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the CEGIS NEWSLETTER

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

Upcoming Events

- National Workshop for Preparation of Country Paper on Sustainable Development Goal-6
- Identification of Ecological Footprint using Satellite Images
- CEGIS Participation in the Global Water Summit 2016
- Delineation of Potential Greenbelt Zone in the Coastal Areas of Bangladesh
- Training on Concept of Climate Change: Impacts, Vulnerability, Adaptation and Mitigation Measures
- Training on River and Delta Morphology: Evolution, Dynamics and Prediction

Inside

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CEGIS Participates in World Conservation Congress 2016 at Honolulu, Hawai'i

Engr. Md. Waji Ullah, Executive Director of CEGIS along with other international conservation leaders in the forum

IUCN World Conservation Congress 2016 was held in the Hawaiian capital, Honolulu from 1 to 10 September 2016. It was hosted by the State of Hawai'i with support from the Department of State of the USA. Engr. Md. Waji Ullah, Executive Director of CEGIS participated in all events of the Congress and met with different conservation scientists, natural resources managers/leaders and high officials from different countries of the world.

The main objective of the Congress was to bring all the world conservation leaders, scientists and decision-makers together to make the planet worth living and conserve the natural resources for future using nature based solution for development. The Congress inspired the international community to take action for nature by demonstrating its critical role as our life support system and by showcasing inspiring examples, from Hawai'i as well as the rest of the world, where conservation has delivered tangible benefits for biological diversity, people and sustainable development. The Congress also shared the consolidate and advance IUCN's policy to address urgent issues of the present and future times, agree on new priorities and actions for the global conservation community from 2017 to 2020, and involve all IUCN constituencies and partners to jointly drive the necessary implementation. It is expected that the Hawai'i commitments will make the world leaders aware for consideration of globally transformative and innovative nature based conservation initiatives to meet the critical challenges and opportunities of present time, including the imperative to scale up action on biodiversity and sustainable development goals.

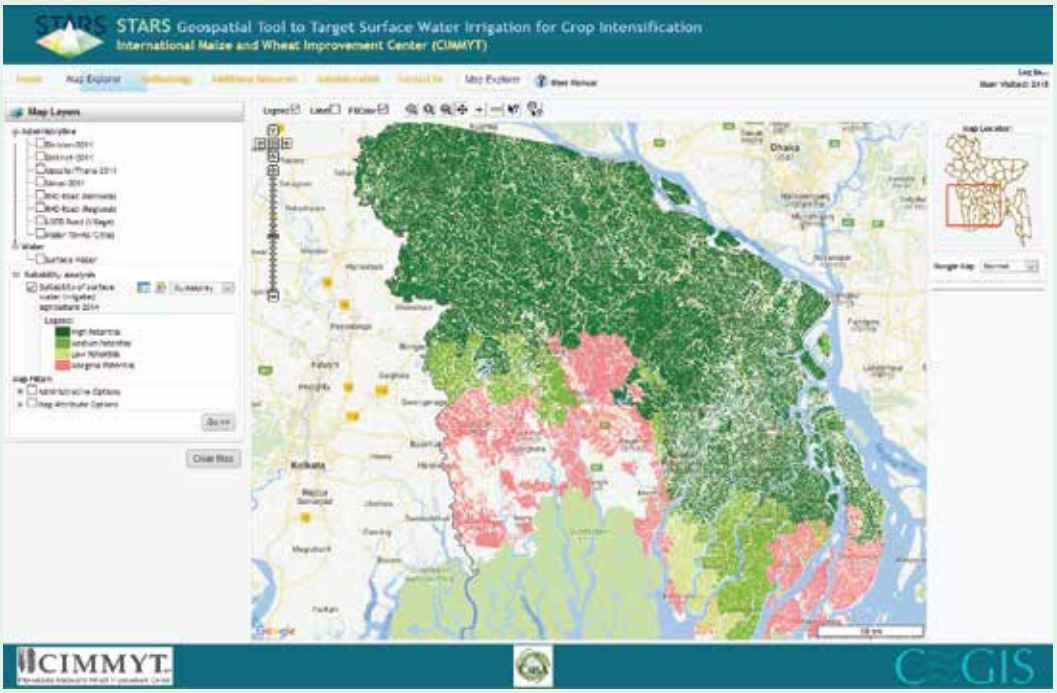
The conservation leaders during this Congress spelt out that the Ocean Warming is affecting humans directly and the impacts had already been felt, including effects on fish stocks and crop yields, more extreme weather events and increased the risk of water-borne diseases, according to

(Cont'd on page 4...)

