Year 17: Issue 58
October-December 2018

Homepage of CEGIS Website
http://www.cegisbd.com

Upcoming

- Integrated River Management through Capital Dredging
- IEE Study of Siddirganj, Feni and Gazaria Power Plant
- Feasibility Study of Expansion and Strengthening of Power Network in Chattogram Area

Inside

- Environmental and Social Impact Assessment of Construction of Prime Minister's Committed Roads and Bridges in Haor Area of Sunamganj and Brahmanbaria Districts
- Training on Environmental and Social Impact Assessment (ESIA) under the Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) of BWDB
- Route Survey and EIA Study of Proposed Bogura-Rangpur-Saidpur Gas Transmission Pipeline
- Demonstration of Land Filling Phases within the Floodplain of Turag River using Multi-temporal High Resolution Satellite Images
- International Training on Modeling Software SWAT and HEC RAS for Government Officials of the Royal Government of Bhutan
- Hydrological Study by Mathematical Modeling for Feasibility Study for Upgrading of National Highways

CEGIS
Center for Environmental and Geographic Information Services
(A Public Trust under the Ministry of Water Resources)
House 6, Road 23/C, Gulshan 1
Dhaka 1212, Bangladesh.
Phone: 88 02 58817649-52; 9842581, 9842551
Fax: 88 02 9843128
Email: cegis@cegisbd.com, Web: www.cegisbd.com

the CEGIS NEWSLETTER

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

Participation of Executive Director, CEGIS in International Technical Workshop on Preparation for Transformational Climate Resilience Water Project Concepts in Asia

Engr. Md. Waji Ullah, Executive Director of CEGIS attended the International Workshop on Preparation for Transformational Climate Resilience Water Project Concepts in Asia in Manila, Philippines

A two-day long International Technical Workshop on 'Project Preparation for Transformational Climate Resilience Water Project Concepts in Asia' was held on 15-16 October 2018 at the Asian Development Bank (ADB) Headquarters in Manila, Philippines. The Technical Workshop was organized by The Global Water Partnership - in collaboration with the Asian Development Bank, Climate Change Commission, Philippines, the Government of Palau, Asia-Pacific Water Forum, Japan International Cooperation Agency, UN Environment, and the Asia Pacific Adaptation Network, in consultation with the Green Climate Fund. 58 participants from 24 Asian countries representing the GCF National Designated Authorities (NDAs), Direct Accredited Entities (DAEs), Decision Makers and Water Resources Planners from Water Ministries and Agencies, GWP Pan-Asia Program Managers, Regional Coordinators and Country Water Partnerships participated in the workshop.

Engr. Md. Waji Ullah, Executive Director, Center for Environmental and Geographic Information Services (CEGIS) and Member (Engineer), Joint Rivers Commission, Bangladesh (JRC), Government of the People's Republic of Bangladesh and Dr. Fazle Rabbi Sadeque Ahmed, Director (Environment and Climate Change), Palli Karma Sahayak Foundation (PKSF) and also Direct Accredited Entity (DAE) from Bangladesh actively participated in the technical workshop and presented ideas of two individual, water and climate change adaptation related projects.

The workshop provided clear understanding and guidance to the participants depending on third party agencies, the way on how to prepare strong water-related climate change adaptation project proposals to develop bankable project proposals under Green Climate Fund (GCF).

The workshop supported project preparation and delivery by promoting exchange of experiences and strengthening capacity. Almost

Cont'd on page 3

Environmental and Social Impact Assessment of Construction of Prime Minister's Committed Roads and Bridges in Haor Area of Sunamganj and Brahmanbaria Districts

Dr. Ashraful Alam, Agricultural and Fisheries Division

Road communication infrastructure in the Haor Area is poorly developed, mostly seasonal submersible rural roads providing connectivity during the dry season. Boat is the main mode of communication in the wet season. Poor communication network limits agriculture productivity and rural growth, off-farm employment opportunities and access to existing social services, particularly health and education, which make this area as the most poverty prone area of Bangladesh. Despite of high demand from the local population for better road communication possibilities, Haor Areas are highly environmentally sensitive, because of its fragile ecosystem with rich biodiversity. Any intervention in the area needs careful consideration of environmental consequences. Local Government Engineering Department (LGED) has taken an initiative to conduct a preliminary Environmental and Social Impact Assessment (ESIA) of 17 roads and structures under "Construction of Prime Minister's Committed Roads and Bridges in Haor Area of Sunamganj and Brahmanbaria Districts".

