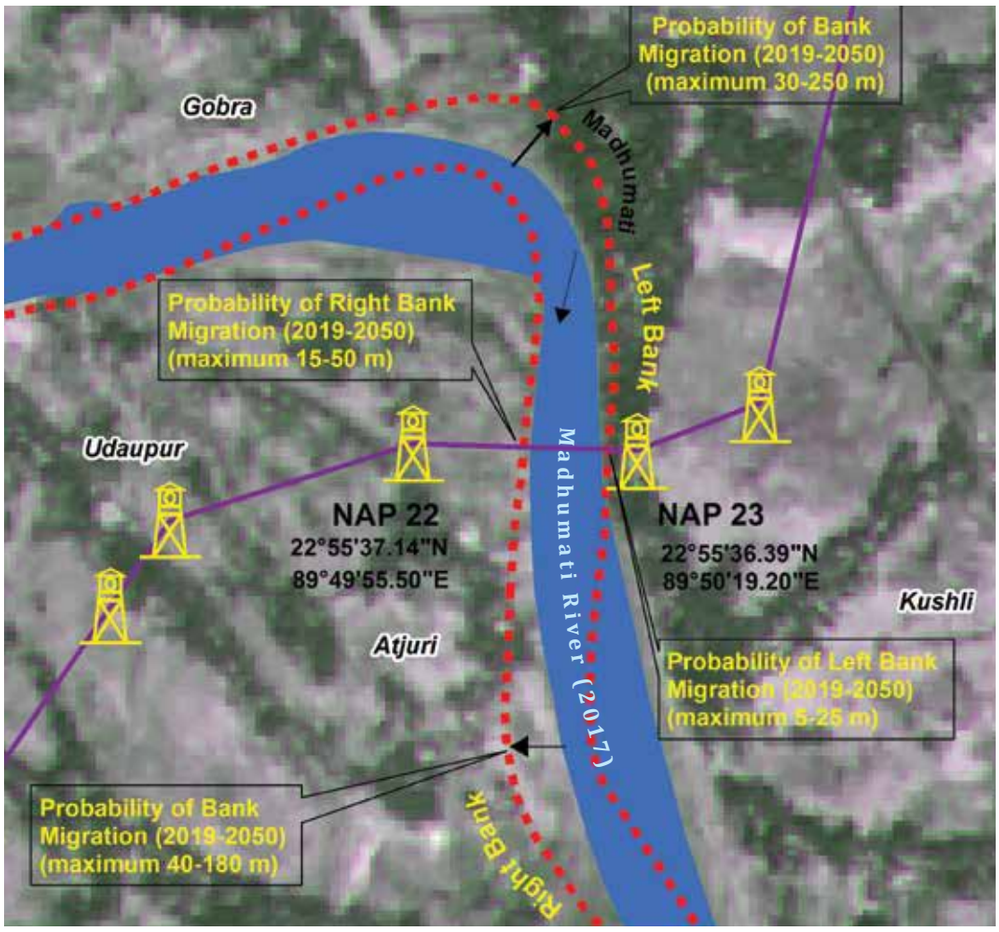
## Young Researcher Awarded

**Gazi Md. Riasat Amin**, Research Associate, Climate Change and Disaster Management Division has received the "Most Promising Applied Young Researcher in Water Resource Management" award for his outstanding contribution in Hydrodynamic Modeling as part of the Metamodel Development under the JCP project. JCP is a Joint Cooperation Programme between Bangladesh and the Netherlands being carried out by partner agencies namely Deltares, CEGIS, IWM and Wageningen University. The award giving ceremony was held on 31 October 2019 at Lakeshore Hotel, Gulshan during the concluding session of the Dhaka Water Knowledge Days (DWKD). The 5 days long DWKD event was jointly organized by JCP to highlight different projects under JCP and other related projects. Participants included professionals from both home and abroad including government agencies, universities, NGOs and also the Netherland Embassy. CEGIS congratulates Riasat for his achievement and wish him success in all his endeavors.

# Morphological Study of Madhumati River for fixing the alignment of the Gopalganj - Mongla 400kV Double Circuit Transmission Line

*Md. Kamruzzaman Akand, River, Delta and Coastal Morphology Division*

Power Grid Company of Bangladesh Limited intends to construct around 102 km of 400 kV Double Circuit Transmission Line from Gopalganj to Mongla. The proposed Transmission Line crosses over the Madhumati River at Gopalganj Sadar and Tungipara Upazila under the Gopalganj District. The Madhumati River shifted its courses several time in last decades. CEGIS, conducted a morphological study on Madhumati River for fixing the alignment of the Gopalganj - Mongla 400kV Double Circuit Transmission Line. The main objective of the study is to find out the most suitable location of river crossing towers at both sides of the river banks.




