



the CEGIS

NEWSLETTER

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

Upcoming

- ❑ Training on Climate Change, Disaster Management and Urban Water Management in Philippine
- ❑ Capital Dredging and Navigability
- ❑ Strategic Environmental Assessment of Haor Area
- ❑ Monitoring tool for reducing SLCP (specially Methane and Black Carbon)
- ❑ Annual Picnic of CEGIS

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CEGIS Celebrates Fifteenth Year



In pictures 1. Hon'ble Minister Mr. Anisul Islam Mahmud, M.P, Senior Secretary Dr. Zafar Ahmed Khan, Ministry of Water Resources, Government of the People's Republic of Bangladesh and their spouses graced the gala ceremony with their presence; 2 & 3. Cultural Program, 4. Welcome Address by Engr. Md. Waji Ullah, Executive Director, CEGIS and 5. Respected Guests

CEGIS celebrated the milestone occasion, 'Fifteenth Year', with a colorful program on 19 July 2017, at RAOWA Convention Hall, Mohakhali DOHS, Dhaka. Mr. Anisul Islam Mahmud, MP, Hon'ble Minister, Ministry of Water Resources (MoWR) graced the occasion as the Chief Guest. The Chairperson of CEGIS Board of Trustees and Senior Secretary, MoWR, Dr. Zafar Ahmed Khan attended the program as Special Guest. CEGIS family members with their spouses, invited guests and stakeholders from different public and private agencies

were also present. Engr. Md. Waji Ullah, Executive Director, CEGIS welcomed the respected guests to the program which was then followed by the speeches from the Hon'ble Minister and Senior Secretary of the MoWR. Among others, the program highlighted the CEGIS journey over the years through a video documentary "Glimpses of CEGIS". This was followed by a laser show presentation on CEGIS Innovations. The program rounded off with a cultural program performed by the professionals of CEGIS, and dinner.

Ensuring Sustainable Access to Water Supply in the Coastal Area of Bangladesh

Jasia Tabzgeeda, Power, Energy and Mineral Resources Division

Sustainable access to water is vital for human existence. People require water and sanitation to maintain good health and to continue their livelihoods. Water and sustainable development goals set by UN (SDG-6) has asked for universal and equitable access to safe and affordable water for all kinds of uses through a number of proposed measures. Sustainable access to water is a challenge for the coastal zone of Bangladesh. Increasing of salinity is one of the main reason behind the water scarcity. Nowadays, the coastal zone is becoming more affected with climatic variability, which adds another challenge to water access. Low water quality and quantity of those areas have led towards poor health, hygiene and lower quality of life of the people of the area.

Bangladesh Water Partnership (BWP) has entrusted a study to CEGIS for exploring the challenges of sustainable access to water in the coastal zone of Bangladesh with particular focus on women and youth in reference to the current context of climate change and to provide relevant suggestions to ensure sustainable access to water supply in the coastal zone. Objectives of this study have been set accordingly to assess water supply and situation for household use, drinking, health, hygiene and livelihoods in the coastal zones and to propose pragmatic measures to ensure sustainable access to water, at a limited scale by giving particular focus on women and youth.



Public Dissemination Meeting at Patharghata Upazila

For this study, six districts were selected based on vulnerability analysis of the districts in the coastal zone which are Noakhali, Feni, Jhalokati, Bagerhat, Barguna and Satkhira. Subsequently, six unions were selected from the sample districts based on water crisis and vulnerability to climate change and natural hazards, namely Char Clerk, Nowabpur, Ranapasha, Nishanbaria, Char Duanti and Buri Goalini respectively. The study was mainly conducted on the basis of primary data collected from the local people of selected districts. A multidisciplinary study team triangulated field findings through 'data triangulation' and 'researcher triangulation'. Preliminary findings of the study have been shared with local stakeholders in Public Dissemination Meetings held locally at Barguna, Bagerhat and Noakhali where the audience took interest in the presentation, agreed to the findings, in general, and gave their findings and suggestions.

