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the CEGIS NEWSLETTER

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

Upcoming Events

- CEGIS Building at Agargaon
- Celebration of Bengali New Year
- Adaptation in Agriculture under Climate Change
- ESIA Study of Coal transportation

Inside

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Application of GIS and RS for Environmental Monitoring

Engr Md Waji Ullah, the Executive Director of CEGIS is delivering his speech in the closing session where Mr Md Shahadat Hossain, Director (Admin & HRD) and Mr Md Abul Kalam Azad, Deputy Director of Department of Environment were present

A six day training program on Application of Geographic Information System (GIS) and Remote Sensing (RS) for Environmental Monitoring was conducted by CEGIS for the professionals of a number of organizations, including Department of Environment, Bangladesh Railway, and Power Grid Company of Bangladesh. This training was conducted in two batches for better attention and good understanding. The training of the first batch and second batch were commenced from 05-10 March and 19-24 March 2016 respectively, at CEGIS training room. The aim of this training program was to enhance the knowledge and strengthen the capacities of the professionals on GIS and RS applications of the respective organizations. This would make them capable in working through utilizing the geographic information and remote sensing and applying the spatial tools and techniques to support their planning and monitoring activities.

A total of 25 participants from the said organizations attended the training program which was conducted by a team of senior professionals and experts from CEGIS. Engr Md Waji Ullah, Executive Director of CEGIS inaugurated the training program at the opening session.

After completion of the training program, certificates were awarded to the participants in the closing session on 24 March, 2016 at the conference room of CEGIS. Engr Md Waji Ullah, Executive Director, CEGIS chaired the closing session. Mr Md. Shahadat Hossain, Director (Admin & HRD) and Mr Md Abul Kalam Azad, Deputy Director of Department of Environment were also present.

EIA study for "Patuakhali - Gopalganj 400 kV Transmission Line and Gopalganj 400/230 kV Substation"

Mohammad Azizur Rahman, Socio-Economic and Instituitional Division

The present government of Bangladesh is committed to fulfill their pledge of electricity by 2021. Government has taken massive program to bring its economy to medium income level by 2030 through rapid industrialization, urbanization, and mechanized cultivation. The establishment of Paira 1320 MW Thermal Power Plant Project at Dhankhali union of Kalapara upazila under Patuakhali district is one of these programs.

The proposed Transmission Line (TL) from Paira to Gopalganj and Gopalganj Substation at Muksudpur will back-feed power from Grid line to the power plant site. The length of the new TL is around 160 km and covers

Consultation with local Government Institutes

the districts of Gopalganj, Madaripur, Barguna, Barisal, Jhalakathi and Patuakhali. The new substation will require to acquire 60 acre of land. The high voltage TL will be connected to the Gopalganj substation and convert the line to 400/230/132 kV for distribution purpose to different districts. The proposed project will transmit a highly significant amount of electricity to the national grid.

CEGIS has carried out Detailed Route Survey, Topographical Survey, Initial Environmental Examination (IEE), Environmental Impact Assessment

Consultation with local stakeholders

(EIA) including Morphological analysis of the river at the crossing points, and initial Resettlement Action Plan (RAP) study. CEGIS has conducted a Public Consultation Meeting with the LGIs, local stakeholders, local elites and politicians, and local administration. Project Director and representatives from the development partners attended the meeting. Series of Rapid Rural Appraisals (RRAs) and Stakeholder Consultations were conducted during IEE and EIA studies.

Dominant River Systems for Freshwater Flow in the Sundarbans

Md. Tamim Zaki, Climate Change and Disaster Management Division

The Sundarbans forest ecosystem supports rich diversity of plants, fisheries and wildlife. The survival of this ecosystem largely depends on the supply of freshwater into the Sundarbans. The sources of fresh water in the Sundarbans are the river systems at its upstream which is mostly contributed by the river Ganges. The Mathabhanga-Kopotakha and the Gorai-Modumati are the two most significant river systems contributing freshwater supply to the Sundarbans.