*Bank Migration of Madhumati River (2019 to 2050)*

Time-series satellite images have been used to delineate the banklines of different years to understand the ongoing morphological changes of the selected river. Water level, discharge and cross section data have been analyzed to assess the scour depth of the river. Discharge of Madhumati River and Madaripur Beel Route at the river crossing location have been found to be 7,491 $m^3/s$.

At the vicinity of the transmission line, three locations have been considered for further analysis in order to have an approximate idea of the trend of bank migration occurred during 1984 to 2017. Three Scenarios (Scenario 1: Decreased Flow (60%), Scenario 2: Unchanged Flow ( 30%) and Scenario 3: Increased Flow (10%)) have been assumed to predict the future bank movement of the Madhumati River based on the historical water level, discharge and river bank movement analysis. Probability (90%, 50% and 20%) of Bank Migration (2019-2050) have been finalized considering the Scenario 1, Scenario 2 and Scenario 3.

**Cont'd on page 2**

## New Faces

**Purnima Das** joined in Climate Change and Disaster Management Division of CEGIS in October 2019 as a Research Consultant. She is continuing her M.Sc. in Water Resources Engineering (WRE) from Bangladesh University of Engineering and Technology (BUET) and graduated in the same discipline from the same university. She has a wide knowledge in Climate Change, Flood Hazard and Vulnerability Assessment. Her areas of interest in Hydrological Modeling. She worked as a Research Assistant in DWRE, BUET under Nuffic-NICHE BGD 155 Project. She got an extensive experience on HECRAS 1D and 2D couple model while working under this project. She has some research-based publications on international journals and conferences.

**Farhan Nafis Hridoy** joined Water Resources Management Division of CEGIS in December 2019 as a Research Consultant. He has completed his M.Sc. degree from Europe in a double degree program named ''Transnational Ecosystem-based Water Management'' which was jointly organized by Radboud University, Nijmegen, the Netherlands and University of Duisburg-Essen, Germany. He graduated in Civil and Environmental Engineering from Islamic University of Technology, Gazipur, Bangladesh. His areas of skills and interests expanded within Integrated Water Resources Management, Water Quality Modeling, and GIS analysis. He has experiences of working with Deltares, Netherlands and IWFM, BUET.

## CEGIS Environmental Lab: Turbidity Meter

*Rafiqul Alam, Water Resources Management Division*

CEGIS has a Turbidity Meter (Model 2100N), manufactured by Hach. Company, USA. This is a digital instrument and meets all requirements of Canadian Interference Causing Equipment Regulations. The turbidity meter is an instrument for measuring the concentration of suspended particulates in Nephelometric Turbidity Units (NTU) specified by United States. The 2100N laboratory turbidity meter measures turbidity in three measurement modes, in NTUs (Nephelometric Turbidity Units), NEPs (Nephelos) and EBCs (European Brewing Convention units). NEPs and EBCs are calculated using the conversion factors of 5.7 nephelos per 1.0 NTU and 0.245 EBCs per 1.0 NTU respectively. The Equipment is used for measuring turbidity of water samples. The measurement method is Nephlometric. Its light source is Tungsten filament lamp. Its measuring range is 0 to 4000 NTU maximum. The equipment should be calibrated regurarly at certain interval for better accuracy. The calibration standards are 0.1, 20, 200, 1000 and 4000 NTU.

Turbidity measurement is the way to measure the amount of suspended solid concentration in a water sample. They are commonly used to monitor the effectiveness of filtration processes. The USEPA filter assembly is required for turbidity measurements reported for United States

*Turbidity Meter*

Environmental Protection Agency, National Primary Drinking Water Regulations, and National Pollutant Discharge Elimination System. Turbidity if not monitored, the environmental pollutant will be increased in drinking water, irrigation and drainage water as well as surface and ground water and wastage water. As a result, the regional environment would be hazardous. Its operation and basic principle of nephelometry and turbidimetry is based on the scattering or absorption of light by solid or colloidal particles suspended in the solution. When light is passed through the suspension, part of incident radiant energy is dissipated by absorption, reflection, and reaction while the remaining is transmitted. As light of a known intensity is passed through a sample, some of the light is scattered or absorbed by suspended particles in the sample and the detector which is placed at 90° to the sample collects the scattered light. The result measured by the meter operating on the transmitted light principle is shown in NTU.