LGED Road for Sarail Upazila to Panishar Bazar

Center for Environmental and Geographic Information Services (CEGIS) has carried out the Environmental and Social Impact Assessment (ESIA) of the aforementioned project of 17 roads and structures. It may be mentioned that 15 roads out of 17 have been defined with existing alignments and 2 roads having no defined alignment are considered as new roads. Finally, CEGIS has prepared 17 ESIA reports, one for each road and also prepared an Overview Report on 17 ESIA reports. This "Overview Report" synthesized the methodology and findings of environmental and social impacts along with EMP considering sensitive Ecologically Critical Area (ECA) of Tanguar Haor as well as hoar ecosystem.

In summary, environmental and social impact assessment of 11 roads out of the 17 roads, will have negligible to low negative impact on physical and biological environment. On the other hand, these 11 roads have high social demand and can be implemented as partial elevated and all-weather roads. The remaining 6 roads have been proposed as submersible type and they have no or very negligible environmental impact. However, social acceptability of these roads is moderate as they are not operational throughout the year but are operational for six months during wet season.

As the project is situated in morphologically active area with high river bank erosion, cut-offs of bends and avulsion of the river courses, frequent flash flood due to changed climatic condition may create hydro-morphological, environmental and social hazards and disasters. Therefore, a detailed hydrological and morphological study for each all-weather roads and bridges need to be conducted in order to design the project. Finally, all ESIA reports should have to be updated based on detailed hydro-morphological and technical study as well as approved ToR from DoE.

Training on Environmental and Social Impact Assessment (ESIA) under the Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) of BWDB

Farhana Ahmed, Research, Development and Training Division

CEGIS, during last two decades, has generated enormous information and knowledge on the Environmental and Social Impact Assessment (ESIA) process. It is necessary to conduct ESIA study to understand the environmental and social changes due to project interventions and thereby reduce the impacts to greatest possible extent. With the objective to acquaint the BWDB professionals with the Environmental and Social Impact Assessment process, this training program was initiated by Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) under BWDB.

CEGIS organized a five-day long training program from 30th September to 4th October 2018 at CEGIS. 15 participants from BWDB participated in the training. The inaugural ceremony was chaired by Engr. Md. Waji Ullah, Executive Director, CEGIS. The training program included sessions on EIA Process, Morphological Considerations in ESIA Study, People's Participations in EIA, Project Design and Description and Water Resources. The participants visited the Main River Flood and Bank Erosion Risk Management Program of BWDB located in Harirampur, Manikganj where they gathered practical experiences in conducting ESIA study such as problem identification in consultation with local people.

Participants of the ESIA Training

The Certificate Distribution and Closing Ceremony was held on 4th October. Engr. Md. Mahfuzur Rahman, Director General, BWDB

Cont'd on page 5

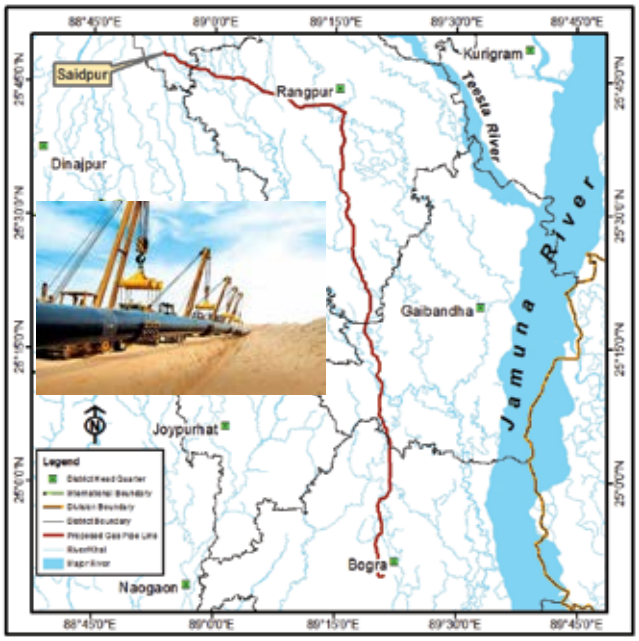
Route Survey and EIA Study of Proposed Bogura-Rangpur-Saidpur Gas Transmission Pipeline