STARS - A Geospatial Tool to Target Surface Water Irrigation for Crop Intensification

Abul Kashem Md. Hasan, Database, ICT and System Management Division

The International Maize and Wheat Improvement Center (CIMMYT), having headquarter in Mexico, is a nonprofit, agricultural research and training center to help developing nations to promote sustainable agriculture development. CIMMYT is currently developing an irrigation management advisory with satellite technology (IrMASaT) in collaboration with BARC, BARI, BIID, CEGIS, and IWM. IrMASaT is a part of a large project - Spurring a Transformation for Agriculture through Remote Sensing (STARS)- that is being coordinated by ITC, Netherlands. Under this study, a huge number of primary and secondary geo-spatial data and information has been collected as well as generated by CIMMYT, CEGIS, IWM and other project partners. CIMMYT engaged CEGIS to develop a Geospatial Tool to incorporate and visualize all these information with relevance for targeting the use of surface water for irrigation in Southern Bangladesh.



Screenshot of Map Explorer

STARS Geospatial Tool has been developed using ASP.Net (C#), XHTML, CSS2, AJAX, jQuery and JavaScript. AspMap 4.8.2 has been used to handle spatial data. PostgreSQL has been used for data server and Internet Information Services (IIS7) for web server. The web portal consists of the following six major components:

Home: This page contains an overview of the STARS project. The user can also navigate to other components from this page.

Map Explorer: This is the main component of the portal. It displays spatial data such as the suitability of land for surface water irrigated agriculture, surface water presence, administrative boundaries, road networks, and such others. Zoom in, zoom out, pan, super imposition and other standard facilities of a geographical information system (GIS) are available here. The Map Explorer also provides facilities to view identity and attribute information of the spatial data layers. The Map Explorer interface contains three main sub-components: Map Layers Tree, Map Filter Tree and Summarize Data. The Map Layers' Tree contains data groups as parent nodes and corresponding data layers as child nodes. Map Filter Tree contains two parent nodes: Administrative Options and Map Attribute Options. Administrative Options contains administrative units such as Division, District and Upazila as its siblings. This option is used to filter data based on administrative units. On the other hand, Map Attribute Options contain different map attributes such as Flood Class, Suitability, Crop Intensity, Soil Salinity, Water Salinity etc. as its siblings. This option can be used to filter data based on different values of map attributes. Summarized Data is used to summarize information based on Division, District, Upazila (sub-District), and other administrative or geographical parameters. Summarized data can be viewed as graph or as a chart and can be exported in excel, access, dbase or text.

Methodology: This component helps to view the detail methodology of the development of the project.

Additional Resources: This component helps to view the selected reports, publications, and such on the topic of cropping intensity and surface water irrigation in Bangladesh.

Administration: This component allows administrator to create new users as well as edit existing users. It also allows a user to change his/her password.

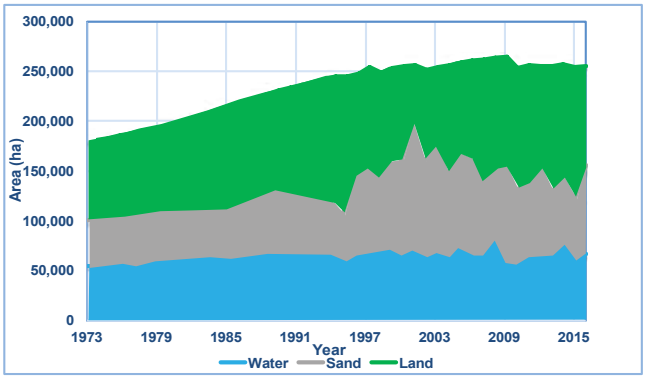
Contact Us: This component provides contract information for the developers of the geospatial tool.