Turbidity of water samples of different projects were analyzed in CEGIS Lab, for feasibility, IEE, EIA, ESIA, EMP, ESMP studies of PGCB and DESCO over head transmission line, monitoring of different environmental studies, monitoring of water related and dredging projects and compliance monitoring of different power plant projects including Rampal Power Plant for several periods.

## Nature: Passur: a tree of mangrove forest

*Md. Amanat Ullah, Ecology, Forestry and Biodiversity Division*

*Passur Tree in the Sundarbans Forest*

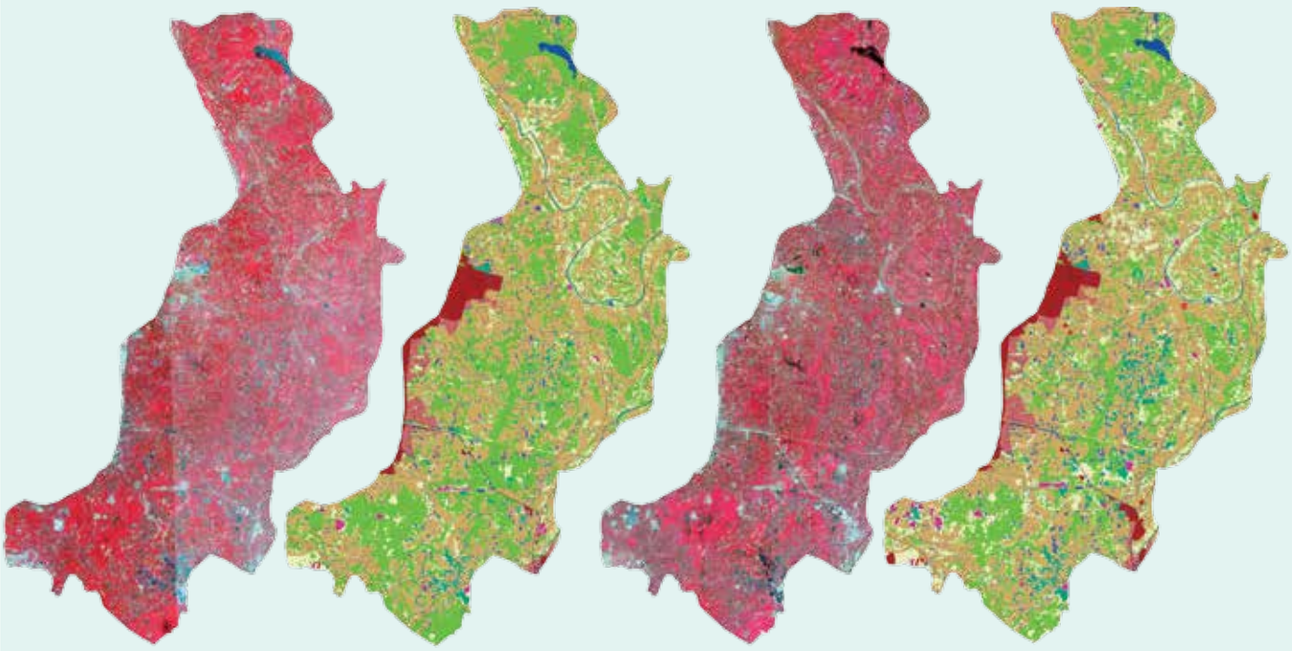
Passur (*Xylocarpus moluccensis*); is a semi-deciduous mangrove tree of Sundarbans, commonly known as "Cedar Mangrove". It is one of the tallest trees in this mangrove forest, which can heights upto 20m and grows on comparatively upland sandy soils of intertidal slightly brackish water zone. The tree originated from Meliaceae family have diameter upto 70cm. The tree bears oval shaped deep green leaves and white flowers. These trees have peg or cone-shaped pneumatophores and straight trunk with large branches. It has both medicinal and timber values. The bark is used for treatment of abdominal problems. The dark red timber of this tree is used for making high quality furniture, house, boat and bridge. Beside Bangladesh, this mangrove tree is distributed along India, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand, Northern Australia and Papua New Guinea. Global population of this plant is in decreasing trend as per IUCN Redlist. In Bangladesh, this tree population is also declining due to illegal logging for its high timber values and hence it is categorized as "Near Threatened" floral species. Usually, this tree is evergreen or semi-deciduous, nevertheless in some areas it became deciduous depending on seasonal climates. Bangladesh Forest Department (BFD) has taken initiatives to increase its population in Sundarban Reserve Forest through in-situ conservation.

