Year 18: Issue 61
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Semi-evergreen Forest at Cox's Bazar

Upcoming

- Environmental and Social Impact Assessment of Economic Zone-4 at Sonadia-Ghotibhanga Islands
- Rainstorm Flow Assessment Investigation
- Geo-hazard Risk Assessment of Road Infrastructure in Bangladesh

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the CEGIS NEWSLETTER

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

Visit of Honorable Chairperson of the Board of Trustees at CEGIS Premises

(from left) Mr. Malik Fida A Khan, Executive Director (In-charge), CEGIS; Mr. Kabir Bin Anwar, honorable Chairperson, CEGIS-BoT and Secretary, Ministry of Water Resources, Government of Bangladesh, and Deputy Executive Director (Development), Dr. Maminul Haque Sarker are seen during the occasion

Mr. Kabir Bin Anwar, honorable Chairperson, CEGIS-BoT and Secretary, Ministry of Water Resources, Government of Bangladesh made an official visit at CEGIS premises on 09 September 2019. The Chairperson was warmly greeted by the Executive Director (In-charge), Mr. Malik Fida A. Khan along with the top management. Professionals from all divisions of CEGIS were present in the occasion. Inaugural speeches were made by both the Executive Director (In-charge) and the Deputy Executive Director (Development), Dr. Maminul Haque Sarker.

The honorable Chairperson, CEGIS-BoT delivered an inspiring speech addressing all professionals of CEGIS during the occasion. Mr. Anwar acknowledged the efforts which CEGIS is putting forth in contributing to the overall sustainable management of natural resources. As an environmentalist by heart, he stressed on the necessity of integration between the natural aspects governing the biodiversity and ecosystem of the country in devising eco-friendly solutions. The honorable Chairperson also highlighted that the Environmental Impact Assessment (EIA) is to be an integral part of present and all future development initiatives. He thus shouldered the responsibility upon the professionals of CEGIS for ensuring simultaneous maximization of beneficial environmental effects whilst amelioration of the adverse effects to the greatest extent possible. He reminded that this can only be made possible through maintaining transparency and sound work ethics in performing all respective duties akin to conducting environmental assessment exercises. Mr. Anwar also exhorted on supporting the management of natural resources for sustainable socio-economic development at home and abroad through cooperation and collaboration with wide group of national and international organizations.Finally, he envisioned CEGIS to be a center of excellence in the fields of water and natural resources management and to continually stamp an authoritative role in its contribution to the sustainable development of Bangladesh through dedication, sincerity with the right amount of innovative touch.

Training on Integrating Climate Change Adaptation into Development Planning of Bangladesh for Officials of Planning Commission

Ahmmed Zulfiqar Rahaman, Climate Change and Disaster Management Division

CEGIS along with C3ER, BRAC University got the opportunity to conduct an intensive participatory training program with the support of German Development Cooperation (GIZ), aimining in building a systematic approach towards climate change adaptation through Integrating Climate Change Adaptation into Government Planning Process of Bangladesh. This training program started in November 2018 and completed in June 2019, where 227 officials from Planning Commission as well as from other departments, agencies and ministries participated. The participants of all the 12 batches were very much interactive, enthusiastic and proactive during case studies. Team of CEGIS and C3ER, Brac University developed and customized the training program and schedule.

The following 5 modules from the original 11 modules were selected for the training program -

- Module 1: Climate Change Basics (Climate Change in Bangladesh)
- Module 4: Risk Assessment
- Module 5: Identify Adaptation Options
- Module 8: Institutional Capacity for Adaptation
- Module 11: Integrating Adaptation to Government Planning Cycle

Dr. Ainun Nishat, Professor Emeritus, BRAC C3ER, Dr. Asaduzzaman, Former Research Director, BIDS and Malik Fida A. Khan, Deputy Executive Director (the then), CEGIS were the Resource persons for this program.