Dynamics of the Charlands in the Jamuna River

Nooren Irtiza Alam, River, Delta and Coastal Morphology Division

The main rivers of Bangladesh are characterized by their dynamic river morphology, in particular the Jamuna and the Padma, with considerable bank erosion and accretion. Each year, many sandbars (areas of sand/sediment above the water) accumulate and wash away with strong river flow. Sandbars emerging as islands/chars within the river channel or as attached chars – attached to the riverbanks - create new opportunities to establish settlements and pursue agricultural production. Once vegetated, such lands are commonly called 'chars' in Bangladesh. However, future erosion of chars is hard to predict and also not possible to declare any of these chars stable, not even those existing for decades. Many chars, especially in the Jamuna River, start to grow vegetation and consequently attract settlement, but then later get eroded, causing suffering and uprooting of the char inhabitants.

CEGIS has conducted a detailed study regarding char stability in the Jamuna and the Padma in 2016 getting financial support from Flood and Riverbank Erosion Risk Management Investment Program (FRERMIP) of BWDB. Analysis of time-series, classified dry season satellite images of the Jamuna River demonstrate the changes of water, sand and vegetated area within the bank-lines of the study area during the last four decades.



Area of water, sand and land in Jamuna River 1973 to 2016

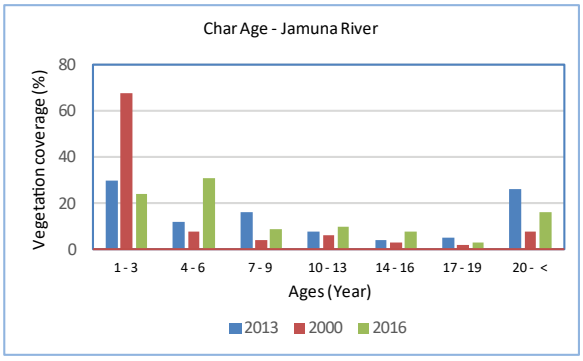
The areas of chars and sand bars within the active river corridor increased at a faster rate between early 1970s and late 1980s, as expected - almost no change in water area. This increase coincides with the increase in the river width. It is remarkable that the process of increasing river width is associated with increasing of sand and sometimes increasing of char areas as well. During last one and half decades char areas are increasing, on the other hand sand areas are reducing. This indicates a more stable form of the river than the preceding decade.

To get a better idea of the char stability, char age is being determined this year using classified images from 1994-2016 for the whole of the Jamuna River. This will update the previous data and also determine the stability of the chars along the entire reach of the river.

Age of chars as observed in 2016 satellite images (analyzed data from 1994-2016)

Analyses of char age suggest that areas of old chars (more than 20 years) is higher in middle and downstream reaches than in the upstream reach, indicating less stability in the upstream, mainly due to the higher gradient.

Age of chars	Percent (%)
1-3	24
4-7	30
8-10	9
11-13	10
14-16	8
17-19	3
above 20	16



Variation of char ages of the Jamuna River over time

From the figure, ages of chars are found to vary between reaches and with time between different periods. EGIS in 2000 found ages of chars to be lower than the ages found at lower Jamuna by CEGIS in 2013 and by the 2016 study.

The Jamuna is a braided river with three distinct anabranches such as Fulchhari, Sariakandi and Chauhali. These anabranches have very important role on the char dynamics. Char dynamics in Sariakandi reach are presented in the time series maps.