*Flowering branch of a Passur Tree*

# Land Use Changes from 2011 to 2019 within the Irrigation Project Area of Palash Upzaila, Narsingdi District

*Md. Nasrat Jahan and Feroze Ahmed Kanak, Remote Sensing Division*

Delineating the land use changes in Palash study area from 2011 to 2019, land use map of 2011 and 2019 was prepared using RapidEye Images (5 meter) under the feasibility study and master plan of Ashuganj-Palash Agro–Irrigation Project (APAIP) by Bangladesh Agricultural Development Corporation (BADC). According to area statistics table of land use map 2011 and 2019, cultivated field area of boro has decreased from 5037 hectare to 3625 hectare in 2019. However, current fallow land has increased from 1711 to 2587 hectare in 2019. This may be due to the lack of irrigation facility within the study area. In addition, expansion of rural settlement, urban area, industrial area and land development area enforced to decrease the agriculture land in the project area. Hence, these land use maps will help us to prepare a comprehensive master plan for Palash Agro–Irrigation project area.



*Satellite Image (left) and land use (right), 2011*

*Satellite Image (left) and land use (right), 2019*

**Legend**

- Aquaculture
- Baor
- Barren Land
- Boro Cultivated Field
- Brick Field
- Current Fallow Land
- Industrial Area
- Land Development Area
- Peri Urban Area
- Pond
- Railway
- River/Canal
- Road
- Rural Settle

**Data Source:**
5 meter resolution RapidEye Satellite Image of 2011 and 2019

**Area (ha) Statistics of Palash Land use, 2011 and 2019**

| Class Name | 2011 | 2019 |
|---|---|---|
| Aquaculture | 316 | 513 |
| Baor | 46 | 42 |
| Barren Land | 9 | 9 |
| Boro Cultivated Field | 5037 | 3625 |
| Brick Field | 51 | 94 |
| Current Fallow Land | 1711 | 2587 |
| Industrial Area | 338 | 404 |
| Land Development Area | 0 | 17 |
| Peri Urban Area | 10 | 3 |
| Pond | 284 | 390 |
| Railway | 6 | 6 |
| River/Canal | 112 | 113 |
| Road | 168 | 168 |
| Rural Settlement | 5854 | 5931 |
| Urban Area | 248 | 286 |
| **Total Area** | **14,188** | **14,188** |

# Environmental and Social Impact Assessment of Embankment-cum Road and Water Management Systems for Economic Zone-4 at Sonadia-Ghotibhanga Island, Moheshkhali, Cox's Bazar

*Md. Shakil Ahmed, Water Resources Management Division*

Bangladesh Economic Zone Authority (BEZA) took initiative to develop the Sonadia Island area in Moheshkhali Upazila for establishment of an economic zone. Accordingly, BWDB took further initiatives and actions including polderization to develop road-cum embankment to protect the Economic Zone-4 against natural disasters.

*The sandy beach and sand dune are important habitats which provide natural support for migratory bird roosting, sea turtle and red crab nesting*

Sonadia Island is a biodiversity hotspot which is currently free from anthropogenic impacts such as development and tourism. The island was declared as the Ecologically Critical Area (ECA) in 1999 by the Government of Bangladesh (GoB) under Bangladesh Environment Conservation Act 1995. Some parts of the island are also considered as an internationally important wetland; since it is the stopover of some endangered migratory bird species.

Sonadia Island in Bangladesh is also one of the five Asian-Australasian Flyway Site Networks which supports three species of globally threatened birds Spoon-billed Sandpiper, Great Knot and Spotted Greenshank; two species of threatened dolphins Irrawaddy Dolphin and Indo-Pacific Finless Porpoise; two species of threatened sea turtles Olive Ridley Sea Turtle and Green Sea Turtle and one species of threatened small cat i.e. Fishing Cat.