Feroze Ahmed Kanak, Remote Sensing Division

The Government of Bangladesh has taken initiatives to transmit natural gas throughout the country for industrialization and power generation, especially in the Northern part of the country. The industrial development in this part, is not sufficient due to absence of natural gas. Bangladesh Government is trying to supply natural gas at Uttara EPZ, Nilphamari Economic Zone and other industrial units of Northern Region. In this regard, it is essential to build up a gas transmission pipeline from Bogura to Saidpur via Rangpur. The overall objective of this proposed assignment is to conduct Route Survey and Environmental Impact Assessment (EIA) of the proposed Bogura-Rangpur-Saidpur Gas Transmission Pipeline Project.

The scope of works for the EIA study of the "Bogura-Rangpur-Saidpur Gas Transmission Pipeline Project" are to i) establish the environmental and social baseline conditions of the project influence area considering physical, biological and social environment; ii) conduct adequate public consultations for ensuring participation of the concerned people of the project area and to incorporate their feedback in the EIA; and iii) prepare Environmental Management Plan (EMP), which would include mitigation measures, enhancement measures, compensation measures, environmental monitoring plan and institutional framework for implementation of the ESMP.

Starting Point of the Pipeline is Silimpur Mouza, Bogura Sadar Upazila, Bogura District and ending Point is Koya



Alignment of the Proposed Gas Pipe Line

Cont'd on page 7

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

25 projects ideas from Bangladesh, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Vietnam, Bhutan, India, Pakistan, Sri Lanka, Nepal and Mongolia were accepted by GCF authority in which three were from Bangladesh. For time limitation only one of these 3 project ideas that is ''Building of sustainable water supply and food security under climate change scenario in drought prone areas'' was discussed in the workshop as case study for Bangladesh. Engr. Md. Waji Ullah, Executive Director, CEGIS and Dr. Fazle Rabbi Sadeque Ahmed, Director, PKSF actively participated and jointly presented this project concept into GCF Project Proposal during the workshop.

The workshop was quite intensive, thematic subject oriented, participatory and interactive as well. Number of interesting findings, knowledge and experience diversity were developed and shared during the workshop which will be quite useful in preparation of a project proposal under GCF. As a follow up, initiative has to be taken so that the concept, ideas and experiences that Bangladesh Team acquired from the Technical Project Preparation Workshop will be gradually disseminated through organizing meetings and sessions in Bangladesh with relevant professionals from different organizations under the leadership of Bangladesh Water Partnership (BWP).

Contract Signing for Different Studies

During the fourth quarter of the year 2018 (October-December) 10 contracts have been signed between CEGIS and other organizations and clients. These contracts are signed for maintenance of Database Management System, conduct workshops and trainings, hydro-morphological and topographic study, support to implementation of the Bangladesh Delta Plan 2100, IEE, and EIA etc. The contracts are as follows:

i) "System Support and Maintenance of Microfinance Information Database Management System (MFI-DBMS)" has been signed with the Micro Credit Regulatory Authority (MRA) on 01 October, 2018; ii) "Letter of Agreement for a) a National Workshop to disseminate knowledge generated through SADMS for filed application and b) Local Workshop ensuring sustainable access to water supply for women, living in hilly districts under the climate change scenario with the Bangladesh Water Partnership (BWP) on 01 October, 2018; iii)

Mr. Mina Masud Uzzaman, Secretary, Bangladesh Power Development Board and Engr. Md. Waji Ullah, Executive Director of CEGIS are seen in the contract signing ceremony with other officials

"Initial Environmental Examination (IEE) of the 3 proposed Gas based Combined Cycle Power Plants

Cont'd on page 4

2nd Water Bangladesh International Exhibition 2018

Mr. Amir Hossain Amu, M.P, the then Hon'ble Minister, Ministry of Industries is visiting CEGIS Stall

A three day long 2nd Water Bangladesh International Exhibition 2018 was organized by the Conference & Exhibition Management Services, CEMS Global, Bangladesh at the International Convention City Bashundhara (ICCB), from 25-27 October 2018. The Ministry of Local Government, Rural Development and Co-operatives (LGRD) in association with CEMS Global have organized the exhibition. Mr. Amir Hossain Amu, M.P, the then Hon'ble Minister, Ministry of Industries has inaugurated the exhibition. CEGIS participated in this event like previous years to share their innovative ideas in relation to water issues.