Char formation and dynamics of Sariakandi anabranch

The convergence reach between consecutive divergent reaches often referred to as nodal reach. In 1980, two big chars (23 km and 24 km long) bounded by the braided channels started to grow larger and initiated the formation of anabranching reach. At that time, there were two sets of anabranching system, at upstream the left anabranch dominated over the right, but at downstream, both anabranches were equally large. The link channel, separating the upstream and

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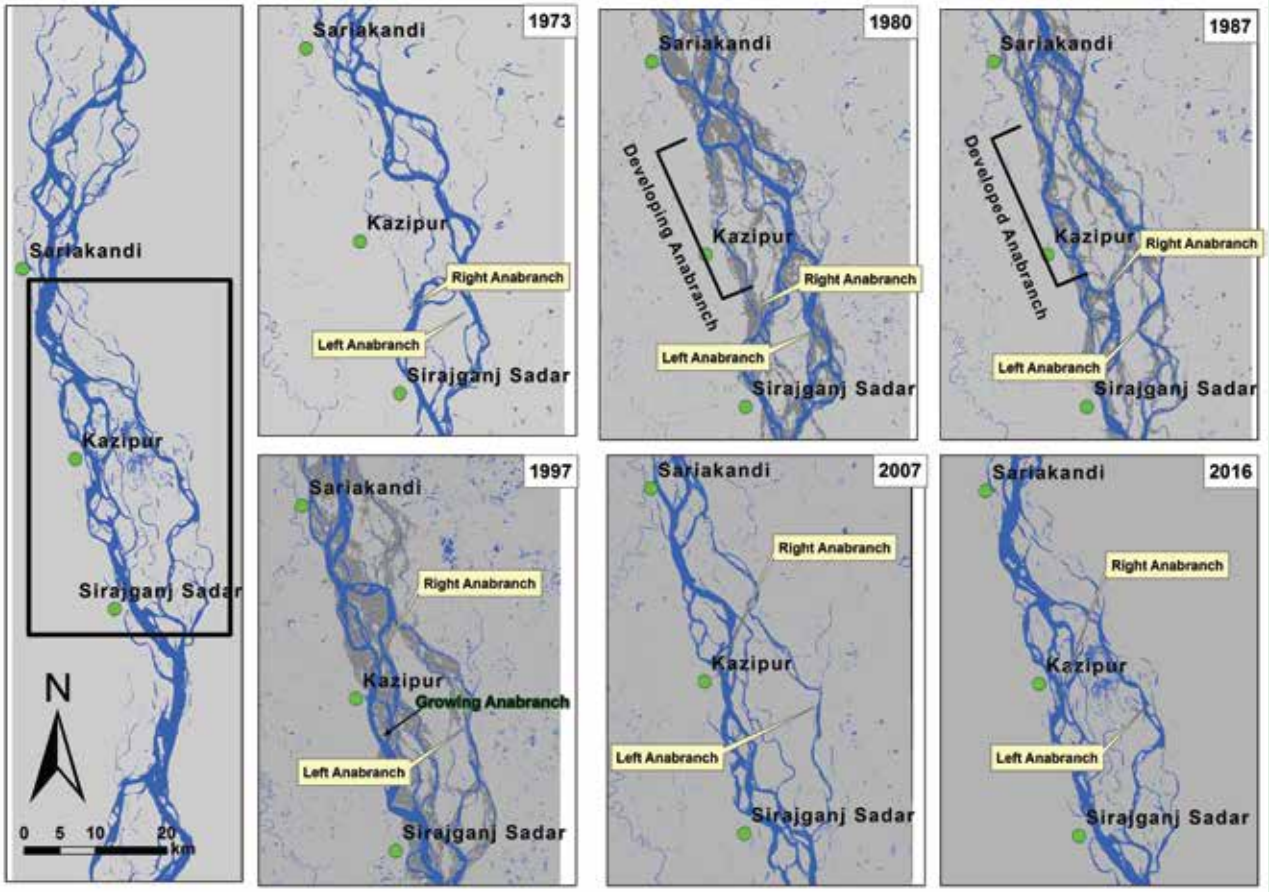
Dynamics of the Charlands..... (Con't from page 3)

downstream and abandoned in 1990s, facilitated the growth of a 32 km long char at this reach. The decline of the left anabranch was continuing in this period and it continued till to the end of the first decade of this century, resulting in the development of a 50 km long island. The left anabranch started to develop in the earlier part of this decade and is continuing till to date.