Sonadia Island is a unique place of Bangladesh, enriched with different flora and fauna including many endangered species. As per decision of meeting conducted by the Ministry of Water Resources on 29th July 2018, observed that as, this area must be undisturbed by any activities which may hamper its natural resources. It was suggested in the meeting that Sonadia-Ghotibhanga Islands can be developed as an eco-tourism spot without any heavy construction. It was also decided in the meeting that Ghotibhanga Island can be selected for development works namely hotel/motel for ecotourism, etc. as it is a less environmentally rich area, keeping Sonadia Island untouched.

Feasibility study conducted by the Institute of Water Modeling (IWM) has proposed to develop eco-tourism in the Sonadia-Ghotibhanga Island which will include river and sea cruise, construction of hotels/motels/ restaurants, nature walk trail, rainwater retention pond, solar power, golf course, park and tennis court.

In the context of the study area being cyclone-prone and a part of ECA (hosting a diverse variety of flora and fauna), it is apprehended that the influx of tourists (and accompanying activities and services for them) would not only degrade the ECA wealth, but would also cause human casualties during natural disasters. Hence, alternatively, it is recommended that (a) no overnight tourists will be allowed; (b) only Day Tourism will be promoted with small groups of tourists from Cox's Bazar will be allowed to the designated spots – escorted by professionally trained Guides (not NGO volunteers). They will NOT stay overnight in the island; hence, hotel/motel construction will not be required and related services infrastructure would be minimal, e.g., only provision for day time food service, rest area, parking, emergency medical assistance and toilet facilities etc.

In addition to making the EMP more rigorous and stronger than other normal projects, the study stated that – unless the mitigation measures along with monitoring tasks are done thoroughly and strictly (without any exception or negligence), the project will fail and damage the ECA irreversibly. **It is not be advisable to proceed in implementing the project if such dedication in implementation is not foreseeable by the authorities.**


*Planning of Eco-park and Ecotourism at Sonadia-Ghotibhanga Island*

# Geohazard Risk Management and Resilient Road Asset Management in Bangladesh

*Ahmmed Zulfiqar Rahaman, Climate Change and Disaster Management Division*

CEGIS was entrusted by the World Bank in association with IMC Worldwide Ltd. to conduct Technical Assistance Study on Geohazard Risk Management and Resilient Road Asset Management in Bangladesh. This study focused on susceptibility mapping due to landslides in the Chattogram and Sylhet Divisions and formulation of mitigation measures aiming at enhancing resilience of road infrastructures against landslides. CEGIS developed division wide rainfall induced and earthquake induced landslides susceptibility maps using Analytical Hierarchy Process (AHP). Later road criticality analysis was performed to identify hotspots and to prioritize highly critical roads for future interventions in the context of managing landslides risk. All roads of LEGD and RHD were considered as part of road infrastructures to set the domain of this study. Relevant stakeholders from LGED, RHD, Defense, local administrations, UNDP, NGOs and academicians from DU, CU and BUET were rigorously consulted during the study to make it more participatory. Field visits near the Kaptai Lake in Chattogram Division with LGED and RHD engineers were also performed to validate the identified landslide hotspots and to finalize some preliminary mitigation measures. The outcome of this study i.e. inventory of landslides, landslide susceptibility maps, criticality of road networks, hotspots, runoff condition and mitigation measures will be greatly helpful not only for the World Bank but also for the key stakeholders LGED and RHD.


*Map showing landslide susceptibility (left), Field verification of land sliding area (right)*

# Training and Capacity Building Programs

*Farhana Ahmed and Anindya Banik, Research, Development and Training Division*

Sharing of knowledge, dissemination of public information and capacity building are elemental parts of CEGIS's vision and mission. With this aim, CEGIS organizes training programs as part of different external projects as well as internal capacity development together with other divisions of CEGIS. The period October to December 2019 was a very active during which 3 external training programs were executed and 2 separate day-long workshops intended for internal capacity building were organized as well. A brief account of these programs is presented in this article.

Two training programs were organized having financial support from Bangladesh Water Partnership. The first one, Training of Trainers (ToT) program on IWRM was organized during 20 to 24 October. In this yearly iteration of IWRM ToT program, the module was redesigned with guidance from Dr. Mashfiqus Salehin, Professor of IWFM, BUET. The training was well accepted in its new form. Fifteen professionals from several govt. institutes along with 3 from CEGIS attended in this training program.

*Dr. Ainun Nishat, Professor Emeritus, Brac University, delivering lecture at IWRM ToT program*

The other one was on 'Capacity Building on Climate Change Adaptation in the Water Sector', and was organized during 8 to 12 December 2019. This is the first

**Cont'd on page 3**

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