CEGIS, CEMS Global, BUET, UNDP and RDA have jointly organized a seminar titled "Moving towards a Water-wise Bangladesh" which was held on 25 October 2018 at 3.00pm and the theme of the seminar was "Practical application of the new knowledge and technologies about water". A large number of Scientist, Researcher, Scholastic personality and dignitaries were present in the Seminar.

Dr. Shamsul Alam, Member, Planning Commission graced the seminar as Chief Guest, while Mr. Khurshed Alam, Assistant Country Director, UNDP Bangladesh (TBC) attended the occasion as Special Guest.

Engr. Md. Waji Ullah, Executive Director, CEGIS delivered a lecture on "CEGIS Governance of Water and Waste: A key to Sustainable Development" in the seminar. The researchers, scientists, academicians, NGO personalities, and dignitaries also shared their valuable comments and suggestions during open discussions after the presentation. The recommendations of the discussants on water sector management through innovation tools and techniques were considered to pave the way for better management practices in Bangladesh.

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

expected to be constructed at Siddihrganj, Feni and Gazaria, Bangladesh" by the Marubini Power System Corporation, Japan on 18 October, 2018; iv) "Support to the Implementation of the Bangladesh Delta Plan 2100" by the Twynstra Gudde Holding B.V., the Netherlands on 01 November, 2018; v) "Hydro-Morphological Study and Topographic Study of 7 Roads including bridges/culverts (Package No-01) of the Feasibility Study Project for Construction of Prime Minister's Committed Roads and Bridges in Haor Area of Sunamgonj and Brahmanbaria Districts" by the Local Government Engineering Department (LGED) on 15 November, 2018; vi) "Hydro-Morphological Study and Topographic Study of 10 Roads including bridge/culverts (Package No-02) of the Feasibility Study project for Construction of Prime Minister's Committed Roads and Bridges in Haor Area of Sunamgonj and Brahmanbaria District" by the Local Government Engineering Department (LGED) on 15 November, 2018 ; vii) "Atlas Preparation, Delivery and Related Service by using GIS Delimitation Tool under the Delimitation of Constituencies Ordinance, 1976 (Ordinance No. XV of 1976)" by the Bangladesh Election Commission (BEC) on 15 November, 2018; viii) Development of "Climate Change in Bangladesh" module to GIZ- OECD Adaptation Training Manual and roll out the training by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) of German Development Agency on 27 November, 2018; ix) "Supply, Installation of Hardware and Software for Implementation of GIS based Distribution Network System and Preparation for 25 Years Master Plan of BPDB on Turnkey Basis" by the Bangladesh Power Development Board (BPDB) on 27 November, 2018 and x) "Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) of the Proposed India-Bangladesh Friendship Pipeline (IBFPL) Project (Bangladesh Part)" by the Bangladesh Petroleum Corporation (BPC) on 26 December, 2018.

New Faces

Dr. Md. Shawkat Islam Sohel joined CEGIS in November 2018 as an Ecohydrology Expert. He has educational background in Forestry and Ecohydrology from Shahjalal University of Science and Technology, Bangladesh; Christian-Albrechts-University of Kiel, Germany; University of Lodz, Poland; and University of Queensland, Australia. He has profound knowledge and skill on natural resources management that includes tropical forest management, ecohydrology, ecosystem service quantification and mapping, stable isotopes in ecology, forest water use, climate impact and habitat suitability modeling, hydrological modeling, ecosystem risk assessment, carbon sequestration and biodiversity conservation. Till today he has published 34 peer review research articles on diversified field of natural resource management.

Khalid Bin Walid joined CEGIS in October 2018 as a Research Consultant under GIS Division. He completed B.Sc. in Civil Engineering from BUET in September 2017 and pursuing M.Sc. in Civil and Environmental Engineering. He is passionate in developing his career in the field of Environmental Engineering and aims to become an Environmental Expert of international level but wants to serve the country. His interest lies in Environmental and Water Resource Management projects. He has participated in different workshops/trainings which include Padma Multipurpose Bridge Project Workshop, CETP (Central Effluent Treatment Plant, Savar) Workshop, Induction Training in CEGIS. He dreams to visit maximum parts of the world.