The study revealed that most of the women collect water from ponds and tube-wells while the youth are involved in

collection of water when the villagers need to buy water from the market. From the study, it was found that all the six sample unions show heavy dependence on shallow tube-well and deep tube-well during dry period, with severe stress on health of young men and women, in particular, to fetch water. People of Char Clerk, Nowabpur and Ranapasha, mentioned that since the coverage of tube-well is low in close neighborhood, they cannot collect drinking water during night time from distant locations as women's security is involved.



Women collecting drinking water from PSF at Buri Goalini

The study further shows that shallow tube-well is the main source for drinking water in Char Clerk, Nowabpur and Ranapasha Unions. Moreover, in general, people use pond water for domestic purposes. However, the number of tube-well is gradually increasing in all of these unions. On the contrary, in saline-prone unions such as Nishanbaria, Char Duanti, and Buri Goalini, the main sources of drinking water are rain water and pond water. But storage capacity of rain water is low compared to that of the requirement. In these places, ground water is saline and surface water becomes saline and dirty during dry season. Salinity is also an increasing challenge in Char Clerk Union.



Women collecting drinking water from tubewell in Suborno Char

The study team also revealed that access to public funded deep tube-wells is free of cost. However, people of Nishanbaria, Char Duanti and Buri Goalini buy water from the market and/or from PSF. Besides, access to private shallow tube-well is restricted (by time and quantity) for other households than the owners. Poor households have restricted access to community level ponds as well as government and private tube-wells because of rural power structure, which often leads to social conflict. Formal institutions [like existing DPHE, UP, NGOs (BRAC, CCDB)] provide tube-wells, tanks, and PSF but are

(Cont'd on page 4 ...)

Feasibility Study on System Loss Reduction by Replacing 5 Million Electro Mechanical Energy Meters with Electronic Energy Meters of BREB

Muhammad Shifuddin Mahmud, Socio-economic and Institutional Division

Bangladesh Rural Electrification Board (BREB) intended to modernize its system by replacing the existing post-paid meters with electronic digital pre-paid meters all over Palli Bidyut Samities (PBSs). Key ideas of this replacement included: reducing technical & non-technical losses, strengthening financial ability, and providing hassle free service to the consumers. For implementing the project, BREB needed to know whether the project would be feasible or not. To conduct the feasibility study, BREB entrusted Center for Environmental and Geographic Information Services (CEGIS) to carry out this study. The Feasibility Study followed a participatory approach, where stakeholders from different levels participated by interacting with the study team, and by providing relevant data and information.

Determination of eligible consumers is one of the major tasks of the study. BREB wanted to define eligible consumers on the basis of a selection of socio-economic indicators like electricity consumption (units used per month), purpose of use (domestic/industrial), user's location (rural/urban), and economic affordability. Data shows that total consumers are around 19.3 million (19,366,704) in all PBSs. Of them, about 7% (1,382,910) consumers are currently disconnected, and the remaining 93% (17,983,794)

are active users. As per decision of the Ministry, the lifeline consumers (≤ 50 kWh unit consumption) are not considered to be eligible for pre-paid metering system. Besides, the large electricity consumers namely CT/PT operated meters have also been dropped from consideration. Excluding lifeline and CT/PT meters, the potential eligible consumers are categorized in terms of different consumption units. Considering the consumption range from 120 to 600+ units, the number of eligible consumers are 5,000,000. The study suggests to implement the project in six years.

The financial and economic analysis of the project shows that the proposed project is feasible, both financially and economically. Financially, the benefit of the project would be 20% higher than all the costs. The economic benefit of the project is much higher than the financial one, signifying that the project would be beneficial to the entire economy and would contribute significantly to country's GDP. The economic sensitivity analysis shows that the project is more sensitive to increase in cost than decrease in benefit. The project remains viable (economic IRR of 14.5%) even in the worst case scenario. In the best case scenario, the IRR reaches its highest level of 25.2%.



