Year 17: Issue 57
July-September 2018

3D View of Mahesh Khal, Chattogram

## Upcoming

- Hydrological Modeling for Upgrading of National Highways
- Integrated River Management through Capital Dredging
- Training on Hydrologic Model SWAT and Hydrodynamic Model HEC-RAS

## Inside



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

# Participation of Executive Director, CEGIS in Asia and the Pacific Regional Expert Workshop on Ocean Accounts

*Engr. Md. Waji Ullah, Executive Director of CEGIS attended the Asia and the Pacific Regional Expert Workshop on Ocean Accounts in Bangkok, Thailand as Panel of International Expert*

The "Asia and the Pacific Regional Expert Workshop on Ocean Accounts" was held from 1 to 3 August 2018 at United Nation Conference Centre in Bangkok, Thailand. The workshop was organized by Economic and Social Commission for Asia and the Pacific (ESCAP). The 85 international experts included scientists in ocean statistics, science, and policy from national governments and research institutions as well as regional and international organizations. Another 37 experts who were interested, but unable to attend, contributed to the development of issue papers and will continue contributing to the resulting guidance documents. Engr. Md. Waji Ullah, Executive Director, CEGIS and Member (Engineer), Joint Rivers Commission (JRC), Government of the People's Republic of Bangladesh and Mr. Md. Rafiqul Islam, Deputy Director, Bangladesh Bureau of Statistics (BBS) and Professor A.K. Enamul Haque, East West University participated as a high level member of the Bangladesh Government Delegation. Countries participating include: Australia, Bangladesh, Canada, China, Fiji, France, Germany (contributor), Indonesia, Japan (contributor), Malaysia, Maldives, Papua New Guinea, the Philippines, Republic of Korea, Samoa, Seychelles (contributor), Singapore (contributor), South Africa (contributor), Sri Lanka, Thailand, Timor Leste, UK, Vanuatu and Viet Nam. Organizations represented include: Association of Pacific Rim Universities (APRU), Asian Institute of Technology (AIT), ASEAN, the Atlantic Research Centre, FAO, GEO/Blue Planet initiative, International Institute for Environment and Development (IIED), the Pacific Community (SPC), SOLSTICE-WIO (Western Indian Ocean), UN Environment and UNITAR.

The workshop provided guidance for testing in national pilot studies, including reviews of governance gaps and good practices and also executed many sessions on ocean resources and management and tools. Engr. Md. Waji Ullah, Executive Director of CEGIS chaired the Modeling Session where CISRO Australia presented all the relevant modeling activities with respect to oceans in the world. The purpose of the workshop was to

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# Environmental Impact Study of Two Tannery Estates on the Buriganga and the Dhaleshwari River

*H M Nurul Islam, Ecology, Forestry and Biodiversity Division*

Hazaribagh Tannery Industries have been shifted to Savar Tannery Estate with the objective to organize and manage these industrial activities in an environment friendly way. To do so, several environmental management plans such as Central Effluent Treatment Plant (CETP) and Soild Waste Disposal Yard etc. have already been adapted. However, environmental problems in Harindhara, Savar, have intensified constantly due to the use of inferior technologies, huge loads to CETP for treating industrial wastes, Open Soild Waste Disposal Yard and saline water issue in effluents. In addition, the existing water use practices by labors is also a problem for the efficient management of waste water of tanneries. And so, having these challenges, Department of Environment (DoE) has engaged CEGIS to conduct this study.

The main objective of this study is to identify the environmental and social problems currently being aggravated by Savar Tannery Estate. In order to do that, the present status of Hazaribagh Tannery Estate was evaluated and the lessons are learnt here have been used in assessing the issues for Dhaleshwari River.

