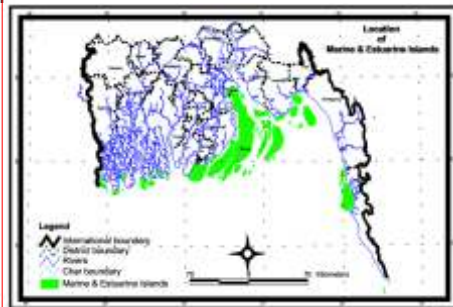


Issue 7  
January 2006

# the CEGIS NEWSLETTER

Bi-annual bulletin of the  
Center for Environmental and  
Geographic Information Services (CEGIS)



Map of Marine and Estuarine Islands (see page 3 for details)

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## CEGIS welcomes new Secretary-in-Charge



CEGIS welcomes Mr. Syed Mohammad Zobaer as the new Chairperson of the Board of Trustees of CEGIS. Mr. Zobaer took charge of the Ministry of Water Resources (MoWR) as Secretary-in-Charge on 8 January 2006.

During his eventful career Mr. Zobaer has served in a number of prestigious positions in the Government of Bangladesh such as Additional Secretary in the Ministry of Water Resources, Director General of the Disaster Management Bureau, Joint Secretary in the Ministry of Commerce, Economic Counselor/Minister in the Embassy of Bangladesh in Riyadh, Deputy Secretary in the Ministry of Agriculture, Senior Assistant Secretary in the Ministries of Post and Telecommunications, Civil Aviation and Tourism, Home Affairs and Economic Relations Division of the Ministry of Finance. Mr Zobaer is a member of the Bangladesh Civil Service Administration Cadre and belongs to the 1979 Batch.

CEGIS is certain to benefit from the able guidance of Mr. Zobaer, and continue to function as a scientifically independent center of excellence in its field of expertise.

## CEGIS at SoftExpo 2005



CEGIS recently participated in SoftExpo 2005, the biggest showcase for software products, ICT enabled services (ITES) and ICT systems solutions in Bangladesh. The event was held from 27 Nov. to 01 Dec., 2005. CEGIS took part in the fair jointly with the Support to ICT Task Force (SICT) project of the Planning Commission, Institute of Water Modeling (IWM) and Roads and Highways Department (RHD). More than 125 local and international companies with more than 180 stalls participated in this IT fair.

## DRAS presented at SAARC workshop

The DRAS model, developed by CEGIS, was presented at a workshop of the SAARC Meteorological Research Center on 29 November, 2005.

A technical paper on 'Drought modeling and its application in crop production' was presented before the participants from the SAARC countries by A. M. Ibrahim and E. H. Chowdhury of CEGIS. The DRAS model was highlighted in respect of its utilization at the national and local levels.

## Method developed for predicting bank erosion along Padma River

Like other major rivers of Bangladesh, the Padma River is highly dynamic in nature, causing huge bank erosion along both its banks. During the last three decades, the river has changed its planform from braided to straight and straight to braided again. The reach-averaged width, braiding index and erosion and accretion rates have changed with the changes in its planform.

CEGIS has attempted to quantify these changes while carrying out a study on Developing Empirical Methods for

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The model's contribution to supplementary irrigation for T. Aman crop in the farmers' fields will be a major breakthrough for raising agricultural crop production. In this respect, DRAS can be very useful in assessing net irrigation requirements as well as in planning efficient irrigation schedules.

### Pond Database for DPHE

CEGIS has developed a database on 'Perennial surface water sources close to villages with over 80% tube-wells arsenic contaminated' for DPHE with financial assistance from the Department for International Development (DFID) Bangladesh.

The objective of the project was to prepare (from available satellite images) GIS maps and a database on perennial surface water sources (rivers, water bodies and ponds etc.) in severely arsenic affected villages of selected unions. The output of the project are to be used for supporting DPHE in the preparation of an inventory of perennial surface water sources close to villages where over 80% of the tube-wells have arsenic contamination in excess of 50 mg/l.

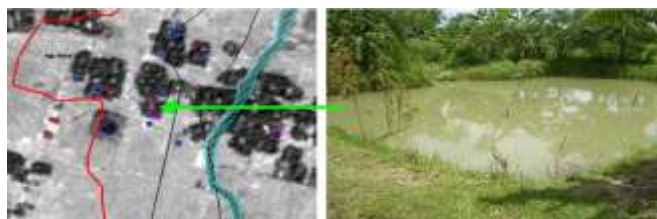


Figure 1: A pond at Agripaara Mauza under Kanaighat Union, Kanaighat, Sylhet

The inventory will facilitate identification of alternate safe water options in arsenic affected areas. A detailed pond survey using GPS, questionnaire and the GIS based database, was also undertaken to help DPHE identify alternate sources of safe water for providing alternate safe water option technologies to arsenic affected rural people.