Resource Person Dr. Ainun Nishat delivering his lecture on Climate Change in Bangladesh Module

Prior to this, Training of Trainers (ToT) was held at The Palace Luxury Resort at Habigonj which was chaired by Dr. Shamsul Alam, Member (Sr. Secretary), General Economic Division, MoP. Dr Shamsul Alam also chaired the closing ceremony and certification program on 27 June 2019. The training was coordinated by Ms. Sharmin Nahar Nipa, Lecturer of C3ER and facilitated by Mr. Ahmmed Zulfiqar Rahaman and Ms. Nowrin Mou from CEGIS.

Land Acquisition Planning (LAP) and Resettlement Action Planning (RAP) Training

Md. Alamgir Hossain, Socio-Economic and Institutional Division

A 3 day long training program on "Land Acquisition Planning (LAP) and Resettlement Action Planning (RAP)" was organized by CEGIS at its Conference Room from 24 to 26 August 2019. Nineteen participants from different government and non-government organizations attended the training program.

The training program comprised of both lectures and hands-on practical sessions by Experts from different organizations including CEGIS, National Curriculum and Textbook Board (NCTB), the Asian Development Bank (ADB), the World Bank, and Bangladesh Bridge Authority (BBA) as Resource Person. The participants learned about LAP and RAP through hands-on experiences leading classes. The Resource Persons delivered lectures through power point presentations in an interactive manner, each of which included a designated time for questions and answers sessions.

Participants sharing knowledge during the training session

The main objective of this training was to enhance the knowledge and capacity of the officials serving in different organizations of the country in land acquisition processes and resettlement processes in different development projects. The responses from the participants were encouraging as they suggested ways to improve such trainings in future. The 3 day long training program can be marked as a successful one.

Contract Signing for Different Studies

Contract Signing between CEGIS and WARPO for Study on Online Processing and Tracking of Water Resources Project Clearance and NOC for Groundwater Abstraction

During third quarter of the year 2019 (July-September), CEGIS has signed 6 (Six) contracts with different other organizations and clients. These contracts are signed mainly for Training of Trainer (ToT) on IWRM, Planning Toolkit for Strategic Delta Plan Implementation, Procurement of Hardware, Software and Required Accessories for Setting up Data Center, Online Processing and Tracking of Water Resources Project Clearance, Feasibility Study and IEE etc. The contract titles with date of signing are given below:

i) "Training of Trainer (ToT) on Integrated Water Resources Management (IWRM)" with Bangladesh Water Partnership (BWP) on 05 August, 2019; ii) "Consultancy Service for Feasibility and IEE studies of Bangladesh (Rahanpur) - India (Jharkhand) 400kV Double Circuit Transmission Line Project (Bangladesh Portion)" with Power Grid Company of Bangladesh (PGCB) on 05 September, 2019;

Cont'd on page 4

Floral Resource in... (Cont'd from page 5)

Bamboo and Cane are widely recognized plants of evergreen forests. Large cluster of Bamboo and Cane can be found here and there in the forest. They germinate and grow there naturally. For building rural houses and many other uses they are closely related to human life. Apart from that, some shrubberies and creepers are also found in evergreen forests. Various ferns, grasses and orchids are found almost everywhere in these forests. On top of providing various necessary components and managing ecological balance, evergreen forests' diversified trees, shrubberies and creepers are significant home to wildlife of our country as a single tree may provide food and shelter to many species of insects, worms, small mammals, birds, amphibians and reptiles.

Despite of having huge beneficial role; forest plant resources are also being affected by massive pressure of large population and annihilation of forest is going on. Due to uncontrolled harvesting, extension of agricultural land, invasion of alien plants and lack of planned management mixed-evergreen forests trees are on the way of extinction. Top of that, many green hills and hillocks are rapidly becoming grey for recent Rohingya refugee crisis in the Southeastern part of the country. Rapid annihilation of this type of forests are truly frustrating. It is high time to protect such forests resources and its gene pool without any delay. Local people needs to be engaged alongside Governmental supervision to protect such forests. Only our combined effort can safeguard these invaluable forests of our country. Otherwise we are going to face consequences for our own misdeed by not stopping the annihilation of floral diversity in semi-evergreen forests of Bangladesh.