During the last five decades, the Jamuna has gone through a rapid metamorphic process. This process, however, has great influence on the formation processes of the chars and their stability. Dynamic processes of char development, however, depend on the dynamics of anabranching channels, which are growing and declining, persistently. With changes in the overall morphology of the river, such as widening of the river, initially increased the sand coverage area, later, sandy area became vegetated area during the stable phase of the river itself.

CEGIS Participation in the Congressat Hawai'i ..... (Con't from page 1)

that, which has been called the most comprehensive review available on the issue. The Hawaii Congress also shared that about 15% of the Earth's land and 10% of its territorial waters are covered by national parks and other protected areas; coverage of marine protected areas have increased by almost 300% in the last decade; and 8 in 10 key biodiversity areas worldwide lack complete protection. About 14.7% of the earth's land and 10% of its territorial waters under protection, the world is on track to meet a major global conservation target, according to a new report by UN Environment and the International Union for Conservation of Nature (IUCN), launched at the IUCN World Conservation Congress in Hawai'i. The Congress also explored the way as to how the valuation of the earth's natural resources (rivers, forests, oceans, deserts, wetlands and such others.) and its impact conservation and people can be done.

World Heritage first became an important element of conservation and sustainability plans in the 2003 World Parks Congress in Durban (South Africa), from then it has become an integral part of WCC ever since. During the Hawai'i Congress 2016, the participants have given due emphasis on World Heritage sites in terms of ecological modeling, management of best practices and shared those with other stakeholders to achieve the highest standards in addressing the key issues, including climate change, tourism management and sustainable development. The slogan of the WCC of IUCN at Hawai'i regarding the World Heritage is declared as "Planet at the Crossroads – A critical time for conservation". The WCC also highlighted the progress made through synergies among the seven biodiversity-related Conventions, as well as collaborative works with site managers and national authorities, and enhanced links between natural and cultural heritage.

Finally, the World Conservation Congress (WCC) ended with formulation of recommendations the responsibility of which will be taken by the world for the next four years (2017-2020).

Training and Capacity ..... (Con't from page 7)

EIA Training Participants along with Management of CEGIS

CEGIS has organized and successfully completed a number of training programs during the third quarter [July –September] of 2016. A five day long training program was organized on "Environmental Impact Assessment", which was designed for oil, gas and mineral resources sectors of Bangladesh. This was arranged from 31 July to 4 August, 2016. About 16 participants from different organizations like BGFCL, GTCL, SGFL, BAPEX, BCMCL and CEGIS participated. External and in-house experts conducted specific sessions as resource persons.

Another training program on "GIS and its application for enhancing the capacity of Petrobangla Officials" was conducted at CEGIS. Seven participants from Petrobangla and two from CEGIS participated in this training program which was held from 31 July to 11 August.

CEGIS effectively completed another training entitled "GIS based training program on agricultural marketing for mid-level officials of relevant organizations". This program was designed in two batches with a total of 29 participants and continued for 8 days for each batch. It started on 28 August and ended on 24 September with 5 days general and 3 days advanced sessions for each batch. This training program adopted participatory approach and incorporated essential requirements placed by FAO and BBS. Honorable Senior Secretary, Ministry of Water Resources, Dr. Zafar Ahmed Khan, graced the certificate awarding ceremony of this training program. Mike Robson, FAO Representative and DG, BBS along with other officials were present in the closing event.

Dr Zafar Ahmed Khan, Senior Secretary, Ministry of Water Resources, is awardeding certificates toamong the participants

Engr Md Waji Ullah, Executive Director of CEGIS is delivering concluding speech

A five day long training program entitled "Practitioners Course on Environmental and Social Impact Assessment" was organised at CEGIS conference room from 24 September to 28 September. About 22 participants from different organizations and CEGIS as well, took part at this capacity development program. There were resource persons from different sectors as well as in-house in this training event. Honorable Minister, Ministry of Water Resources, Government of the People's Republic of Bangladesh, Mr. Anisul Islam Mahmud, MP graced the closing ceremony as Chief Guest. Lt. Col. (Retd.) Muhammad Nazrul Islam, Bir Protik, MP, honorable State Minister, Ministry of Water Resources, Government of the People's Republic of Bangladesh was present as Special Guest at the closing session. The Executive Director of CEGIS, Engr. Md. Waji Ullah chaired the session. Mr. Raisul Alam Mondal, Director General, DOE, Mr. Mike Robson, FAO Representative in Bangladesh, Dr. Patrick E. Meyer, Climate Adaptation Group Leader, USAID also graced the session as Special Guests.