A user-friendly software has also been under construction for the management of the database for arsenic mitigation planning. The data collected from the field present some very useful information on:

- Availability of surface water in affected villages in specific periods
- Number of usable ponds
- Usage of ponds
- Availability of surface water during peak dry season in affected villages
- GPS locations of ponds
- Available surface water to serve the population in highly arsenic affected areas
- Type of safe water option technology provided in villages

The deliverables of the project include: (i) GIS based surface water database including river and waterbodies, (ii) detailed pond database including their physical attributes for the selected unions, and (iii) user-friendly software / tools for database management for arsenic related planning purposes.

predicting the morphological changes in the Padma River.

CEGIS has developed tools this year (2005) for predicting the morphological changes in the Padma River under the framework of the JMREM Project of BWDB. Using the tools it is possible to predict bank erosion 1-2 years ahead in time. CEGIS has so far predicted bank erosion at six locations along the Padma River.

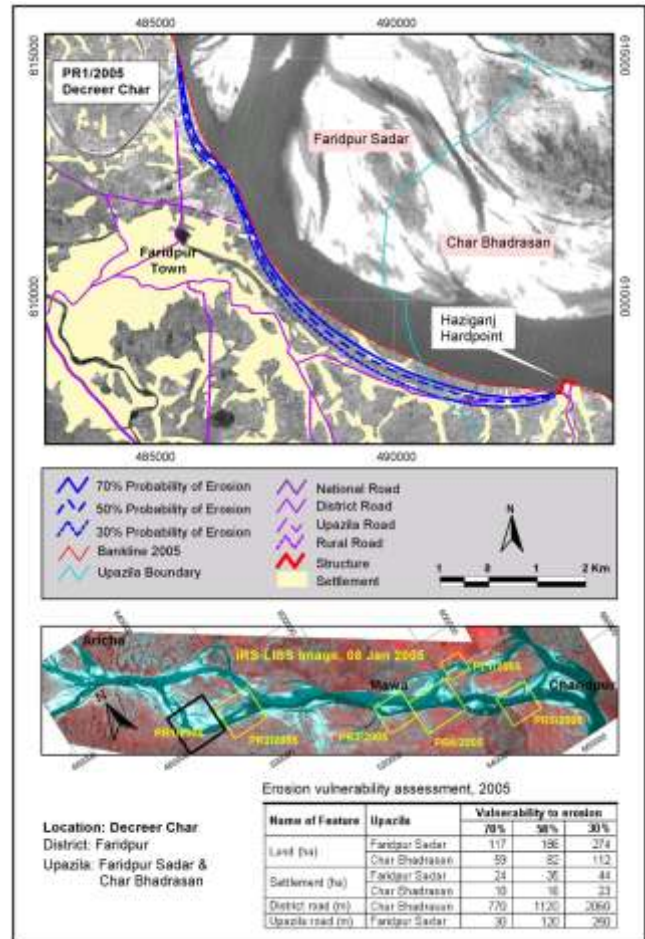


Figure 2: Bank erosion along Padma River at Faridpur.

The above figure presents bank erosion along the Padma River at Faridpur. It has been predicted that about 270 ha of land is vulnerable at Faridpur under the probability range of 30%.

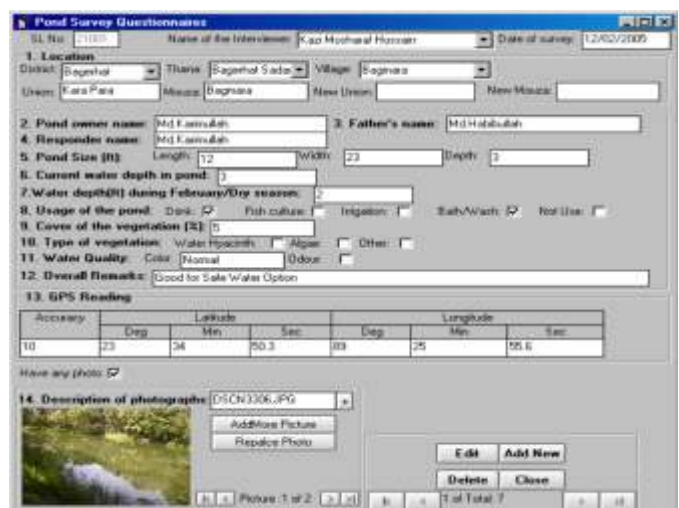


Figure 3: Pond database interface.