Multiparmeter Water ... (Cont'd from page 5)

to generate power without external voltage. Galvanic probe contains an anode and a cathode in electrolyte. Oxygen enters in to electrolyte via membrane, which generates voltage between the anode and cathode. This difference in potential voltage is used to measure the amount of dissolved oxygen.

pH and DO of water samples of different study projects were analyzed in CEGIS Laboratory. This Instrument can be used for environmental monitoring or related study projects.

ISO Internal Auditor ... (Cont'd from page 8)

ISO requirements.

To commence CEGIS's meticulous journey in acquiring relevant ISO certifications, a training program entitled 'Internal Auditor Training on Integrated Management System' was organized for the professionals of CEGIS with a view to provide them with a basic understanding of 3 relevant ISO standards- ISO 9001-2015, ISO 14001-2015 and ISO 45001 - 2018. Centre for Quality Solutions (CQS), a registered consulting firm that provides consultancy services in the field of Management system development and certification especially on Quality Management System, Environmental Management System (ISO 14001) etc., was engaged for this purpose. Mr. Md. Rokibul Hossain, Chief Consultant, CQS was the resource person for this 3-day long training program which was held at CEGIS on 11, 12 and 15 September.

Twenty-eight professionals from CEGIS took part in this training program. The program was inaugurated on 11th September by Mr. Malik Fida A. Khan, Executive Director (In-Charge), CEGIS. In his speech, Mr. Khan expressed his enthusiasm for this training program and delivered a succinct plan for further development of this organization.

Strive for Excellence

Farhana Ahmed, a senior level professional working under the Research, Development & Training Division of CEGIS successfully completed her PhD on 1 July 2019 from the Vrije University, Amsterdam as a part of sandwich project of IWFM, BEUT and Wageningen University & Research. Dr. Farhana conducted her research titled "Resilient Adaptation to Flood Risks under Urban Growth and Climate Change Dynamics: A Case of Dhaka". She identified the adaptation tipping points, assessed flexible resilience options against the existing robust engineering measures and formulated adaptation policy pathways for adaptive flood management of urban areas in the delta regions in light of the changing of urban and climatic environment. During her PhD study, Dr. Farhana published several scientific papers in renowned international journals and presented her findings in several international and national conferences. Her research has contributed to strategic and adaptation planning (e.g. BDP2100) and expected to be applied in future projects related to flood management.

Route Survey, Topo Survey, IEE, EIA, RP with Feasibility Study of Proposed Grid Network Development Project at Southern Zone

Bilkish Sultana, Power Energy and Mineral Resources Division

Power Grid Company of Bangladesh Limited (PGCB) has entrusted CEGIS to conduct the Feasibility Study including Soil Investigation, Route Survey, Topographical Survey, Initial Environmental Examination, Environmental Impact Assessment, and Resettlement Plan studies for Proposed Grid Network Development Project at Southern Zone to select the suitable routes and substation sites, to get approval of Development Project Proposal (DPP) and to have necessary site and environmental clearance. The proposed project includes 80km long Barishal (N)- Gopalganj 230 kV Double Circuit line, 2×230 kV AIS bay extension at Barishal (N) Substation, 55 km long Gopalganj-Faridpur 230 kV double circuit line, 2 km long Line In Line Out (LILO) of Barishal-Bhola-Borhanuddin at Bhola, Gopalganj (N)-Shibchar 230 kV double circuit line, 2km long Double LILO at Bhanga from Madaripur-Faridpur line, 2km long LILO of Barishal-Bhandaria double circuit 132 kV line, 45km long Bagerhat-Bhandaria 132 kV double circuit line, 132 kV bay extension at Bagerhat and Bhandaria, 50 km long Bakerganj-Barguna 132 kV line second circuit stringing and 132 kV bay extension at Barguna, Bakerganj.

Map showing proposed Grid Networks and Sub-station

The proposed project will cover eight districts of Bangladesh namely Faridpur, Madaripur, Gopalganj, Barishal, Jhalakathi, Bhola, Pirojpur and Khulna. Transmission lines and substations spreaded over 81 unions under 22 upazilas of the aforementioned 8 districts.