The participants received certificates for their successful completion of the training program.

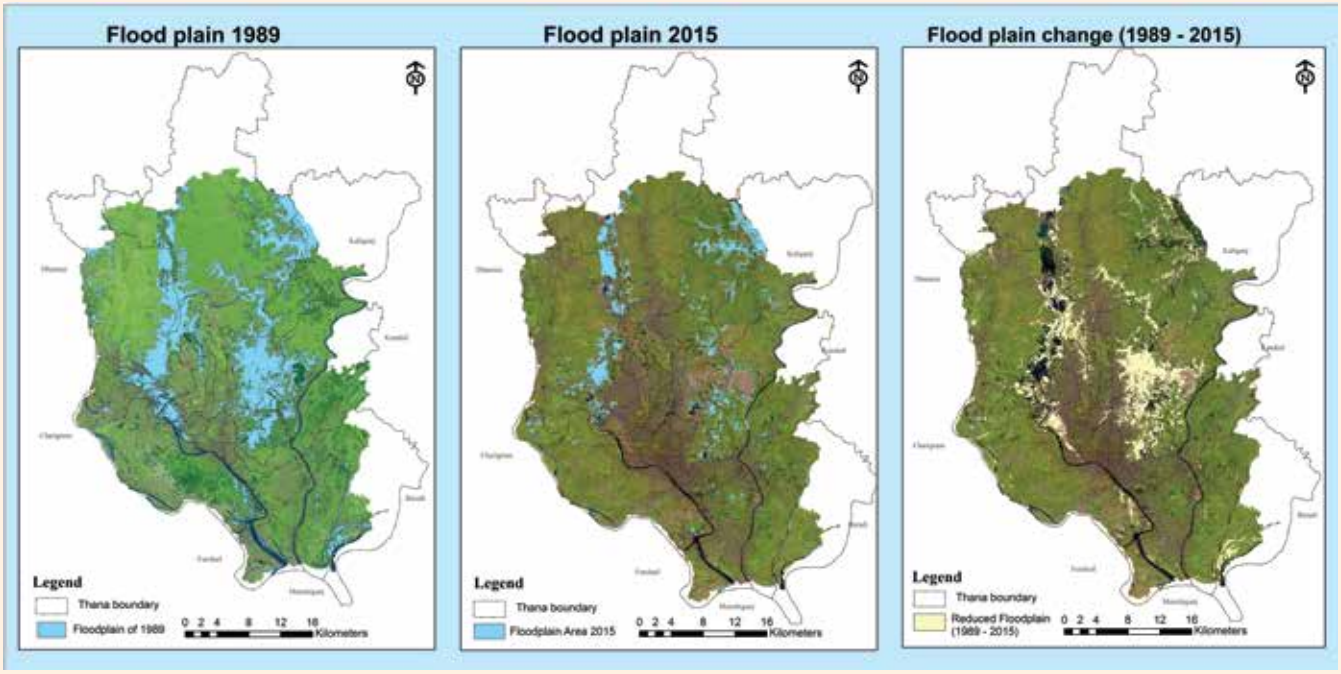
Permanent water bodies and floodplain extent change analysis using remote sensing and GIS Technology: a Case Study of DAP Area of Dhaka City