## Information on Coastal Islands in ICRD

CEGIS has conducted a study on 'Ground truthing inventory of islands in the coastal zone' to assist the Integrated Coastal Zone Management Plan (ICZMP) Project in making information on coastal islands easily available. It is one of the components of the 'Knowledge gap filling' of the Integrated Coastal Resources Database (ICRD). The study was first initiated as a short-term study titled 'Inventory of Coastal and Estuarine Islands & Chars' in 2001 which made a recommendation to initiate an extensive ground truthing and updating of the collected information. CEGIS collected all information from primary and secondary sources as well as field visits.

Islands and chars in the coastal region are categorized into 3 different classes: 1) Detached riverine char; 2) Chars attached with mainland; and 3) Marine & Estuarine Islands. The study identified 185 islands and chars in the coastal region. Among these, 21 chars have been identified as 'Detached riverine char', 92 chars as 'Chars attached with mainland' and 72 islands as 'Marine & Estuarine Islands'. 'Marine & Estuarine Islands' are those, which are located within the area with a tidal range of 2 to 6m (Macro and Meso-tidal). Associated information on islands and chars were collected mainly from 'Marine & Estuarine Islands'.

It has been learnt through the study that the islands ('Marine & Estuarine Islands') are located mostly in 11 coastal districts (Bagerhat, Barguna, Bhola, Chittagong, Cox's Bazaar, Khulna, Lakshmipur, Noakhali, Patuakhali, Pirojpur and Satkhira). The island area covers 15% of the total district area. The highest number of islands (20) was found in Patuakhali District. The area of the islands comprises 36% of the total district area of Patuakhali. The district Bhola has the second highest number of islands - 18, which is 79% of the entire district region.

The total population in these islands are about 3 million. 13% of the total population of the coastal districts lives in these islands. Bhola has the highest (93%) district population living in these islands. No permanent population was found living in the islands in Barguna, Khulna, Pirojpur and Satkhira districts. Among these 72 islands, 35 have no permanent population. The average population density and household size in these islands are about 568 person/sq. km. and 8 respectively.

In the above-mentioned 72 islands there are only 2 cyclone shelters for every 10,000 people. Islands located in Bagerhat, Barguna, Khulna, Pirojpur and Satkhira have no cyclone shelters. There are only 6 cyclone shelters for every 10,000 people (which is the highest among these 11 districts) in Noakhali District. Among the 72 islands, only 14 are protected by embankments or polders; the remaining 58 are unprotected.

17% of the island area is covered with mangrove forests. The rest of the area is covered by settlements, potential agricultural land, fallow land and Uri grass.

This is thus a summary of the study output. It is only a part of the whole scenario related to the socio-economic and development conditions of the coastal environment. To bring out the complete scenario, thorough investigation and collection of information on other parameters are needed.