This study has identified physical, biological and social issues of the study area. It has been found that water quality of Dhaleshwai River has become the prime concern among all. Both the physical and chemical characteristics of water quality have been affected severely. Changes in water color, low dissolved oxygen (around 4-5 mg/L) and high organic loads have damaged the aquatic environment and later affect on the ecosystem services. In addition, heavy metals especially Chromium (Cr) is being disposed at the rate of 3-4 mg/L from the CETP, which is almost double than the ECR'1997 recommendation of 2 mg/L into inland surface water. This impacts on aquatic environment, changes the fish habitat suitability and overall the ecology of the Dhaleshwari River. Several wild animals like aquatic snakes and Indian bullfrogs left the polluted areas permanently. Spawning of fishes are hampered and fry fish does not survive due to water pollution. Therefore, ecosystem

*Tannery waste dumping at river side*

services are being limited from the Dhaleshwari River. The pollution of surface water triggers the unavailability of suitable surface water for agriculture thus the farmers of the area have stopped using surface water for their agricultural practices. Last but not the least, the social status, has been influenced a lot due to this Savar Tannery activities. Some positive economical changes such as grocery shops, transportation facilities and so on have been assessed in the area. In contrary, residents of the surrounding areas are facing the problem of chronic odor in air, drainage congestion, shortage of drinking water during dry season (overexploitation of groundwater) etc.

Therefore, this study finds the best achievable solutions to keep the surrounding environment safe, healthy and sustainable. Recommended solutions are improving water quality, managing odor problem, managing soild wastes, improving river habitat suitability, enhancing ecological resources, supporting agricultural productions and improving socio-economic condition.

# Feasibility Study for Developing River Ports, Ferry Ghats and Jetties at Various Locations

*Sarazina Mumu, Water Resources Management Division*

Bangladesh Inland Water Transport Authority (BIWTA) has vested the responsibility to CEGIS to conduct the feasibility study (including Environmental and Social Impact Assessment) for developing 4 Ferry Ghats at Aricha, Norodah, Cox's Bazar and Moheshkhali; 4 Jetties at Chanua, Baroghop, Sattaruddin and St. Martin's Island and 5 Rivers Ports at Teknaf, Cox's Bazar, Chhatak, Faridpur and Noapara of Bangladesh. Being part of this feasibility study, topography survey, hydrographic survey, morphological study, traffics survey and Multi Criteria Analysis (MCA) were conducted. MCA has been conducted considering 4 criteria; technical feasibility, environmental sustainability, social acceptability and economic aspect. Based on these criteria, the best possible location for each of the proposed development has been identified and an ESIA has been conducted on each of that best locations. Later on layout plans of ports, ferry ghats and jetties including their associated facilities, 3D views and animations have been prepared. Feasibility study revealed that the proposed developments are viable both technically and economically. However, this project will have some impact on environment (especially on ecological and fish resources) and society though not anything major. Thus, mitigation measures are proposed in ESIA study to minimize/reduce those to ensure no trade off in between environmental degradation and infrastructure development for economic benefit.


*Proposed location of River Ports, Ferry Ghats and Jetties*

# CEGIS Comprehensive Resource Database

*K. H. Razimul Karim, Database, ICT and System Management Division*


*Home page of the Comprehensive Resource Database*

CEGIS works as a scientific independent organization and conducts integrated environmental analysis using technologies like GIS, RS, IT and databases. It provides solutions to issues and problems in a wide range of sectors, such as water, land, agriculture, meteorology, forestry, fisheries, morphology, ecology, environment, climate change, archeology, socio-economy, power, transportation and disasters.

CEGIS has been conducting studies of different projects and provides its intellectual services since its birth. A huge volume of information of different sectors are collected and generated while carrying out the studies. CEGIS' services and products include Integrated Environmental Analysis such as IEE, EIA, SIA, Environmental and Social Monitoring Studies, Development of Environmental Guidelines; Resettlement Action Plan; Analytical Framework for Planning for IWRM; Spatial Analysis using GIS and RS for flood monitoring, drought assessment and monitoring, river planform changes, river erosion and accretion prediction, flood damage assessment, development of Digital Elevation Model (DEM), land-use planning, urban planning; development of web based spatial database, MIS and Decision Support System (DSS) for planning, designing, implementation and monitoring of water sector projects, etc. At the same time CEGIS has produced lots of good quality reports and documents. The information so far generated was not stored in a systematic system that could be easily made available for other studies.

In this context, a comprehensive database system has been developed to incorporate all these information into a central database system. As this database contains data and information related to all types of resources, CEGIS named it as Comprehensive Resources Database. This database is an integrated database comprising of tabular, spatial and time dependent data as well as reports and documents collected and generated from different studies of CEGIS. This web enabled system intends to preserve and disseminate the data and information to optimize CEGIS resources and maximize its utilization.