CEGIS Environmental Lab: Echo Sounder

Rafiqul Alam, Water Resources Management Division

Echo Sounder

The Echo Sounder is a single beam hydrographic echo sounder. The function of the echo sounder is to measure bathymetry or cross sectional survey of river. The general principle of echo sounder is to determine the depth of water by transmitting sound pulses into water. The time interval between emission and return of a pulse is recorded, which is used to determine the depth of water along with the speed of sound in water at a time. This echo sounder is 2006 Kongsberg Maritime AS. The operating system of the echo sounder is windows 2000/ XP. The software is HYPACK/ 2017. This software is used for acquisition and processing of bathymetry data through inter-facing the DGPS and echo sounder. The type of the echo sounder is EA 400. This echo sounder is a single or multi frequency echo sounder which is used for the professional hydrographic community. It can operate with four frequency channels simultaneously. The operating frequencies are 38 and 200 kHz and the depth range is 0.5-2200m. The ping rate of transducer is maximum 20 pings per sec. Transducer is the sensor which is to be fixed in water.

The echo sounder system is used with Laptop for input and output. The EA 400 uses Microsoft Display Interface. This echo sounder, in CEGIS is used for measuring bathymetry survey of Mongla- Ghosyakhali Khal Monitoring Project. It can be used for water resources applications, hydro-morphological or any hydrographical study projects where cross section and depth is needed for study. This instrument is used for monitoring of river, streams or water ways in safe navigation, flood protection, civil engineering works or environmental monitoring program and river engineering/river training works. CEGIS can use this equipment in the aforementioned projects or works.

Training on Environmental ... (Cont'd from page 2)

dignified the ceremony as Chief Guest. Md. Rafiqul Islam Choubey, Project Director, PMO-FRERMIP, BWDB was presented as special guest. Engr. Md. Waji Ullah, Executive Director, CEGIS chaired the closing ceremony. Certificates were awarded to the participants for their achievement in completing the training program successfully.

Nature: Rosy Starling, a passerine bird

Md. Sharif Hossain Sourav
Ecology, Forestry and Biodiversity Division

The possibility of appearing bird is rare when the sun is at the top of the horizon. It is their resting time, usually during the full sun, birds hide into the foliage cover of trees. However, there was a desperate search from my end for few unusual birds those are vagrant and winter migratory to islands and coastal areas of Bangladesh. During the second day of my field survey, there was no sign of Pacific -reff Egret at CherraDwip. Despite of this, my concentration was focused to look for Rosy and Common Starling, the two starling species.

It was my dream to see the starling species in natural environment of Bangladesh. During a walk in an agricultural field to observe birds, my binocular spotted two small birds coming from the East end of the sky and within few seconds, I finally landed in a tree trunk. Among these two species, one resembles the starling. Immediately after few minutes, I realized that the bird is Rosy Starling and my dream came true!

During the first day, the Rosy Starling was foraging alone while following other two days during the study tour it was discovered that both Rosy Starling (migratory bird) and common Myna species (very common Starling species in Bangladesh) were always together, which is an interesting observation. In addition, it was found that they were slow and late moving. Always fly after common starling to reach out a feeding source. Usually, perching tree branches like other starling species. Foraging for feed from common source, agriculture land and other suitable habitat.

Rosy Starling from Chhera Dwip of Saint Martin's Island

Rosy starling (*Pastor roseus*) is a passerine bird. The adult Rosy Starling has pink body, pale orange legs and bill, and glossy black head, wings and tail. Plumage of young Rosy Starling in winter is comparatively dull.

Rosy Starling migrates during winter season to India and tropical Asia including Bangladesh. In India during winter, it often outnumbers the local Starlings and Mynas. It occurs from easternmost Europe throughout temperate Southern Asia. The starling is a summer visitor for Northwestern Afghanistan, passage migrants in the rest of the Afghanistan and a regular winter visitor in most of Pakistan and India.

It feeds grasshoppers and other insects. Rosy starlings are highly gregarious birds, and often form large, noisy flocks, which can on occasion be a pest for growers of cereal crops or orchards; as the birds are strongly attracted to flowering trees. However, they are also greatly beneficial to farmers as they prey on pests such as locusts and grasshoppers, thereby limiting their numbers.