Electronic Energy Meters of BREB

Consultation Meeting on Early Warning for Riverbank Erosion



Dr. Maminul Haque Sarker, Deputy Executive Director of CEGIS is presenting the effectiveness of riverbank prediction and developed tools

A half-day consultation meeting on Early Warning for Riverbank Erosion was held on 21 August 2017 at BRAC Centre which was attended by the representatives from Disaster Management Department (DDM) and Center for Environmental and Geographic Information Services (CEGIS) along with number of national/international NGOs, experts from the universities, local community representatives and media personnel. The meeting was hosted by Disaster Management and Climate Change Programme (DMCC), BRAC. The meeting was inaugurated by Mr. Gawher Nayeem

Wahra, Director DMCC, BRAC through discussions on riverbank erosion and sufferings of the people. Dr. Maminul Haque Sarker, Deputy Executive Director (Development), CEGIS presented the effectiveness of riverbank prediction and tools developed by CEGIS. Mr. Sudipta Kumar Hore, Junior Specialist, CEGIS presented the findings of the riverbank prediction results of 2017. In the meeting, it was decided that riverbank erosion should be included in the disaster management program of DDM as it is a big silent disaster for the country.

Development of GIS based Digital Land Information System for BWDB

Kazi Kamrull Hassan, Water Resources Management Division

Bangladesh Water Development Board (BWDB), one of the largest government agencies in Bangladesh is engaged in micro planning, designing and implementing environment friendly water resources projects such as flood control, drainage and irrigation, riverbank management, capital dredging of rivers, coastal embankment, and land reclamation, which are contributing directly to food production.



Land survey using DGPS

All these projects are spread over throughout the country. With the implementation of these projects, from their inception, BWDB has become one of the biggest land possession agencies in Bangladesh. Acquisitions of these lands were made for many different purposes over a long period of time. In many cases, all these land properties are not efficiently utilized to the full extent, which have subjected them to illegal encroachments every now and then. In order

to ensure the complete possession of the property, utilize the land areas efficiently and to support the land acquisition plans, it is essential to organize the maps and property ownership data systematically in a digital structure. BWDB now emphasized that all these assets should be identified, digitally converted and preserved for easy accessibility in a manageable digital system.

In this connection, BWDB Land and Revenue Directorate has taken initiative to produce a digital database of BWDB asset and land acquisition map, for a strip of approximately 20km length starting from Gabtoli to Abdullahpur covering 19 Mauzas.



Digital Map preparation with detail land information

For this, BWDB has engaged CEGIS to develop a LIS and web based interactive Information System for approximately 1,173.42 acres acquired land of BWDB.

Ensuring Sustainable Access ... (Cont'd from page 2)

not adequate. It was observed during primary data collection, that local people are indifferent to preserve or maintain the community water sources like community tube-wells, ponds or PSFs. Women and youth have very little contribution in maintenance and operation of them.

From the lenses of livelihood, the study found that agriculture, livestock, fishery, poultry, kitchen gardening mainly constitute the most common livelihoods based on water supply in the coastal districts. All available sources of water (from ground, surface and rain) are mostly used for irrigation. But these sources are uncertain, inadequate and saline. On the other hand, excessive withdrawal of ground water for irrigation renders shallow aquifers dry. Livelihood opportunities that have been opening up for last few years, are around vegetable and fruit production by women (like in kitchen garden) in the coastal area but are handicapped by such large scale withdrawal of water.

Climatic risk such as sea level rise, temperature fluctuations, precipitation changes and salinity changes are perceived to be crucial for coastal livelihoods. Agricultural livelihoods for many households in Bagerhat, Barguna and Satkhira have been shifted to fishing livelihoods due to salinity increase and intrusion. Shifting of monsoon seasonal cycle due to climate change impact has shifted the practice among farmers in growing new saline tolerant rice varieties (BRRI and BINA)

from earlier varieties. Open fishery is being replaced by Ghers and Bunds due to increased flooding, and the livelihood of shrimp cultivators is changing to crab cultivation due to salinity increase and to avoid white spot syndrome virus (WSSV).

Finally, from the situation analysis of existing levels of access to water supply for the coastal population, it was recommended in details that for ensuring sustainable access to water supply in the coastal zone of Bangladesh, it is important to actively pursue water resource augmentation, policy and regulatory functions, appropriate infrastructural support and social empowerment.