**Participation of Executive Director, CEGIS ... (Cont'd from page 1)**

facilitate a community of practice around standards for ocean statistics. This workshop builds on UN-ESCAP's groundwork in scoping a statistical framework for Ocean Accounts and experience in providing technical assistance to strengthen environment statistics in 17 member states. This workshop directly addressed the theme of the UN Development Account 11th Tranche in "Supporting Member States in strengthening evidence-based policy coherence, integration and participatory implementation of the 2030 Agenda at all levels" by strengthening the evidence-base and coherence of ocean-related policies to address SDG 14 (Life below Water) and related goals; and ensuring a participatory approach by (a) engaging a range of partners and stakeholders determining national priorities, and (b) focusing on the benefits and risks to target populations such as coastal communities, small enterprises, and women and subsistence fishers.

# Web Application on Water Resources Mapping

*Md. Kamal Pasha, Geographic Information System Division*

Water resources management in Bangladesh suffers multifaceted challenges in resolving different problems and issues. The most significant of these are stark differences in water availability and demand in dry season, increasing demand yet declining availability of water for growing population, supply of safe drinking water and sanitation, arsenic problem and water pollution.

To overcome the growing challenges regarding water rights, protection of resources, sustainable use, services and management, the Government of Bangladesh (GoB) passed "Bangladesh Water Act 2013", published in November, 2013. Swiss Red Cross (SRC) and Development Association for Self-reliance, Communication and Health (DASCOH) have jointly taken an initiative to support the goal of "Bangladesh Water Act 2013", by aiming promotion of Integrated Water Resource Management (IWRM) in the country.

In this connection, CEGIS carried out a study titled "Web Based Water Resource Mapping System supporting IWRM" for DASCOH/ SRC. The main objective of this study was to develop a geodatabase on the collected information

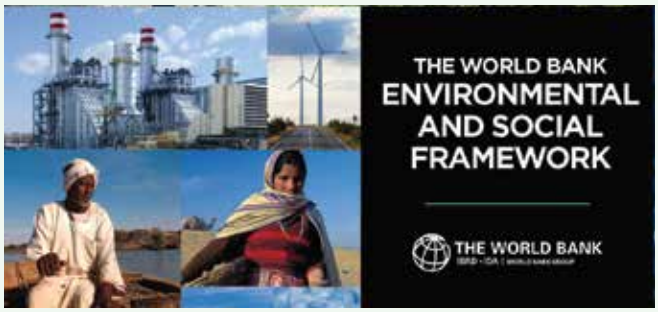

*Home Page of the Web Application on Water Recources Mapping*

related to the water assets/resources and an interactive and web GIS/MIS. It will enable decision makers to view, analyse and query spatial and aspatial information, for example location of deep/shallow tube wells/ponds in a selected area. The MIS will assist in planning and management on equitable and sustainable development of water, land and related resources.

# The World Bank Environmental and Social Framework

*Kazi Kamrull Hassan, Water Resources Management Division*

The World Bank Environmental and Social Framework document is a safeguard for protection of natural environment by any type of development work. It's a new commitment made by WB for sustainable development.




*Environmental and Social Framework of World Bank*

"This Framework replaces the following Operation Policy and Bank Procedures (BP): OP/BP4.00, Piloting the use of Borrower Systems to Address Environmental and Social Safeguard issues in Bank Supported Projects; OP/BP4.01, Environmental Assessment; Op/BP4.04, Natural Habitats; OP4.09, Pest Management; OP/BP4.10, Indigenous Peoples; OP/BP4.11, Physical Cultural Resources; OP/BP4.12, Involuntary Resettlement; OP/BP4.36, Forests; and OP/BP4.37, Safety of Dams. This Framework does not replace OP/BP4.03, Performance Standards for Private Sector Activities; OP/BP7.50, Projects on International Waterways; and OP/BP7.60, Projects in Disputed Territories" (The World Bank, 2017).

Ten Environmental and Social Standards (ESS1: Assessment and Management of Environmental and Social Risks and Impacts; ESS2: Labor and Working Condition; ESS3: Resource Efficiency and Pollution Prevention and Management; ESS4: Community health and Safety; ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement; ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources; ESS7: Indigenous Peoples; ESS8: Cultural Heritage; ESS9: Financial Intermediaries; and ESS10: Stakeholder Engagement and Information Disclosure) has been adopted by the World bank from October 2018.