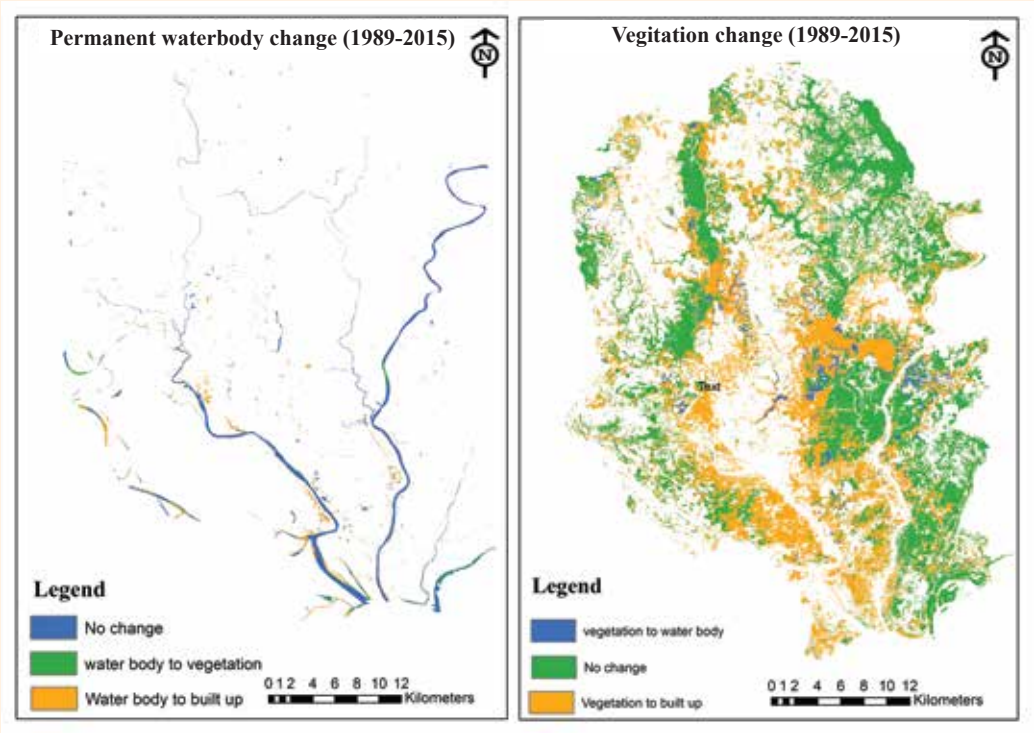
S M Samiul Islam and Rafiullah Arefin, Internee under Remote Sensing Division

Dhaka, the capital of Bangladesh, is one of the world's fastest growing mega cities (Krass, 2009) in the world. It has undergone radical changes in its physical form through internal physical transformations over the last decades. In the process of urbanization, the physical characteristics of Dhaka are gradually changing. The open spaces, flood plain (low land) and permanent water bodies have been transformed into residential, commercial or industrial areas. Remote sensing and GIS technologies are excellent tools for understanding the land cover identification and change detection.

The aim of this case study was to analyze the change of extent of permanent water bodies and floodplain within DAP (Detailed Area Plan) area of Dhaka city between 1989 and 2015. For this purpose the area extent of permanent water bodies and normal year flood plain were indentified from LANDSAT images of dry season (November and March) 1989 and 2015.

The areas of water bodies (both permanent and seasonal), built-up areas and vegetation have been changed drastically within DAP area between 1989 and 2015. The area of permanent water body was 58.7 sqkm in 1989 and it was found 45.4 sqkm in 2015. About 22.57% of water bodies were reduced over the 26 years period. The normal year flood plain was found 224 sqkm and 82.5 sqkm from analysis of





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Training and Capacity Building

Participants and resource persons along with the management of CEGIS and IWA in the Training Program