Demonstration of Land Filling Phases within the Floodplain of Turag River using Multi-temporal High Resolution Satellite Images

Md. Nasrat Jahan, Remote Sensing Division

Multi-temporal High Resolution Satellite Images of Google Earth is very useful to identify the land filling process. Different locations of the flood plain of Turag River is gradually filling with sand particle and is converted into a land for different uses. The satellite images that were acquired on 13 November 2004, 6 April 2013, 17 November 2016 and 25 April 2018 show different phases of land filling process within the flood plain of Turag River at Deuni, Savar Upazila, Dhaka. On 13 November 2004, flood plain area was occupied by open water. However, one large patch and two or three small patches of sand were visible on 6 April 2013 within the flood plain area at Deuni. This indicates the land filling process was started at Deuni. The major portion of the flood plain at Deuni was filled by sand particle within 17 November 2016. After the sand filling process, the land development process started within the land filling portion. Satellite images of 25 April 2018 shows the different land development signatures within the land filling portions like roads and plantation.

Open Water in Turag River Floodplain, Deuni *13 November 2004*

Signature of Some Patches of Sand Particles in Turag River Floodplain, Deuni *6 April 2013*

Land Filled Area in Turag River Floodplain, Deuni *17 November 2016*

Signature of Land Development within Land filled Area, Deuni *25 April 2018*

International Training on Modeling Software SWAT and HEC RAS for Government Officials of the Royal Government of Bhutan

Ahmmed Zulfiqar Rahaman, Climate Change and Disaster Management Division

CEGIS conducted a ten days long international training for Government Officials of the Royal Government of Bhutan from 23 October, 2018 to 02 November, 2018. The training was on hydrological model SWAT and hydrodynamic model HEC-RAS with a view to make twelve Engineers of different departments of the Royal Government of Bhutan, capable of applying those softwares in their respective working arena through hands on exercises. The training module was tailored and customized for the country perspective with own resources of CEGIS. A case study was also conducted to prepare flood hazard map using same softwares for Kerong River of Bhutan to illustrate the real life application of their learnings. As an organizer, Dago Zangmo, Chief Engineer, Flood Engineering Management Division under the Department of Engineering Services of Ministry of Works and Human Settlement, the Royal Government of Bhutan praised and appreciated the wholehearted effort and enthusiasm of CEGIS to make the training successful and exemplary one. Mr. Malik Fida Abdullah Khan, Deputy Executive Director (Operations), CEGIS inagurated the training program and Engr. Md. Waji Ullah, Executive Director of CEGIS attended the closing ceremony and distributed certificates among the participants and committed to deliver more integrated effort by CEGIS for the betterment of the society in general and environment in particular for both at home and aborad.

Malik Fida A Khan, Deputy Executive Director, CEGIS is conducting the training session in Thimphu, Bhutan

Trainees are receiving Certificates from Engr. Md. Waji Ullah, Executive Director of CEGIS after the completion of the training in Thimphu, Bhutan

Route Survey and EIA ... (Cont'd from page 3)

Mouza, Saidpur Upaliza of Nilphamari District. Total Length of the 24" diameter pipeline is 149km. Width of acquisition and requisition for the pipeline is along the right way 8m (4m+4m on both sides) and 15m (6m on the right side and 9m on the left side) respectively.

According to the land acquisition procedure the pipeline have not crossed the Mosque, Madrasha, School, Graveyard, Temple, and Permanent Structures. Initially the pipeline route was identified using Google Earth, Base Map and High Resolution Satellite Imageries and was verified by direct field survey. Trimble Juno 3D (GPS) and Apple iPad have been used for the field survey to identify the actual position of the features in the real world. Total Station have been used for high level precision detailed route survey. Finally, the route alignment drawing, plot index map and topographical contour map has been prepared by AutoCAD software.

4th National Development Fair 2018

The "4th National Development Fair 2018" was held throughout the country at the headquarters of all districts and upazilas of Bangladesh including the Capital City during 4-6 October 2018.

Honorable Prime Minister Sheikh Hasina has inaugurated the 4th National Development Fair 2018 across the country through a Video-Conference from her official residence (Gonobhaban) in the City on 4th October 2018, Thursday at 11.00 am. The slogan of the Development Fair - 2018 was 'Indomitable Bangladesh on March Towards Development".