CEGIS has initiated the process of integrating the 10 Environmental and Social Standards adopted in the Environmental and Social Framework of WB while conducting the Environmental and Social Impact Assessment of projects in Bangladesh.

# Contract Signing for Different Studies

During the third quarter of the year 2018 (July-September) 10 contracts have been signed between CEGIS and other organizations and clients to conduct EIA, SIA, IEE, RAP, LAP etc. The titles of these signed contracts are as follows:

i) "Route Survey, Soil Investigation, Environmental and Social Survey for JICA's Special Assistance on Dhaka Underground Substation Construction Projects" with Tokyo Electric Power Grid Company (TEPCO), Japan and the Japan International Cooperation Agency (JICA), Japan on 01 July, 2018; ii) "Initial Environmental Examination (IEE) of HVDC Back to Back (BtB) Station at Cumilla for 500 MW Electricity Import from Tripura (India)" with Power Grid Company of Bangladesh (PGCB) on 02 July, 2018; iii) "Establishing National Land Use and Land Degradation Profile toward Mainstreaming SLM Practices in Sector Policies (ENALULDEP/SLM)" with Department of Environment (DoE) on 15 July, 2018; iv) "Post Project Evaluation and Impact Assessment of 10 BWDB Projects" with Bangladesh Water Development Board (BWDB), Dhaka on 27 July, 2018; v) "Training of Trainers (ToT) on Concept of Practices of IWRM" with Bangladesh Water Partnership (BWP) on 01 August, 2018; vi) "Natural Resource Survey and other related activities under Ecosystem based development, management and conservation of the Saint Martin Island Project" with Department of Environment (DoE) on 5th August, 2018; vii) "Information Technology Enabled Services for Land Cover Mapping and Land Cover Change Detection of Chattogram Hill Tracts using GIS and Remote Sensing Technology" with the Second Chattogram Hill Tracts Rural Development Project (CHTRDP-II) on 08 August, 2018; viii) "Monitoring the Performance of the Dredging in/c Hydrological & Morphological Impacts and Assessment of Effectiveness of Dredging at the Outer Bar Area in the

**Cont'd on page 5**

# New Faces

**Brig. Gen. (retd.) Md. Ahsanul Huq Miah, ndc** joined in CDA Study of CEGIS in July 2018 as Chief Coordinator. During his 37 years career in Bangladesh Army, he managed various projects as Chairman of KDA and as Chief Engineer of DCC/DNCC, Director of Works and Chief Engineer, Bangladesh Navy and as Deputy Managing Director of Bangladesh Machine Tools Factory, where his works involved strategic analysis and planning supervision and preparation of project profile, leading project implementation teams, and procurement, sourcing and quality control aspects. He is a graduate from National Defence College (NDC). He did his MPhil from NDC in 2013. He completed his B.Sc. in Civil Engineering from RUET and did his B.Sc. in Military Science from University of Chittagong.

**Mowaze Shabib Bin Mohsin** joined CEGIS in July 2018 as an Electrical Engineer. His previous work experiences include working as an R&D Engineer with Schlumberger Canada and as an Electrical Design Engineer with Schlumberger USA. His experiences include working with hazardous materials, Risk and Hazard assessment, and Health, Safety and Environment (HSE). He became a Professional Engineer (P.Eng) with the APEGA, Canada in 2015. Currently he is a licensed P.Eng with the PEO, Canada. Prior engaging himself as an engineering career, Mr. Mohsin completed his M.Sc. in Power Electronics and Power Engineering from the University of Alberta, Canada. He completed his B.Sc. in Electrical and Electronics Engineering from the IUT, Bangladesh.

## CEGIS Environmental Lab: Current Meter

*Rafiqul Alam, Water Resources Management Division*

This Current meter is "The Valeport Braystoke BFM001 Current Flow Meter" which is designed to accurately measure water velocity in open channels with flows varying 0.03 m/s to 10 m/s. The calibration of the meter was carried out by HR Wallingford to standards established by the British Standard Institution.