Public Consultation Meeting at Morrelganj Upazila

Analysis of Resilience of Flood Interventions in the Delta Areas A Case Study of Tangail District

Farhana Ahmed, Research, Development and Training Division



Floodplain at Dainya Union Parishad under Tangail Sadar Upazila

Resilience varies from one community to another and from one region to another. With a view to assess resilience in the flood prone delta areas, CEGIS is jointly conducting a research study with the Wageningen University and Research Centre (WUR), Wageningen, Netherlands and the Vietnamese counterparts. For developing a flood resilience framework for Bangladesh Delta, the Tangail District, one of the frequently flooded districts of the country, has been selected. This area experienced devastating floodings in 1988, 1998, 2002, 2004, 2007 and recently in 2017. This district is in the north central region of Bangladesh and located at the northern corner of the capital city, Dhaka. Tangail District is part of the Jamuna-Brahmaputra River deltaic region. The study covered the Compartmentalization Pilot Project (CPP) area of the Tangail District. Through FCDI projects, embankments and drainage structures were built to manage flood risks. The CPP area showcase controlled flooding and drainage using the concept of 'Compartmentalization' through structural



Public Consultation Meeting at Tangail Sadar Upazila

and institutional arrangements. CPP mainly focuses on water management, in particular the flood management for productive activities in flood plains and to uplift the economic situation with special emphasis to the poor of Bangladesh, in general, and specifically, in Tangail. The Compartmentalization Pilot Project (CPP) is one of twenty-six components of the Flood Action Plan (FAP) undertaken by the Government of Bangladesh after disastrous floods in 1987 and 1988.

Apart from the technical analysis of the flooding situation,

participatory consultations were conducted with different stakeholders. In this regard, an upazila level workshop was organized on 15th November, 2017 in the auditorium of Tangail Sadar Upazila Complex. The objective was to disseminate the study findings as well as to get their opinion on different issues such as flood damages those occurred in the past and also in the present along with their coping mechanisms. Ms. Zinat Jahan, the UNO of Tangail Sadar Upazila and Advocate Md. Khorshed Alam, Chairman, Upazila Parishad with other officials and representatives of relevant organizations, people from different communities (e.g. farmers, fishermen, women representatives) were present in the workshop. The participants shared experiences on damages, adaptation and mitigation measures so far taken to deal with the situation. Consultation workshops similar to this, were also organized in Nijmegen and Wageningen in the Netherlands. The academicians, civil society representatives including the study team members, expressed their ideas on how they perceive flood risks and resilience. Similar type of case study is being conducted in Vietnam also.

Utilizing the field level findings obtained from the case studies of Bangladesh and Vietnam and based on the experience of the experts of the Netherlands along with analysis on flood risk, the resilience brigade will assess the resilience of the community people living in the dynamic deltas.



Loubojong River in dry season

An Assessment of the Change in Built-up Area and Vegetation of Dhaka and Chittagong

Syed Mostaqim Ali, Anas Hussain, Md Nasrat Jaban, Remote Sensing Division

Built-up areas in Bangladesh are growing at an unprecedented rate. Many of the farmlands, wetlands and forests have been transformed into built-up area in past 50 years. We all have noticed these changes in our local levels without clear understanding of the intensity of change. It is not until now we observe the change from a spatial perspective. With a timescale of decades, we can now measure how much it has changed.

For the purpose of our study, we selected Dhaka and Chittagong the two urban centers of Bangladesh. The objective is to determine the landcover change in Dhaka from 1988 to 2017 and in Chittagong 1989 to 2017.

The project was accomplished by using multispectral images, which includes Landsat 5 TM, Landsat 8 with a spatial resolution of 30m. For Dhaka city, images of January 1988 and February 2017 and for Chittagong city, images of January 1989 and January 2017 were used. To get the full view of the area separate images