To conduct the aforementioned studies, necessary data have been gathered through field visits, secondary sources as well as from proponent and other relevant organizations. All study reports have been prepared and submitted to the client. Based on the technical and environmental reports it can be concluded that the project is sustainable and acceptable in all respect and definitely a timely decision of the Government in general and PGCB in particular.

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

"Extending the Planning Toolkit for Strategic Delta Plan Implementation in Bangladesh" with Policy Research Institute of Bangladesh (PRI), Center of Water Management and Climate Change (WACC) and IHE Delft on 12 September, 2019; iv) "Procurement of Hardware, Software and Required Accessories for Setting up Data Center" with Bangladesh Climate Change Trust (BCCT) on 19 September, 2019; v) "Study on Online Processing and Tracking of Water Resources Project Clearance and No Objection Certificates for Groundwater Abstraction" with Water Resources Planning Organization (WARPO) on 26 September, 2019; vi) "Construction of 13 storied CEGIS Bhaban with 4 basements at Plot No. F-14/E, Agargaon, Sher-e-Bangla Nagar, Dhaka" with SpaceZero Limited on September 22, 2019.

Development of GIS based... ... (Cont'd from page 7)

about consumers, HT/LT poles, power and distribution transformers, 132/33kv and 33/11kv sub-stations, 33kv, 11kv feeder lines, RMUs. These data will be synchronized with the existing database systems of BPDB and finally, they will be overlaid onto GIS map. BPDB Engineers and stakeholders will be able to have access to the data and can conduct various analysis on data through Web GIS applications. There will be various level access control to the Web GIS application, protected by user names and passwords. Outputs of the project will support enhancement of power distribution network capacity of BPDB's present system in an efficient way and ensure high-quality support to the consumers and stakeholders.

New Faces

Tasbiha Kabir joined CEGIS in July 2019 as Research Consultant under Climate Change and Disaster Management Division. She graduated in Civil, Environment, Water Resource & Coastal Engineering (CEWCE) with Civil and Environment as Major from Military Institute of Science and Technology (MIST). She jointly published papers on "Re-evaluating the Traditional Rainwater Harvesting Systems in Climate Change Induced Potable Water Scarce Coastal Areas of Bangladesh" which was selected for International Conference on Climate Change (ICCC-2019) and "Production of Concrete using diverted Rainwater First Flush" in International Conference on Future Environment and Energy (ICFEE-2020).

Abdullah-Al-Faisal joined Climate Change and Disaster Management Division of CEGIS on September 2019 as a Research Consultant. He graduated in Urban & Regional Planning (URP) from Rajshahi University of Engineering & Technology (RUET). He has extensive experience in Remote Sensing, Geographic Information System (GIS), Climate Change, Disaster Management, and Environmental Management. His areas of interest are Remote Sensing, Environmental Assessment, Climate Change, Water Modeling, Urban Growth Assessment and Prediction, Population Data Analysis, Land Use Regression (LUR), Modeling etc. He has some research-based publications on international journals and conferences.

CEGIS Environmental Lab: Multiparmeter Water quality Tester

Rafiqul Alam, Water Resources Management Division

Edge (pH) Meter

Multiparameter Water Quality Tester enables the user accurate measurements community measured laboratory parameters using of HANNA digital sensors for pH and Dissolved oxygen. The model of pH meter is HI2020 and of DO meter is HI 2040. Range for pH is -2 to 16 and for DO is 0 to 45 mg/L. EC, TDS, Salinity and Temperature may also be measured with this Water Quality Tester. The instrument has to be calibrated before measurement for accuracy. Calibration for pH is done for 3 point by buffer solutions pH 7.01, 4.01 and 10.01 and for DO meter for 2 point at 100% water saturated in air and at zero oxygen solution. The basic principle of pH meter is to measure pH that is hydrogen ion concentration. Acid is stronger for increasing of hydrogen ion concentration. Solutions having pH value ≤1 will be highly acidic and with pH value ≥14 will be highly basic. A neutral solution as pure water, the pH value of which is 7. The pH meter comprises of a simple electronic amplifier and two electrodes, a sensor electrode and a reference electrode and some form of display calibrated in pH units. These electrodes are in the form of glass tubes. The sensor electrode bulb is made up of permeable glass membrane coated with silica and metal salts and a silver wire coated with silver chloride which is immersed in pH 7 buffer solutions and reference electrode bulb contains another silver wire coated with silver chloride which is immersed in the saturated potassium chloride solution.