The main function of this current meter is to measure the velocity of river flow, sea or water ways in magnitude and direction in single point or fixed point in a vertical water column. The basic principle of the meter is to open and close a reed switch by rotating magnets around it, to open and close a circuit producing a pulse. The pulse count is displayed on LCD of control unit. Magnet which is fitted in to the meter produces strong magnetic field and allows only one pulse per impeller revolution. Water flow is measured through the pulse signal produced per

*Current Meter*

revolution. This signal is generated by the encapsulated reed switch which resides inside the current meter body. The wading rod can be used with current meter as the positioning system. This current meter acts on electromagnetic induction principle. For deep water velocity measurement the meter from cable can be suspended from a bridge or parapet in water. Valeport supplied a sinker weight and suspension bar and stainless shackle to make this operation easier. This current meter can be used in hydro-morphological study projects or for any hydrographic studies. This current meter is used for measuring cross sectional velocity or point velocity of project GSE001. This instrument is mainly used for water resources applications, monitoring of river, streams or water ways in safe navigation, flood protection and civil engineering works or environmental monitoring program and river training works. In CEGIS, this equipment can be used for mentioned projects.

**Contract Signing... (Cont'd from page 4)**

Pussur Channel of Mongla Port" with Mongla Port Authority on 16th August, 2018; ix) "Optimizing the Dredging in the Padma, Meghna, Lower Meghna, Jamuna, M-G Cannel, Tetulia, Surma, Old Brahmaputra, Arial Khan, Kushiyara, Sitalakhya, Kumar, Lower Kumar, Shibsha, Passur, Turag, Balu, Modhumati, Echamoti, Lalmohon, Boral, Kalabodor, Sugandha, Kumarkhali, Hurasagar, Khagdon, Pona Rivers and monitoring the dredging activities and volume calculation for the year 2018-19" with Bangladesh Inland Water Transport Authority (BIWTA) on 16th August, 2018; x) "Morphological Study of 4 Rivers" with GS Engineering & Construction Corporation on 27 August 2018.

## Nature: An Island of Stunning Large-Screw Pine

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

Screw Pine (locally in Bangla called Keya) is the most dominant tree species of St. Martin's Island covering adjacent Chhera Dwip Island (which is separated at high tide) as well and occupying altogether about 44 ha of land in the Island (Figure 1). The scientific name of the plant is Pandanus fascicularis. It has been developed as the protected fence surrounding the island except the north and northeast part. Saint Martin Island is a small island (areas only 693 hectares) in the northeastern part of Bay of Bengal and designated as an Ecologically Critical Area (ECA). It is about 8 kilometres (5 miles) west of the northwest coast of Myanmar, at the mouth of the Naf River. The island is about 5 km long in north-south direction and 2 km average width during high tide. The attractive color of oceanic water, magnificent coral reef intermingled with eye-catching Large Screw Pine has created a spectacular scenic beauty which attract tourist of all over the world to visit this Island.The species are dense, well developed and located in the upper fore dune. Local community takes care of Keya tress and have been extended plantation as thatching and shading plant surrounding their houses and walking ways. The flower and scenic fruits can easily attract the visitors, though these are not selling items in the island but the local people never mind if any visitor collects fruit from the plant.

In Bangladesh a total of 5 species of Screw Pines are seen and grown in fallow land, forest edge. Screw Pine grows naturally at Saint Martin's Island possibly in the past due to some floating fruits trapped the shore of this Island and gradually adapted with this landmass. This plant is mainly found in Southern and Western side along the shore before the beach. However, few spectacular patch of Large Screw Pine is found in Chhera Dwip.