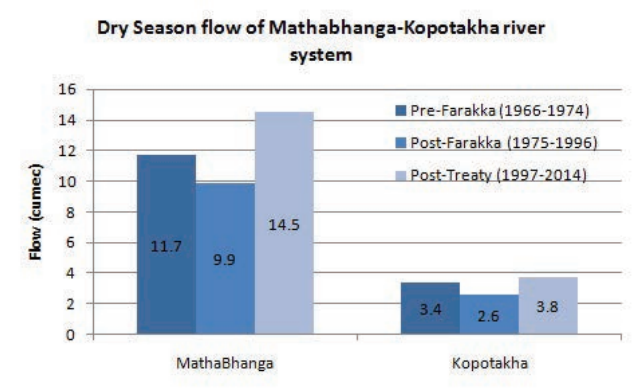
The rivers Mathabhanga and Kopotakha have lost their connections with the Ganges in the 1800s due to siltation. Both of these rivers, historically, had significant influence over freshwater flow into the Sundarbans. Presently, both these rivers contribute insignificant amount of freshwater to the Sundarbans during dry season as well as in wet season. As such, Kopotakha-Sibsa subsystem flowing through the Sundarbans have no significant amount of freshwater into the mangrove forest. Apart from the Sibsa, the other tidal river which dominates the flow of the southern part of the Sundarbans is the Passur, which is a part of the Gorai-Modhumati river system. The central Gorai subsystem currently maintains weak connection with the Ganges and carries reasonable amount of freshwater during the dry season to the Sundarbans. The distribution of the Gorai river flows through the Madhumati and the Nabaganga rivers. The Gorai-Madhumati is the major spill river of the Ganges and carries about 12% of the flow of the Ganges into the Sundarbans. The Farakka barrage on the Ganges constracted in 1975 significantly diverts the flow at its upstream rivers i.e. upstream of Sundarbans. Although after signing of the Ganges Water Sharing Treaty in 1996, there has been gradual increase of flow of fresh water in the upstream rivers and ultimately in the Sundarbans.

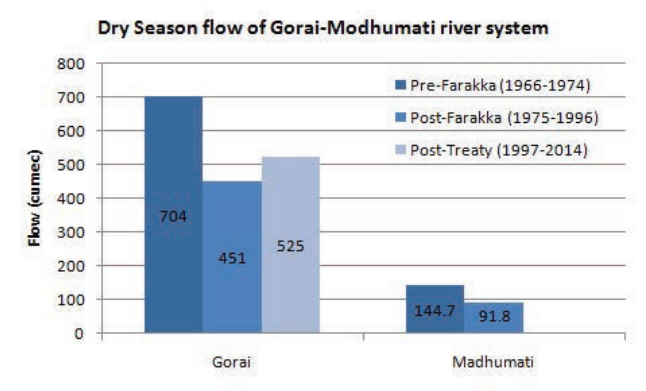
An analysis of the minimum discharge of dry season flow of these river systems in the Pre-Farakka, Post-Farakka and Post-Treaty period, provides an insight of the freshwater flow of these rivers entering into the Sundarbans. From this analysis, it is safely

(Cont'd on page 3…)

Dominant River Systems ..... (Con't from page 2)

assumed that the dominant river system supplying freshwater into the Sundarbans is the Gorai-Modhumati river system. Thus, it has resulted in the lesser amount of salinity in the eastern part of the Sundarbans compared to that in the western part where the freshwater supply is dominated by the Mathabhanga-Kopotakha system. This has caused an increase in salinity on the western part of the Sundarbans which will further worsen in the future unless proper measures are undertaken by the authorities to establish connection of these river systems with the Ganges.





Dry season flow of Major River Systems into the Sundarbans during Pre-Farakka, Post-Farakka and Post-Treaty period

Impacts of Urban Housing Projects on Water Sector: Challenges and Counter Works

Asif Ahmed Abir, Consultant, Water Resources Management Division

Dhaka, the capital city of Bangladesh, is one of the oldest and fastest growing cities across the world. Dhaka Statistical Metropolitan Area covers 1,353 sq km, and about 16.9 million people live in this area. Major national facilities and infrastructures of the country are centralized in Dhaka city. For which, people are continuously migrating to Dhaka city, as a result, population is increasing beyond it's capacity. The increasing population creates pressure on the housing sector of the city, triggering both vertical and horizontal expansion of the city. The government and different private development companies have thus taken several initiatives for land development inside and in the periphery of Dhaka. Bashundhara Group, Jamuna Builders Limited, Bangladesh Development Company (BDC), to name a few, are the leading companies in Bangladesh who are implementing new housing projects. CEGIS has the opportunity to conduct the Environmental Impact Assessment (EIA) of those projects.

The housing projects cover huge land areas which may affect the hydrological system of certain region. The changes in land use associated with urban development affect flooding in many ways. Removal of vegetation and soil, grading of land surface, and constructing drainage networks increase runoff to streams from rainfall. As a result, the peak discharge, volume, and frequency of floods increase in nearby streams. Changes to stream channels during urban development can limit their capacity to convey floodwaters. Roads and buildings constructed in flood-prone areas are exposed to increased flood hazards, including inundation and erosion, as new development continues (Konrad, 2003).