The Center for Environmental and Geographic Information Services CEGIS has under taken a number of unified and productive initiatives for building basic capacities of its professionals on water and climate. One of the most important initiatives of the CEGIS management is to involve its young professionals in international training program to different countries every year on various relevant and essential issues in order to increase their expertise and exposure. Like previous years, this year CEGIS sent a group of young professionals to attend a 5 day training course entitled "Water, Climate and Resilient Cities" organized by the International Water Association (IWA) at the Malaysia-Japan International Institute of Technology (MJIIT) in Universiti Teknologi Malaysia (UTM), Kuala Lumpur, Malaysia. The aim of this training program was to acquire knowledge regarding climate change and its impacts on water resources sustainability and its effective application in building climate resilient cities. There were a number of relevant topics throughout the training program, which included the role of water, food and energy nexus, climate change and its impacts, effective functioning of water supply, health and sanitation system, and water safety planning. There were also some interesting interactive sessions such as role-play on sensitive topics as gender issues and international water law practices with focus on the role of negotiation in strategy development. A day was dedicated for field visit to Malaysian Water Association (MWA) where various aspects of water allocation strategy and management issues faced in Malaysia and how their system works, and functions as a whole were discussed. Another field visit was made to the sewage treatment plant of Indah Water Consortium. Lot of new concepts and ideas were learnt on effective sewerage development strategies of developing countries and sewage treatment process. Besides training activities, the free hours were utilized engaging in various recreational activities, adding to the overall experience gain for the participants. It is, thus, envisaged that these initiatives will be continued in the future and this will indisputably be helpful for the young professionals to perform better in their regular routine activities and in essence, help them in becoming a better person in every aspect.

Technical Session of the Training Program

Technical Session on field activities of the Training Program

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Contract Agreements between Various Agencies and CEGIS

Engr. Md. Waji Ullah, Executive Director of CEGIS and Mr. Uttam Kumar Saha, D.C.F. & Project Director, CRPARP of Forest Department, Government of the People's Republic of Bangladesh are signing the contract document

A number of important contracts have been signed between various agencies and CEGIS in this quarter (July – September 2016). CEGIS, during this period, has continued the expansion of its relationship horizon with new clients and signed contracts for consultancy services for the followings:

Digital elevation model and delineation of catchment boundaries for 2 polders under Blue Gold;

Mapping of potential greenbelt zone in coastal areas for Bangladesh Forest Department;

Environmental Impact Assessment (EIA) and Resettlement Plan (RP) of Khulna 800 MW LNG Based Combined Cycle Power Plant Project under North-West Power Generation Company Ltd;

Feasibility Study including IEE/SIA on selection of Navigation Route for Ruppur Nuclear Plant.

Permanent Waterbody and Floodplain ..... (Con't from page 6)

LANDSAT image of 1989 and 2015 respectively. Over the years, the flood plain was reduced 141.5 sqkm, which is 63.15% of the area of flood plain of 1989. The population of Dhaka city is growing exponentially since the last few decades. It is the prime reason of reduction of water bodies and flood plain zone. The rapid growth of population, unplanned urbanization and industrialization in the periphery of Dhaka city has created a tremendous pressure on the changes of land cover.

New Faces in CEGIS

Salma Sultana Taposhi joined CEGIS on 29 August 2016 as Consultant in Socio-Economic & Institutional Division. Ms. Sultana has worked in the disaster management sector for about 2.5 years. She worked in Caritas Bangladesh prior to joining CEGIS. She was involved in projects like: Strengthening Community for Flood Risk Reduction, Strengthening Arsenic Preparedness and Mitigation Program, and Improvement of Livelihood and Health Program related to disaster management and disaster risk reduction. Recently, she accomplished a Master of Environmental Policy and Management (Applied) from the University of Adelaide, Australia. Earlier, she completed her Bachelor of Social Science (BSS) and Masters in Social Science (MSS) in International Relations from the University of Dhaka. She did her internship in Department of Environment, Water and Natural Resources, South Australia. She has also participated in several national and international trainings on sustainability, gender and development. Ms. Sultana has keen interest on environmental legal aspects, natural resource management and environmental and social impact assessment.

Susmita Das Rimi joined CEGIS in August, 2016 as Consultant under the Agricultural and Fisheries Division. She has completed her Bachelor of Science (B.Sc) and Masters of Science (MS) in Fisheries from the University of Dhaka. She has attended a number of many seminars and workshops in the university before joining CEGIS.