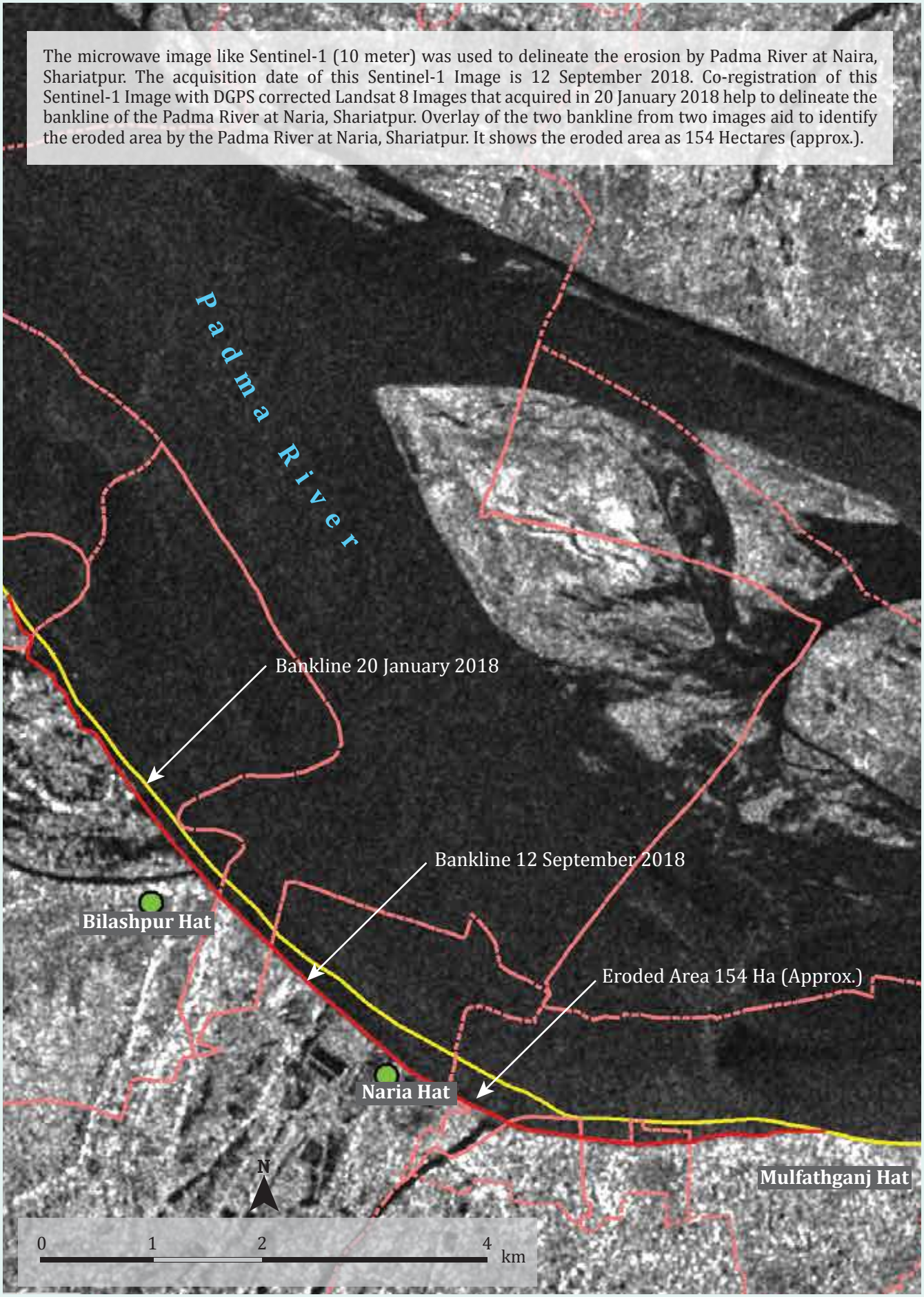
*Keya-bush at Chhera Dwip of Saint Martin's Island*

The tree can grow to a height of 4 meters. Leaves grow in clusters at the branch tips, with rosettes of sword-shaped, stiff (leather-like) and spiny bluish-green. Leaves are about 40–70 cm long. The long green leaf, brownish trunk of this plant made the island much enthrallment to visitors. It has robust and shrubby stem which is glossy brown. Its branches appear in different parts of main trunk. Leaf is downward with midrib and spine on each leaf edge. Stem produce aerial and prop root.

Areal root takes part to respiration during high tide and nutrient collection. The thick prop root takes part to anchor the plant and survive during storm and wind. Those prop roots emerge from the stem, usually close to but above the ground, which helps to keep the plants upright and secure to the ground. In summer, the tree bears very fragrant flowers which attracts wild bees, insects and butterflies. Flower is very small, white colored, sweet scented and associated with an inflorescence called spadix. Fruits are large, pineapple like, drooping and drupe con fluent in group of 5-8. This plant can propagate from a cutting. Leaf is used for treatment of skin diseases. It inhabits in sandy beach, along the Island, canal side as well.