The impervious surfaces in urban areas (pipes and sewer networks) reduce infiltration and can reduce the recharge of groundwater. Moreover, excess groundwater extraction is a serious issue. If we look at the long-term groundwater-level hydrograph at a monitoring well in Mirpur area, managed by Bangladesh Water Development Board (BWDB), we see a steady decline in water-level since the mid-1980s. Recently, groundwater level is declining at even greater (>2 m/year) rate (Shamsudduha, 2016). Groundwater level in 2007 was about 70 m below ground level (bgl), which was only a few meters bgl during the 1970s.

As population and human aspirations increase, land becomes an increasingly scarce resource, calling for land-use planning. Land-use planning is important to mitigate the negative effects of land use and to enhance the efficient use of resources with minimal impact on future generations. Land-use planning can help coordinate various land uses in a watershed, thereby minimizing conflicts and sustaining water quantity and quality for future generations.

Moreover, drainage systems have been expanded to increase their capacity for detaining and conveying high stream flows; for example, by using rooftops and

(Cont'd on page 4...)

Impacts of Urban Housing..... (Con't from page 3)

parking lots to store water. Techniques that promote infiltration and storage of water in the soil column, such as infiltration trenches, permeable pavements, soil amendments, and reducing impermeable surfaces have also been incorporated into new and existing residential and commercial developments to reduce runoff from these areas.

In the sum, without adequate water resources and water infrastructure, urban development and redevelopment can be stymied. Conversely, land use and development impacts the use of and need for water. It takes more than turning on the tap to bring safe, reliable drinking water to an urban area. An approach gaining favor with water managers is Integrated Urban Water Management (IUWM), sometimes also called One Water. IUWM principles recognize that water from all sources must be managed holistically and cooperatively to meet social, economic, and environmental needs (Warner, 2014). But for IUWM to be fully effective, water managers need to cooperate and collaborate with other professionals and sectors, notably planners.

Climate Change Vulnerability of Drinking Water Supply Infrastructure in Coastal Areas of Bangladesh

Farhana Ahmed, Climate Change and Disaster Management Division

The importance of safe drinking water has been reflected in the outcomes of a series of international policy forums, as well as the Millennium Development Goals adopted by the United Nations Genral Assembly (UNGASS) in 2000 and the outcome of the Johannesburg World Summit for Sustainable Development in 2002. The UNGASS declared the period from 2005 to 2015 as the International Decade for Action, "Water for Life".

Women living in the coastal region is using tubewell water for household use

CEGIS conducted a study titled "Support to Bangladesh on Climate Change Negotiation and Knowledge Management on Various Stream of UNFCCC Process", under a DFID funded project of IUCN, Bangladesh. One of the objectives of the project was to generate information, and support knowledge management in various tracks on climate change negotiation under UNFCCC. The project identified infrastructure as one of the knowledge management issues. The study covered the coastal zone situated in the southern part of Bangladesh which is one of the hotspots of the country due to climate change. Coastal zone refers to the area where the lands are adjacent to the sea. Bangladesh has a 710 km long coastline. About 62% of the land of the coastal area has an elevation less than 3m and 86% less than 5m. Under the Integrated Coastal Zone Management Project (ICZMP), 19 districts have been identified as coastal districts.

The study focused only on safe drinking water supply infrastructure considering the importance of the issue and is limited to the coastal zone. The study assessed the current status of drinking water availability, its vulnerability to natural and socio-economic hazards and future threats due to climate change. It also identified the possible adaptation measures and proposed possible investment programs with an institutional framework to make the adaptation a part of development process. The cumulative effects of hazard with social vulnerability, enhance the risks on the provision and access to safe water. About 61% area of the Coastal Zone (19% of Bangladesh) with a population of 20 million has been found to be highly vulnerable to natural and social hazards. As the impacts of climate change are evident, improved or modified technologies are thus needed. The level of modification and improvement will depend on the type of hazard and the area that it will be in use. Piped system, tubewells, protected dug well and Rain Water Harvesting System (RWHS) are considered as the safest options.