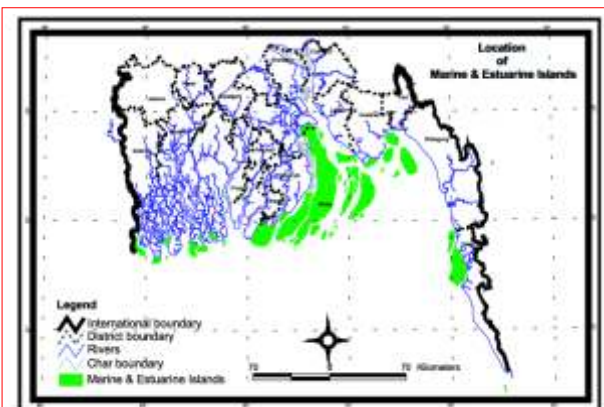


Figure 4: Map of Marine and Estuarine Islands

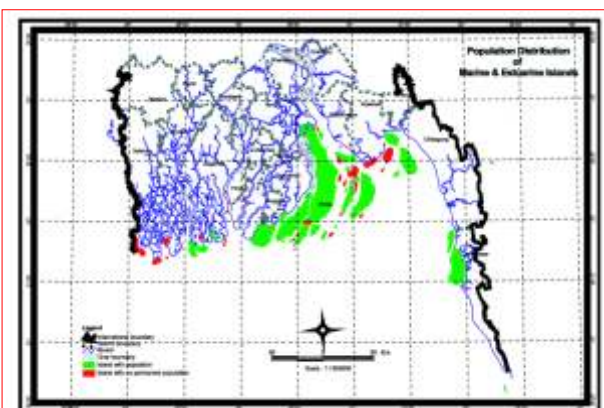


Figure 5: Human Settlement in Islands

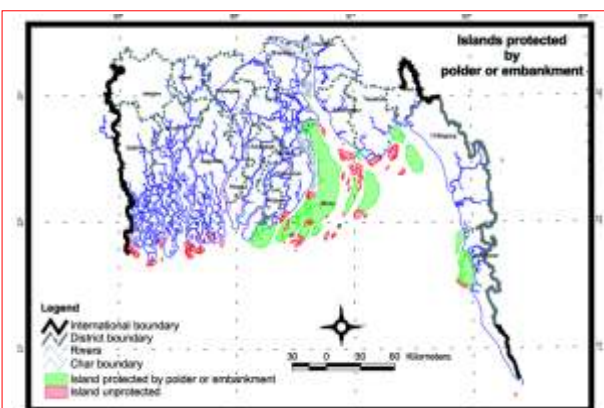


Figure 6: Islands protected by Embankments or polders



## Workshop News

### Seminar on Disaster Preparedness: Erosion Prediction

A seminar on "Disaster preparedness: Erosion Prediction" was held on 17 August 2005 to disseminate the results of erosion prediction and its application as a part of disaster pre-paredness.



*Chowdhury Kamal Ibne Yusuf, Minister for Food and Disaster Management delivering his speech at the seminar*

Chowdhury Kamal Ibne Yusuf, Minister for Food and Disaster Management was the chief guest of the seminar. Advocate Goutam Chakraborty, Hon'ble Minister of State for Water Resources, was Special Guest and Mr. S.M. Jahrul Islam, Secretary, Ministry of Water Resources, chaired the main session.

Prediction of bank erosion along the major rivers of Bangladesh may help in planning both structural and non-structural measures. Under the framework of JMREM and EMIN projects, CEGIS has predicted bank erosion at 35 and 6 locations along the Jamuna and Padma rivers, respectively.

### Workshop held on Application of DRAS model at BARC

CEGIS and the Bangladesh Agricultural Research Council (BARC) jointly organized a day-long workshop on 24 November 2005 at the BARC auditorium. The workshop was on "Application of DRAS model for drought vulnerability assessment and irrigation water management". The inaugural session was presided over by Mr. Giasuddin Ahmed Choudhury, Executive Director, CEGIS. He highlighted the activities of CEGIS in the field of environment and research studies focusing on natural hazards like drought, flood and erosion in the study area.



*From left to right: Giasuddin Ahmed Choudhury, Executive Director, CEGIS, Dr. Moslemuddin Miyan, Member Director BARC, Mr. Khan M. Ibrahim Hossain, Director General DOE.*

Several presentations were made by lead technical experts in the field, including senior researchers and officials from BRRI, BARI and DAE. CEGIS presented the DRAS model, which is a scientific solution for assessing and managing agricultural damage caused by drought. The other presentations were on the utilization of the model and its future adoption for the assessment and management of drought at the local level. The workshop concluded that farmers can immensely benefit through the development and application of the DRAS model and its outputs at the local level for reducing drought impacts.

### Regional Workshop on Seasonal Crisis Study



*Mr. Mohammad Qamar Munir, Mr. Giasuddin Ahmed Choudhury, Dr. Babar Kabir and others at the workshop*

On 14 November 2005, CEGIS held a day-long regional workshop in Kurigram on the study "Support to Action Research Work on Seasonal Crisis in the Northern Districts" of the UNDP funded Sustainable Environment Management Programme (SEMP). Mr. Mohammad Qamar Munir (Deputy Secretary, Ministry of Environment and Forest) was present as the Chief Guest while Dr. Babar Kabir (Programme Coordinator, SEMP), and Deputy Director of DAE, Kurigram participated as special guests. Mr. Giasuddin Ahmed Choudhury (Executive Director, CEGIS) welcomed the participants comprising professionals from DAE, UNDP, IPSU, Thikana, CEGIS, several local agencies, journalists and individuals from Kurigram and neighboring northern districts.