# Application of Sentinel-1 Images to Delineate Erosion by Padma River at Naira, Shariatpur

The microwave image like Sentinel-1 (10 meter) was used to delineate the erosion by Padma River at Naira, Shariatpur. The acquisition date of this Sentinel-1 Image is 12 September 2018. Co-registration of this Sentinel-1 Image with DGPS corrected Landsat 8 Images that acquired in 20 January 2018 help to delineate the bankline of the Padma River at Naria, Shariatpur. Overlay of the two bankline from two images aid to identify the eroded area by the Padma River at Naria, Shariatpur. It shows the eroded area as 154 Hectares (approx.).



# Re-excavation, Renovation and Development of Khals for Mitigating Water Logging Problems of Chattogram City

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

The Center for Environmental and Geographic Information Services (CEGIS), has signed a contract with the 34 Engineering Construction Brigade of Bangladesh Army, for conducting studies under the Mega Project, titled, "Re-excavation, Renovation and Development of Khals for Mitigating Water Logging Problems in Chattogram City", sanctioned by the Government of Bangladesh (GoB) and taken up by the Chattogram Development Authority (CDA) and to be implemented by the Brigade to address the prevalent water logging problems persistent in the city due to a combination of heavy monsoon downpour and recursive periodic tidal influx; further aggravated by unplanned urban infrastructure development and poor maintenance of the existing drainage facilities. This study will encompass 41 khals, all within the Chattogram City Area. Fully implemented and properly maintained, the developed system will undoubtedly go ways in alleviating the existing water logging problems in Chattogram and ease the lives of people of the port city. Major activities under this project will include:

– Comprehensive Drainage Modeling Study for drainage network in the Chattogram City. Separate models will be established for the two most prominent primary drainage systems, Chaktai and Mahesh. Separate tidal hydrodynamic model will be developed for the Karnaphuli River adjacent to the Bay of Bengal to mimic tidal inflow into the primary system and support regulator design. Based on the initial findings from these models, finer resolution models will be developed and simulated simultaneously for the secondary and tertiary drainage systems of the city;

– Complete structural design in the form of Detailed Design Drawings and BOQ based on findings from topo survey, drainage modeling and soil investigation study, for the a) Design cross-section for 41 khals; b) Volume of earthwork to be excavated for the 41 khals; c) Design of a massive 9-vent regulator over Mahesh Khal with tidal navigation lock and high capacity pump station; d) Design of tidal regulators at selected khal discharge points into the Karnaphuli; e) Renovation of existing secondary drainage; f) Construction of additional lined secondary drainage; g) RCC Retaining Wall along selected khal banks; h) Renovation and replacement of existing bridges & culverts; i) Khal-side road sections along khal banks; j) silt traps; and k) Water Retention Ponds;

*Ongoing Physical work at Noa Khal, adjacent to Noa-Mirza Confluence*

– 3D models with detailed landscapes for all the major structures to be implemented. Models will show the post-implementation alignment of retaining walls, khal-side road, tidal regulators etc. and their integration in providing a complete drainage solution;

– Extensive Environmental and Social Impact Assessment (ESIA) study as per ECR, 1997 which will include reviewing of existing policies, guidelines, laws, rules and regulations and suggestion of EMP, suitable monitoring network and plan suggestions etc.;

– Comprehensive Land Acquisition Plan (LAP) through a combination of field work involving rigorous site visits and consultations with affected people as well as desk study involving digitization of available CS and RS maps with latest Mauza maps; and

– Management Information System (MIS) including development of geospatial database, web-based knowledge portal and a number of tools collecting information and pertinent hydrological, hydrodynamic and other data generated by and related to modeling, design, ESIA etc.

# Workshop on Awareness Program - 'Our Environment Our Resource'

CEGIS and Livelihood Education And Development Services (LEADS) Foundation which provides sustainable education and healthcare facilities through different awareness and education support programs for selected school children, especially underprivileged children enrolled in different government schools of Bangladesh, organized workshop with the selected School Teachers titled "Our Environment Our Resource". This is the 5th phase of a regular yearlong program of LEADS on environmental awareness campaign for the 'School Children'.