When the Electrode is immersed in a solution, hydrogen ions accumulate around the bulb and replace the metal ions from the bulb. These exchanges of ions generate some electric flow that is captured by the silver wire. The voltage of this electric flow is measured by pH meter by converting it into pH value by comparing the generated voltage with the reference electrode.

Edge (DO) Meter

The basic principle of Edge (DO) Meter underlying the electrochemical determination of oxygen concentration is the use of membrane covered electrochemical sensor. The main component of the sensor is the oxygen permeable membrane, the working electrode, the electrolyte solution and a reference electrode. Dissolved oxygen refers to the measure of a percentage of oxygen or mg/L that dissolves in a given solution. The measurement can be determined with dissolved oxygen meter device that uses oxygen-sensing probe which contains galvanic sensor.

In this meter galvanic sensor acts as a battery and is able

Multiparameter Water Quality Tester Edge (pH/DO) Meter

Cont'd on page 3

Nature: Floral Resource in Semi-evergreen Forests

Mushfiq Ahmed, Ecology, Forestry and Biodiversity Division

Semi-evergreen Forest, Ramu, Cox's Bazar

Mixed or semi-evergreen forests are generally found in Bandarban, Rangamati, Khagrachari, Chattogram, Cox's Bazar, Sylhet, Moulvibazar and Habiganj Districts in Bangladesh. These woodlands are enriched with many small hillocks and hilly springs and are home to numerous species of flora and fauna.

Babbling sounds of streaming springs are - the heartbeat of evergreen forests. Various species of wildlife wandering in these forests truly creates enthralling environment. Numerous tall and medium sized plants and shrubberies are unique attribute of semi-evergreen forest. High density plants grow upto around 46-61 meter high. These forests looks green throughout the year due to extensive rainfall. Major plants of semi-evergreen forests in Bangladesh are: Gorjon, Telshur, Dhakijam, Uriam, Nageshwar, Chatim, Jarul, Koroi, Fig, Chapalish, Ashok, Chikrashi, Bohera etc. The evergreen forests are actually made up of such evergreen plants all over the country. The significance of evergreen plants to all the living being is staggering. In fact, plants supply food to nearly all terrestrial organisms, including humans. We eat either plants or other organisms that eat plants. They maintain the atmosphere which produce oxygen and absorb carbon dioxide during photosynthesis. Oxygen is essential for cellular respiration for all aerobic organisms. It also maintains the ozone layer that helps to protect lifefroms from damaging UV radiation. Removal of carbon dioxide from the atmosphere reduces the greenhouse effect and global warming. The role of evergreen forest plants are immense in this regard.

On the other hand, such plants provide many products for human use, such as firewood, timber, fiber, medicine, dye, pesticide, oil, rubber etc. For example: timbers of Gorjon are very strong and are used for railway sleeper, doors and furniture. Again, Chatim's timbers, being comparatively soft, are widely used in safety-match making industries etc. Banyan trees and various species of Figs are among the vital plants of evergreen forests. Though they do not provide any timber, yet they offer food to wildlife throughout the year.

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Historical Satellite Images as a Tool for Wetland Monitoring

Mir Fahim Shaunak, Remote Sensing Division

A picture worth thousands of words. To address the raising demand of Dhaka City's increasing population a land development project named 'Uttara Residential Model Town (3rd phase)' was taken by RAJUK. A connecting road "Sonargaon Janapath" has been constructed through the flood plain zone to connect the new project area with Uttara sector-12. The sequential satellite images shown below are derived from Google platform, from which it is observed that a portion of wetland has been filled up and haphazard settlement is progressing with those land. Satellite image analysis on regular basis could be an effective regulatory tool for urban policy makers.