ICT Application and its Impact on Groundwater Management in Bangladesh

Foez Ahmed and Motaleb Hossain Sarker, Ecology, Forestry and Biodiversity Division

CEGIS has been awarded to conduct the study on "Impact of ICT in Groundwater Management in Bangladesh" by Food and Agriculture Organization of the United Nations (FAO). The major aim of this study is to assess the impact of Information and Communication Technology (ICT) on groundwater resources management in Bangladesh. It is a research study, based on pilot areas through selecting a small number of deep tubewells. The study covers different areas of interest and includes (i) Physical and policy context of ICT application in GW management, (ii) Compatibility of technology, (iii) Cost and benefit, (iv) Water delivery services, (v) Impact on water resources management (WRM), (vi) Synergy across water energy and food, and (vii) Scope for adoption and expansion in the region.

The study is going on in the drought prone northwest region (Rajshahi and Dinajpur) of Bangladesh in selected Upazilas. The study areas have been selected on the basis of hydrogeological condition, groundwater irrigation system, Agro-Ecological Zone (AEZ), existing ICT application status as well as expert judgment. There are two AEZs-High Barind Tract and Level Barind Tract. Three study sites namely, the Godagari Upazila in Rajshahi falls in High Barind Tract while Birganj and Kaharol Upazila in Dinajpur district fall in Level Barind Tract as determined by their lithological characteristics.

Eight DTWs and one LLP (running with ICT based prepaid meter system) have been selected as case study sites on the basis of practicing the ICT. Two private DTWs, operated by electricity but without prepaid meter, have also been selected for making a comparative study.

Field surveys were carried out in the selected Upazilas to assess the impact of ICT on groundwater management. Key Informant Interview (KII) and Focus Group Discussions (FGD) were conducted for collecting necessary data and information.

It was observed from the field visit that before introducing the smart card based prepaid meter, the cropping pattern of the study area was mainly Kharif-2, and Rabi. After implementation of ICT based prepaid meter, cropping pattern turned to Kharif-1, Kharif-2 and Rabi.

Discussion with Local Stakeholders and Pump Manager

Before introducing ICT based prepaid meter, the command area and the irrigated area were about 50 acres and 42 acres respectively. But after introduction of ICT based prepaid meter, command area and irrigated area increased to about 75 acres and 71 acres respectively. The irrigation efficiency was 84% when water was normally distributed through earthen canal system, but after introducing buried pipe system irrigation efficiency has increased to about 95%. This indicates that irrigation efficiency has increased due to change in water delivery pattern. Irrigation cost decreased for installation of the ICT based prepaid meter.

Crop Diversification in Barind Region of Bangladesh

In ICT based prepaid metering system, the irrigation cost per acre of agriculture land is about Tk. 2100.00 which was Tk. 3000.00 per acre when there is no metering system. Water demand by farmer has decreased for the installation of ICT based prepaid meter. Before installation of ICT based prepaid meter, the average pumping hour was 30 hr/acre during Boro season. But after installation of ICT based prepaid meter the average pumping hour has reduced to around 21 hr/acre for the same Boro season.

After introduction of ICT, the pumping hour has been reduced up to 30% and electric bill up to 12%. At present farmers are very cautious about the optimum use of water in their fields. As a result, minimum energy use has become efficient, i.e. minimum energy is being used and maximum purpose is being achieved which is ultimately providing the sustainable use of energy.

There is a wide scope for expansion of the Barind model in other regions of the country. BADC has already started the use of ICT based prepaid meters in its irrigation system. Bangladesh Water Development Board (BWDB) is going to introduce ICT on surface water management like Muhuri Irrigation Project (MIP). BWDB has scope to apply the same to Ganges - Kobadak Irrigation Project (GKIP), Teesta Barrage Project (TBP) and so on. Dhaka Water Supply and Sewerage Authority (DWASA) can also apply the smart card based prepaid meter in drinking water purposes in near future. Local Government Engineering Department (LGED) is also carrying out study for expansion of smart card based prepaid meter in their projects.