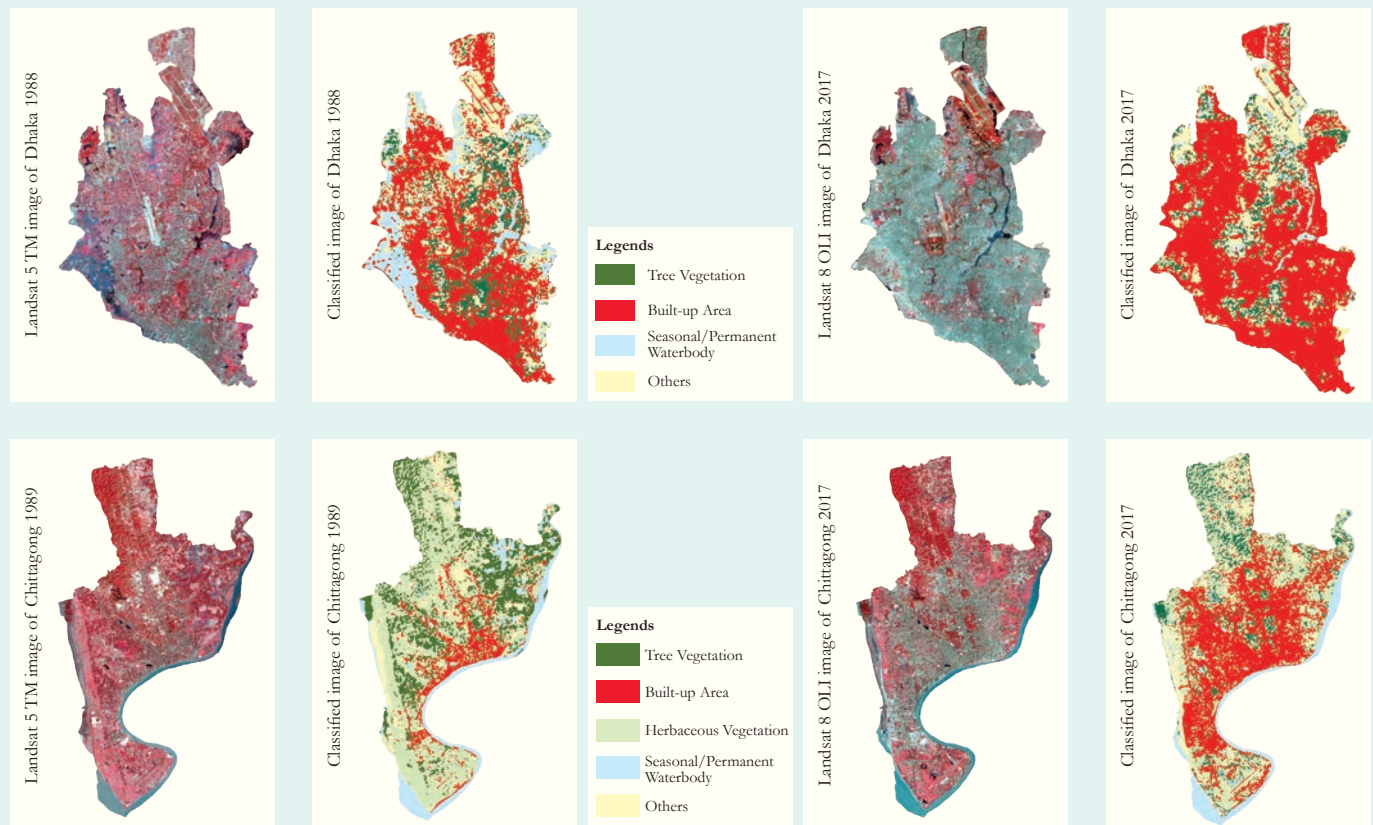
from different satellite zones were merged and subset to remove unnecessary part of the image. After image processing, unsupervised classification with 50 classes was performed. Each type of landcover has its own reflection type which helped us to differentiate between landcover types. Each of the 50 classes were identified and separated into 4/5 classes like Trees, Built-up Area, Waterbody, Herbs and Others. Each of the classes were recoded and then statistically filtered to remove lonely pixels.

The increase in built-up area and destruction of trees in the process of urbanization in the result.

From the table, we found 19.94% increase in built-up area, 4.37% decrease in trees, in Dhaka City.

In Chittagong, we found a surprising rate of 27.29% increase in built up area while 12.60% trees decreased in this timeline.