13 November 2004

06 November 2008

01 November 2011

14 November 2013

17 November 2016

09 December 2018

River Management by Enhancing the Navigability, Minimizing Drainage Congestion, Wetland Ecosystem, Irrigation and Landing Facilities

Jakia Akter, River, Delta and Coastal Morphology Division

Waterway transportation is characterized as the cheapest, most environment-friendly and less accident-prone compared to any other mode of transportation. However, waterways in the Southwestern region of this country serve as an important mode of transportation not only for the local movement of freight and passengers but also to import and export goods through the Mongla Port. Besides, construction

Chandana River view

of Padma Bridge and the third seaport at Payra would surely add additional demand for inland navigation in this region.

Due to proximity to the deep sea, Mongla Port has already attracted many international shipping companies. Use of the Mongla Port is increasing rapidly as an alternative to the Chattogram Port for avoiding the increasing traffic congestion. Moreover, Khulna is becoming a vital regional industrial center of Bangladesh. Cheap and safe communication network connecting Khulna with other parts of the country throughout the year will certainly contribute to the overall socio-economic growth on a large scale. Due to the presence of crisscross river system in Bangladesh, the cost of construction and maintenance of roads and railway is high, along with their environmental and social negative consequences. Thus, waterway transportation could be one of the sustainable and cheapest alternatives, especially for Khulna Division, where rivers shape the landform in the Southwest region of Bangladesh. The available crisscrossed rivers and tidal creeks can be used effectively for navigation with appropriate capital and maintenance dredging.

The present condition of the rivers in this region is very poor. Sometimes, it is difficult to trace a river, because of its higher bed elevation and encroachment by the elite people. Dense water hyacinth mats in many rivers, like Chitra, Kabadak, Mathabhanga, Kumar and many more rivers also interfere the boat navigation and prevent fishing, swimming, and other recreational activities. It creates difficulties for other water uses, like- clog intake pipes used for irrigation. Shallow depth rivers have become mosquito breeding grounds in many places. In addition, extreme drainage congestion due to low or no conveyance capacity of the river. Under such circumstances, Government of Bangladesh has given responsibility to BIWTA to improve the conditions of the rivers for ensuring year-round navigability along with other riverine services. In order to achieve this goal, BIWTA has taken initiatives to revive the river networks through capital and maintenance dredging. Accordingly, BIWTA decided to conduct a feasibility study for rejuvenating the river networks and enhancing the existing navigation facilities in Khulna Division through dredging along with other activities as required. CEGIS has been awarded for conducting this feasibility study.

Development of GIS based Distribution Network System Database and Preparation of 25 Years Master Plan for BPDB

AMM Mostafa Ali, Benzir Huq Mou and Md. Ashraful Alam, Geographic Information System Division

Bangladesh Power Development Board (BPDB) has planned to expedite planning and implementation of renovation/augmentation works of the existing power distribution network system as well as expansion of the same within its jurisdiction through applying latest available digital technology. In order to achieve this goal, BPDB planned to enrich the existing distribution network database by introducing GIS based mapping of area under BPDB, so that multi-dimensional analysis on data and ease of access to the database for its stakeholders can be established and finally a better consumer service can be ensured.

In order to establish such GIS based distribution system network database and digital mapping system, BPDB has undertaken an 18 months duration project starting from December, 2018. BPDB has entrusted the project work to a Joint Venture (JV) named KEPCO-WAVUS-CEGIS, led by Korea Electric Power Corporation (KEPCO), Korea. CEGIS is the local and main partner of this joint venture and responsible for technological support, data collection, quality assurance, data analysis and eventually development of geodatabase.