*Organizers and participants of the workshop*

The campaign focused on issues such as environmental pollution and mitigation measures; responsible consumption of national resources, and adoption of the

**Cont'd on page 8**

# Hydro-morphological Study and Design of Paturia-Daulatdia Ferry Ghats

*Jakia Akter, River, Delta and Coastal Morphology Division*

Paturia-Daulatdia Ferry Route, in the vicinity of the confluence of the Ganges and Jamuna Rivers, plays an important role in the development of national trade and commerce. The Paturia and Daulatdia Ferry Ghats are positioned on the left and right banks of the Padma River respectively. Bank erosion and collapse, and riverbed scour are the common features of this river. So, any physical intervention should be designed very carefully to make it sustainable. Therefore, CEGIS has carried out a hydro-morphological study of the Padma River that was necessary to understand the morphological process of the river and to predict the possible future changes of the river for facilitating layout and design of ferry ghats and the associated on-shore installations at Paturia and Daulatdia as well as for selecting suitable bank protection measures for Bangladesh Inland Water Transport Authority.

The Jamuna River is characterized as braided river and the Ganges is a meandering river. The Jamuna River is hydro-morphologically more dynamic than the Ganges River. After meeting of these two very large rivers, a relatively stable confluence is formed because of the geometry of approaching rivers and due to the characteristics of the bank materials. In addition to the bank material erodibility properties, the location of the confluence has an influence on riverbank erosion. The Ganges is characterized by planform changes with divergence and convergence. However, the confluence of the Ganges and Jamuna has a minimum width, followed by a divergence. If the confluence is formed upstream of the present ferry route, then this route will fall within the divergence region, where huge erosion is expected depending on the erodibility of the river bank materials.

The Jamuna is a braided river and has multiple channels. It has usually two channels, called anabranches, before meeting the Ganges River. The right bank channel has created the first confluence with the Ganges; whereas the left bank Anabranch has produced the second confluence at further downstream of the first confluence. Area of maximum convergence will be found downstream of the second confluence, followed by a divergence at downstream. Hence erosion at Paturia and Daulatdia Sites are dependent on the confluence locations.

The location of Paturia-Daulatdia Ferry Route depends on the position of the confluence of the Ganges and Jamuna Rivers. If the ferry route lies in the divergence reach, downstream of the confluence, then bank erosion occurs and comparatively more dredging would be required. Less erosion occurs at Paturia Site, due to existence of cohesive bank materials; whereas Daulatdia Ghat is very erosion prone due to erodible bank materials. Goalanda Ferry Ghat has been shifted to Daulatdia Ferry (2 km upstream of Goalando location) in 1970s, due to channel abandonment and shifting of the channel away from the bank.

*3D Plan of Daulatdia Ferry Ghat*

Topography survey, hydrographic survey, and traffics survey and assessments were conducted for this study. Moreover, Initial Environmental Examination was conducted on the best option for planning the orientation and layout plans of the ferry ghats and their associated on-shore facilities and services. The economic study results indicate that the project is technically feasible, economically viable, socially acceptable and environmentally sustainable.

**Workshop on Awareness Program ... (Cont'd from page 7)**

3R principle of Reduce, Reuse and Recycle to minimize wastage, in line with the government curriculum. The main objective is to help the students reflect on their classroom lessons and accordingly adopt best practices in everyday lives and change their behavior to save environment and national resources.

As part of its Corporate Social Responsibility (CSR) and its mandate CEGIS extended all out support including the technical assistance to LEADS to conduct this workshop with School Teachers. The workshop was sponsored by Merits Technologies Ltd. which was held in Ambala Inn on 4th August, 2018. Romina Dewan, Executive Director, LEADS facilitated the workshop. TV Personality Dr. Enamul Huq, A. S. M Kabir, Chairman, LEADS, A. T. M Shamsul Alam, Director, CEGIS were also present. Despite of the situation prevailing then with the demonstration by the students for safe road, 27 teachers out of 30 from different public and non-public schools of Dhaka City were present and participated spontaneously giving importance to the issue and owned the program. CEGIS was happy to be the part of this innovative approach of involving school students to combat climate change through the teachers workshop.