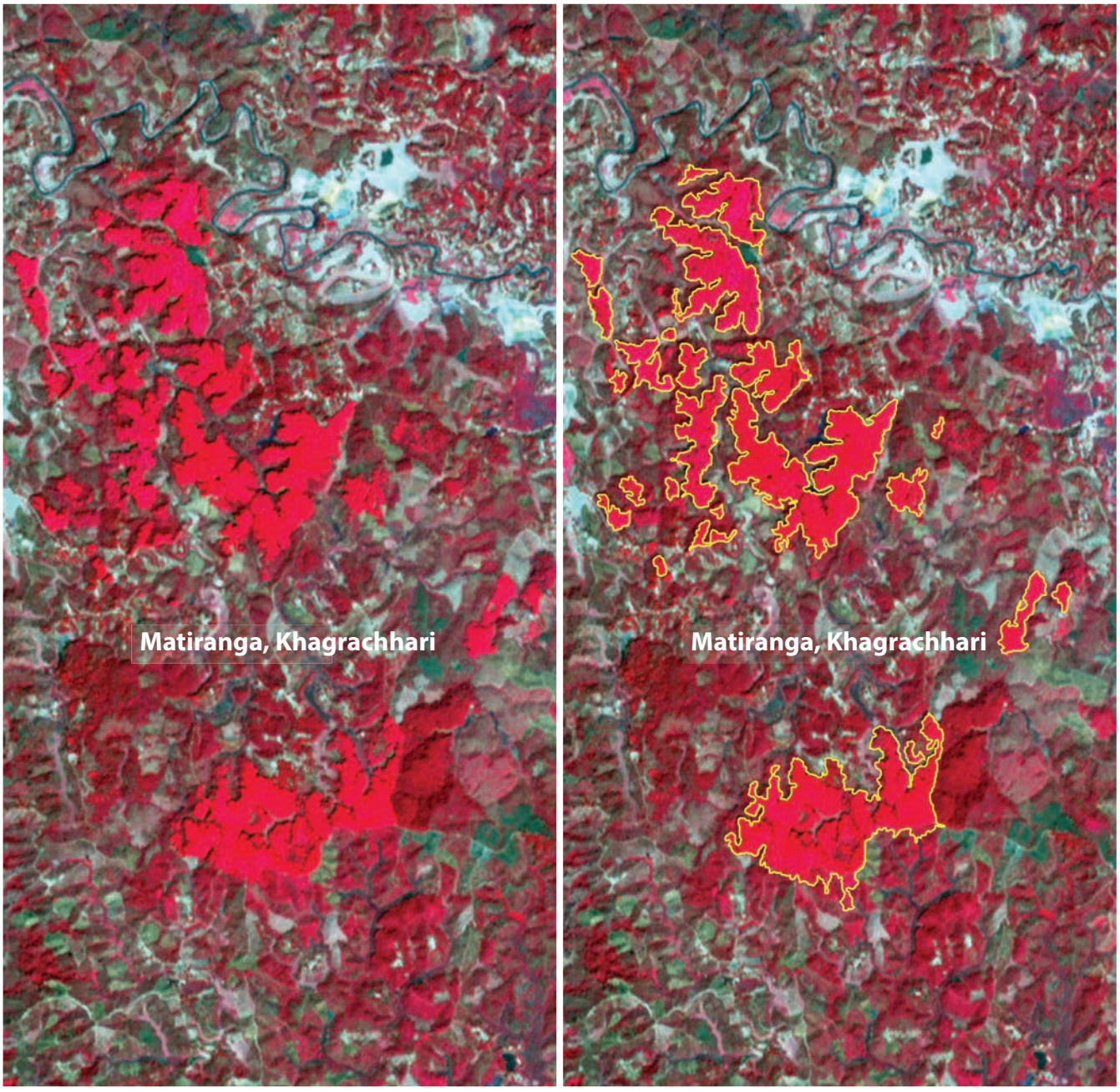
Identification of Rubber Tree Plantation from Satellite Images

Md. Nasrat Jahan, Remote Sensing Division

Rubber is one of the most important cash crops, and it has multipurpose uses. It is extracted from latex of the rubber tree (*Hevea brasiliensis*). Rubber tree is a quick growing, fairly sturdy, perennial tree of a height of 25m to 30m. It is deciduous in habit and withers from December to February in South Asia region. New leaves appear in early March.

Bangladesh has set the target of producing 100,000 tonnes of rubber in the year 2020 and 200,000 tonnes by the 2050 (Source: Daily "The Financial Express", Dhaka; 19 Feb 2013). To achieve the target it is necessary to increase and monitor the area coverage of rubber plantation.

Remote sensing technology may be an excellent tool for monitoring the area coverage of rubber plantation, spatially and temporally. Through analysis of spectral characteristics of new leaves of the rubber trees, image acquisition date and local knowledge, it is possible to delineate the rubber field in the satellite image. It appears bright red color in image of growing season, when it viewed in false color composition.