Activities of the project include carrying out of high precision Global Navigation Satellite System (GNSS)/ Real Time Kinematic (RTK) based survey of distribution system network assets of BPDB. The activities also include preparation of database of existing network elements and preparation of short term, mid-term and long-term plan for renovation and expansion of distribution network and a distribution network system masterplan up to 2042. Apart from that, GIS based mapping will be prepared for analysis of future distribution network system. Moreover, the database will be populated with data/information

Map showing Laksham Sub-station and Distribution Network

Cont'd on page 4

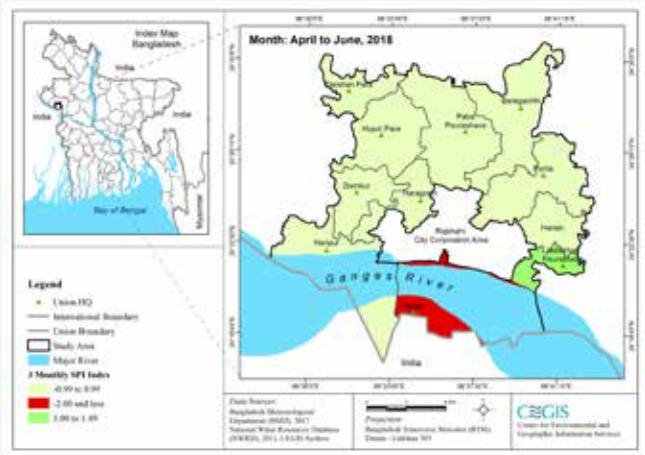
Development of SPI and Drought Indices Map from BMD Model Output for Micro Level Agriculture Water Management

Rifat Jahan Sadia, Water Resources Management Division

Agriculture is the main driving force of the economy of Bangladesh which is highly dependent on climatic phenomena. Despite of technological improvement such as improved crop varieties and irrigation system, weather and climate variability are still key factors in agricultural productivity. Decrease in rainfall, shortage of surface water and ground water abstraction cause depletion in soil moisture. It puts immense pressure over agricultural production. Bangladesh was affected for 19 times by droughts between 1960 and 1991. Agricultural water demand and management is highly interlinked with drought severity. Apart from loss to agriculture, droughts have significant effect on land degradation, livestock population, employment and health. Under such circumstances it is high time to develop system to provide early warning about drought to the farmers to reduce/minimize the loss of crop production and ensure effective use of irrigation water to maximum possible extent. Bangladesh Meteorological Department (BMD) has engaged CEGIS to forecast drought through Standard Precipitation Index (SPI) for national/district level. CEGIS is developing SPI maps of upazila level using downscaling of Weather Data from NWP (Products of BMD) for drought monitoring at local level. It is also developing ways to disseminate the drought information among the farmers so that the information can be distributed properly and efficiently for crop production.

Paba Upazila of Rajshahi District is considered as study area for this project, since the Northwestern region is affected by recurrent and severe droughts every year.

The specific objectives of the study are i) to generate upazila level SPI maps from downscaled NWP of BMD; ii) to generate the drought indices using SPI data; iii) to evaluate and validate the SPI map at field level; iv) to inspect the plausibility of drought indices with soil moisture level of land; v) to assess the farmer's knowledge and perception on drought patterns; vi) to verify the information regarding drought indices using SPI data, its functionality, effectiveness and user satisfaction; vii) to assess the need/new requirements of forecasting drought patterns; viii) to assist farmers and relevant stakeholders in efficient use of irrigation water based on generated drought indices.



Standard Precipitation Index of the Study Area

The output of the study are mainly reports with SPI and DSI Map during different time span of the study. The study will be published as a paper in a peer review journal creating access to new information and technology regarding drought indices forecasting.

ISO Internal Auditor Training

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

Participants of Internal Auditor Training with the Trainer from CQS

CEGIS is fully committed to its vision and is dedicated to become a center of excellence in true sense of the term. Developing business on international platform, ensuring client satisfaction and employee safety, transpiring as a pioneer in research innovations and tools are quintessential in achieving that goal.

ISO is an international standard setting body. It promotes worldwide proprietary, industrial and commercial standards and sets guidelines and framework for standardization of Management Systems. Since its first published standard in 1951, ISO has published more than 22,000 standards and has emerged to be the "Guardian of Standardization". It is to be noted that, ISO does not provide any certification facilities itself, rather, organizations engage an independent certification body to audit their Quality Management Systems (QMS) implementation against the

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