Land Covers	Dhaka					Chittagong				
	1988		2017		Change (%)	1989		2017		Change (%)
	Area (Hec)	%	Area (Hec)	%		Area (Hec)	%	Area (Hec)	%	
Permanent\Temporary Waterbody	2157	15.05	732	5.11	-9.94	2092	11.31	1792	9.68	-1.63
Tree Vegetation	1870	13.04	1242	8.67	-4.37	4042	21.85	1712	9.25	-12.60
Herbaceous Vegetation	--	--	--	--	--	8628	46.65	6014	32.48	-14.17
Built-up Area	6664	46.48	9501	66.29	19.79	2016	10.90	7071	38.19	27.29
Others	3645	25.43	2858	19.94	-5.49	1718	9.29	1925	10.40	1.11



Landcover changes in historical images

Environmental Laboratory

The Center for Environmental and Geographic Information Services (CEGIS), a Public Trust and Center of Excellence established by the Government of Bangladesh under the Ministry of Water Resources (MoWR). The main mission of CEGIS is to support the management of natural resources (water, land and air

monitoring in both indoor and outdoor environment through hand held devices. Number of soil physical quality assessment equipment such pH, Salinity and Moisture are now available in this laboratory. Moreover, this Environmental Laboratory is fully capable of monitoring various surface and ground water



Ultra Violet Visible Spectrophotometer



Grab sampler

related) for sustainable socio-economic development using integrated environmental approaches and techniques. In connection with this, CEGIS needs to assess and monitor the natural resources in different landscapes and environmental settings with time

quality parameters. Furthermore, biological production of aquatic ecosystems assessment is one of the unique feature of this laboratory. Some of the mentionable equipment of CEGIS Laboratory includes Water Salinity meter, pH meter, Electrical Conductivity and



Multi-parameter Tester



Digital Flow Meter

interval. To be more reliable and scientific in data collection, CEGIS is developing its own Environmental Laboratory for the assessments of Water, Land and Noise Quality of a given geographical settings. Presently, CEGIS is fully capable of Dust and Air quality

Turbidity meter; Multi-parameters water quality tester; Ultra-violet visible Spectrometer; Plankton Sampler; Sediment Grab Sampler; Multi-parameter Tester; Microscope and Binocular.

Runoff Scenario and Water based Adaptation Strategies in South Asia

(International Study in three countries – Bangladesh, Nepal and Pakistan)

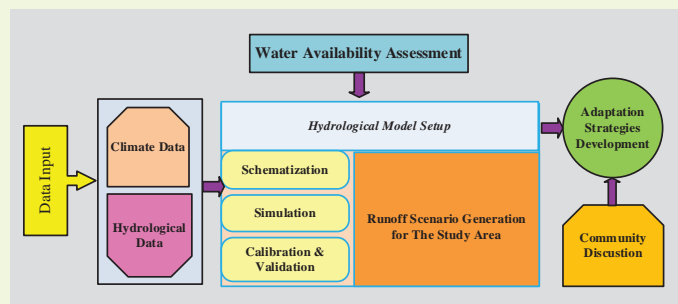
Motaleb Hossain Sarker, Director, Ecology, Forestry and Biodiversity Division, CEGIS

CEGIS carried out a study on “Runoff Scenario and Water based Adaptation Strategies in South Asia” as a joint venture partnership with Small Earth Nepal and Global Change Impact Study Center (GCISC), Pakistan. The strategic knowledge partners of the study were (i) East-West Centre (EWC), Honolulu, USA, and (ii) Department of Meteorology and Oceanography of Andhra University (AU), India. The study was conducted at three case study sites namely: Karnali River basin in Nepal, Gilgit River basin in Pakistan, and Gange-Padma River basin in Bangladesh.

The main objective of the study is to generate runoff scenarios through hydrological modeling and to develop water based

adaptation strategies through community discussions. Furthermore, the specific objectives of this study are to: (i) develop future run off scenarios under the IPCC scenarios in short term (2020), medium term (2050) and long term (2080); through hydrological modeling using IPCC climate scenarios data, (ii) explore the potential adaptation measures and to produce community based adaptation strategies focusing on water resource management; and

(iii) share the research findings with the policy makers as a decision support system. The study has been conducted through hydrological and climate modeling as well as community discussion at field level. Based on runoff scenarios and community



Flow diagram of the methodology

(Cont'd on page 8 ...)