Organizers and participants of the Development Fair

Cont'd on page 8

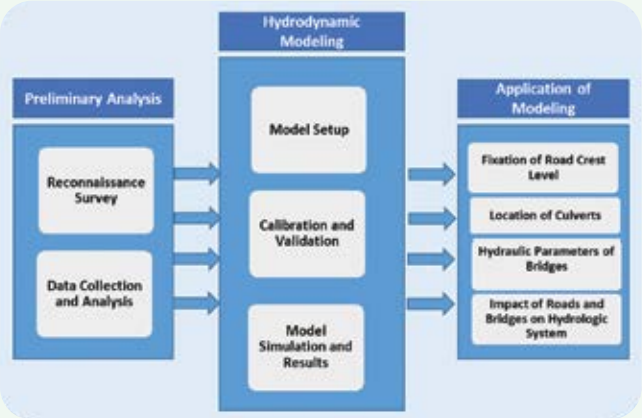
Hydrological Study by Mathematical Modelling for Feasibility Study for Upgrading of National Highways

Gazi Md. Riasat Amin, Climate Change and Disaster Management Division

Roads and Highways Department (RHD) has taken initiative to enhance its transportation sector through increasing its existing road network. Funded by Asian Development Bank (ADB), HIFAB was engaged as the consultancy firm to conduct the feasibility study and detailed engineering design for upgrading 590 km of the selected portion of national highways, regional highways and zilla roads. Hifab engaged CEGIS to conduct study for understanding the hydrological regime in detail and to assess cross drainage requirements for proposed structures along the seven roads located at five hydrological regions of the country. This study includes detailed hydrological analysis of river basins associated with the proposed road sections with mathematical modeling and satellite image analysis to determine crest width for roads, suitable location and horizontal and vertical clearance for bridges which are to be constructed.

The overall approach and methodology that has been followed during the study of the project are according to the overall approach of the modeling.

As a part of the study, hydrodynamic and hydrology



Overall approach of the modeling

model was developed for seven national highways under NW, SW, NE, NC, and EH Hydrological Regions. The objective of this modelling study is to assess the adequacy of the existing bridges by analyzing the hydrodynamic and hydrological condition and suggesting improvement of the bridge or roads if required by analyzing the model outcome i.e. water level, velocity, discharge. SOBEK was used for all the regions except EH. Hydrodynamic Model of Chattogram was done with Delft3D FM.

For detailing, catchment areas were first delineated using Arc-Hydro tool of ArcGIS software. Region wise available water level and discharge data were used as boundary condition of the model.

On the other hand, Delft3D Flow has been used for simulating Chattogram Port Access Road Model. Delft3D has been selected as it has the capability to simulate storm surges along with flow model and it is well known that Chattogram is one of the storm surge prone areas and the study road is located close to the shore.

The calibrated and validated flow model was used to set up storm surge model for extreme event simulation. Representative cyclone selected from the historical cyclones by applying extreme value analysis from GUMBEL Method.

Developed detailed model was calibrated and validated against observed water level and flow data. For statistical performance evaluation, two objective functions names, Nash Efficiency (NSE) and Correlation Co-efficient (R2) will be used.

The end results of this overall study are as follows:

- Horizontal and Vertical clearance
- High water Standard water level
- Low water level
- Design discharge
- Depth of flow
- Flow velocity and
- Scour Depth.

4th National Development ... (Cont'd from page 7)

Honorable Prime Minister Sheikh Hasina said, "The fair will inspire the youth to build their own future and to do something for themselves and for the betterment of people as well as of the country while abstaining themselves from militancy, terrorism and other vices."

In the capital city the three-day long Development Fair was organized at International Trade Fair in Agargaon Area. The main objective of the fair was to focus and inform the people about the development activities of the government, its success and ongoing development programs/projects taken by the present government to build Bangladesh as a middle income country by 2021 and a developed one by 2041.

The three-day long program included development debate, cultural function, documentary show and prize distribution among the winners/performers of different events.

CEGIS as a Public Trust under the Ministry of Water Resources (MoWR) has also participated in the Development Fair from Dhaka. CEGIS Team presented its products/publications (map, report, flyer etc.) in the fair with MoWR banner in association with BWDB in their nicely decorated pavilions.