RapidEye (Resolution 5m) Image, acquisition date: 19 March 2015

ToT Course on "Concept and Practice of Integrated Water Resources Management"

Innagural Session of the Training Programme

A Training of Trainers (ToT) course on "Concept and Practice of Integrated Water Resources Management" was conducted by CEGIS from 20 March to 24 March 2016 in association with Bangladesh Water Partnership (BWP). Around 19 participants from different GOs, NGOs and Universities attended the training program. Nationally and internationally reputed experts from CEGIS, BUET, BRAC University, NGOs and other organizations conducted the technical sessions. In one of the sessions, the participants learned about the IWRM issues through hands-on experiences. The learning process was facilitated through a participatory approach.

The training program had two parts. The first four days were devoted to Part 1, which covered the knowledge and information sessions with lectures on IWRM and its Practices. Part 2 was a day long field activity consisting of visits to three different water pump stations inside Dhaka. The first session covered 25 lectures while the second session allowed the trainees to take part in the practical application of IWRM along with the implication possibilities. CEGIS played the key role in steering and coordinating the entire training program while BWP was involved in the overall monitoring and evaluation of the program through their presence and financial support in addition to the contribution of CEGIS.

Integrated Water Resources Management is now one of the growing concern for people working in water as well as natural resources management. The joint initiative taken by BWP and CEGIS in organizing such a Training for the Trainers was highly appreciated by the participating organizations. Many organizations sent participants to obtain training on IWRM each as they found the program effective. CEGIS tries to involve the most relevant organizations who could participate in such capacity development program and broadly use the concept with required application in their individual fields.

Certificate Awarding Session of the Training Programme

Contracts and Agreements between Various Agencies and CEGIS

CEGIS has signed more than 10 different contracts with various national and international agencies during the January – March, 2016 period to conduct different studies. Among them, three contracts have been signed with different agencies, responsible for power generation in Bangladesh. CEGIS through these contracts is involved in providing various intellectual services like conducting 'Environmental Impact Assessment (EIA), Environmental Monitoring Plan (EMP) and other services of the three proposed power plant projects at Rampal of Bagerhat, Gazaria of Munshiganj and Chapai-Nawabganj.

In March, a contract has been signed with SINOHYDRO Corporation Limited to carry out a survey to prepare base maps for identification of plots for requisition for the Padma Multipurpose Bridge Project.

A contract has also been signed with the Embassy of the Kingdom of the Netherlands to provide consultancy services in respect of the Blue Gold program in Bangladesh project.

CEGIS has signed a Memorandum of Understanding (MoU) with The Small Earth Nepal (SEN) to study on Runoff Scenario and Water Based Adaptation Strategies in South Asia on 3rd January, 2016.

CEGIS is providing services regarding Baseline and Resettlement Action Plan preparation on Ganges Barrage Project with Power China Chengdu Engineering Corporation Limited from March.

Engr Md Waji Ullah, the Executive Director of CEGIS and Mr Qu Yan, Project Manager, SINOHYDRO Corporation Lt. are signing the contract document

A contract agreement has also been signed with Dhaka Electric Supply Company Limited (DESCO) to Design the Supply and Installation of Supervisory Control and Data Acquisition System on Turnkey Basis for this project.

On the of Global Program for strengthening the Capacity of the Private Sector to Adapt with Climate Change, a contract has been signed with Gesellschaft für Internationale Zusammenarbeit (GIZ) to provide rational services.

New Faces in CEGIS

Mr Mostafa Ali joined CEGIS in March 2016 as Director of GIS Division. Prior to joining CEGIS, Mr Ali worked for International Center for Integrated Mountain Development (ICIMOD) in Nepal for more than 4 years under NASA SERVIR-Himalaya Program. He completed his Master of Science, specializing in GIS and RS from the University of Nottingham, UK in the United Kingdom. He has over 25 years of experience in designing, developing, implementing, and maintaining GIS, RS, MIS and other database applications. Mr Ali started his career with Local Government Engineering Department (LGED) and later on carried out many international assignments. He worked in the countries like Nepal, Laos, Denmark, Romania, USA, Egypt, Uganda, Tanzania, Kenya, Zambia, Ethiopia, Malawi and Ghana.

Mr Nur Mohammad joined CEGIS in February 2016. He is experienced in application of GIS and RS in the field of project planning, environmental conservation, disaster management and water management for more than 8 years. He completed his Master of Bussiness Administration (MBA) degree from Northern University after obtaining Bachelor's degree in Urban and Rural Planning from Khulna University. He also completed a special course on GIS & RS from the University of Putrajaya, Malaysia. He is known to be an upbeat, self-motivated team player with good communication skills. His interests includes development and implementation of innovative geospatial applications. His ambition is to advance his knowledge and expertise in the areas of his interest.

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