Contract Agreements

CEGIS is a center of excellence in research and development having capacities in providing services to Water Resources, River Morphology & Delta, Environment, Ecology, Agriculture, Fisheries, Forestry, Power & Energy, Climate Change, Social & Economy, GIS, RS and Database & IT. It uses state-of-the-art modern technologies like geo-informatics, space technology, information technology, modeling and social tools and techniques. CEGIS works both with the Government and Non-Government Organizations (NGOs) of the country and also with regional and international agencies. CEGIS to date has already conducted and is in the process of conducting more than 600 study projects.

About 250 highly qualified CEGIS multi-disciplinary professionals are always committed to conduct the studies with best options and solutions to a project. CEGIS is proud for these professionals who through their



knowledge, experience and expertise of diverse working fields have made numerous successful innovations. By using modern and latest scientific tools and techniques, the professionals conduct IEE, EIA, SIA, ESIA, EMP, Environmental Monitoring, Feasibility Studies, Geo-informatics and Remote Sensing reports.

During the period from July to September 2017, a contract has been signed on 5 July 2017 with Bangladesh Rural Electrification Board (BREB). The title of the Contract is “System Loss Reduction by Replacing 5 Million Electro Mechanical Energy Meters with Electronic Energy Meters”.

Another contract has also signed on 10 August 2017 with Water Resources Department, Government of Bihar to develop a Management Support to the Mathematical Modelling Centre (MMC) for Water Resources Research & Development.

Basic Training on GIS and RS

A basic internal training programs on “Geographical Information System (GIS) and Remote Sensing (RS)” were organized at CEGIS Training Room from 23-24 August and 25-26 September, 2017 by Research Development & Training Division, CEGIS. The main objective of these training programs were to give the basic concept about GIS and RS for enhancing their conceptual and professional capacity. Around twenty four (24) participants from different divisions of CEGIS have attended the training programs. The participants learnt about the basics of GIS and RS related issues

through lectures and hands-on experiences. The training programs were conducted in two phases. In the Phase-I (first two days) 14 participants, and in the Phase-II (next two days) 10 participants attended the respective subject sessions. The first day covered the GIS related basic issues and the second day covered the RS related basic issues of each phase. Resource persons from GIS and RS Divisions of CEGIS delivered the lectures through power point presentation. The both training programs completed successfully.

Runoff Scenario and Water ... (Cont'd from page 7)

discussions, the adaptation strategies were developed and disseminated to the policy makers, decision makers, planners, scientists and community stakeholders.

The study result shows that the runoff will decrease in Chuadanga (7.20%), Jessore (1.70%), Rajshahi (12.16%) and Tangail (12.20%) by 2030. Again, by 2080 the runoff will decrease in Jessore, Jhenaidah and Bagerhat by 7.84%, 7.70% and 7.40% respectively. The study generated seven strategic options which were then prioritized as follows: (i) establish a regulatory framework for water management along with the local level management and capacities for water resource management system; (ii) increase the quantity of water availability through rehabilitation of different water storage structures, and (iii) improve the capture and natural storage of water through improved land and water management process.

Performing Holy Hajj by CEGIS Professionals

The Almighty Allah blessed five professionals of CEGIS to perform Holy Hajj in this year. Engr. Md. Waji Ullah, Executive Director; Mr. Md. Sarfaraz Wahed, Director (Addl. Charge), Administration, Finance, Accounts, Audit and Logistics Division; Mr. Badal Md. Faruque, Principal Specialist, Database, ICT and System Management Division; Mr. Md. Monirul Islam, Associate Specialist, Socio-Economic Division and Mr. Md. Mominuzzaman, Research Associate, Database, ICT and System Management Division from CEGIS have performed Holy Hajj. CEGIS family whole heartedly pray to the Almighty Allah to accept their Hajj and allow them to lead a happy and prosperous life with all their family members. May Allah also bless other members of CEGIS to perform the Holy Hajj in the coming years.

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Engr. Md. Waji Ullah

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