The workshop was highly successful in sharing the study findings and experiences of the interventions carried out by Thikana in six villages of Rajarhat Upazila. In a technical session, the study findings were presented by Mr. Atiq Kainan Ahmed, Anthropologist, CEGIS. In an experience sharing session facilitated by Mr. Aminul Islam Mondol (Advisor, Thikana), local beneficiaries from the six villages shared their experiences of overcoming the last monga crisis through the Thikana interventions. The workshop concluded with a very well delivered synergy discussion by Dr. Md. Rezaur Rahman, IWFM, BUET.

The workshop was useful in identifying the practical lessons from the interventions for overcoming monga at the local level. The study findings have implications for policies and institutions concerned in managing seasonal crises in a sustainable way.

## CEGIS Report on FAO "SD Dimensions" Website

CEGIS has carried out a vulnerability assessment in the agriculture sector for the "Support to the Strengthening of Disaster Preparedness in Agricultural Sector (SSDP) project" of the Food and Agriculture Organization (FAO) and Department of Agriculture Extension of Bangladesh (DAE). Adopting a participatory vulnerability assessment framework, a multi-disciplinary team of CEGIS made an innovative analysis of the conditions of vulnerabilities, livelihoods and institutions existing in the agricultural sector in the northwestern areas of Bangladesh where the SSDP project was piloted.

The final report of the CEGIS study under this project has recently (December 2005) been uploaded in one of the most prestigious and popular websites in the development community.

The major objectives of the CEGIS study were threefold: a) Development of a replicable methodology for vulnerability assessment and analysis; b) Identification of the vulnerabilities in the three major areas (i.e. physical/environmental, livelihoods, and institutional) that can be used for a plan of action for increasing preparedness; and c) Contribution to the overall capacity building exercise of DAE for agricultural disaster preparedness.

The study findings reveal that some of the risks and vulnerabilities existing in the agriculture sector are associated with climatic or environmental conditions, while some are linked with anthropogenic causalities or livelihoods dimensions, and others still depend upon people's access to adequate services from formal and informal institutional services. Despite the presence of these risk factors, one encouraging trend is that some individuals are actively attempting to decrease their vulnerable status by better managing these vulnerabilities. The core knowledge acquired through this study has implications for strengthening the process of the agriculture sector and other initiatives relating to disaster preparedness. The capacity-building process for the preparedness both within and outside DAE would benefit from the study findings.

The digital version of the final report of the study is now available for downloading from the FAO SD Dimension website.



Figure 7: Announcement of publication of CEGIS study report in FAO website

## Current active projects of CEGIS

- Land Acquisition Proposal Preparation for PCP
- Drought Assessment at Thana Level
- BUET/DC Joint Research Project
- CAIRN-Char Jabbar High Resolution Imagery
- GIS Database on Surface Water Sources for DPHE/DFID
- EMIN Phase II
- Livelihoods Adaptation to Climate Change in NW Districts
- Flood Monitoring & Calibration
- EIA/SIA Eastern Bypass Project
- Technical Mission for Faridpur
- Morphological Predictions for JMREMP
- Erosion Prediction for JMREMP
- Morphological Prediction & BWDB Training
- Land Use Zoning Southwest
- CLMS of Dhaka City
- Off the Shelf Services
- Integrated Coastal Resources Database
- Risk Reduction System for Flood
- Hydrological Data Collection
- Arsenic DSS for UNICEF
- Application of GIS for Injury Project of UNICEF
- GIS for Hill Tracts Para Mapping
- Public Construction, EIA/SIA North East region
- Development of Web Site for BWDB
- EIA/SIA of 6 BWDB Projects
- WRP: National Adaptation Plan for Action

## Satellite Image Processed By CEGIS



Khilgaon Flyover from QuickBird Satellite, 13 November 2004

The country's second and biggest flyover was constructed at the busy Khilgaon road-rail intersection in a major step towards easing traffic congestion in the capital. The 1.9 kilometer long and 14-meter wide flyover was constructed by LGED at a cost of Tk 81.75 crore, including expenses for land acquisition and compensation to the affected people.

Includes material © 2001, Space Imaging LLC.

## Holistic Development of Haors: A Challenge for the Millennium

Bangladesh has a wide diversity of water bodies spread all over the country. These are categorized and identified differently based on the salient characteristics of origin and location. Haors are such inland water bodies, which are the best source of natural surface water resources. There are altogether 411 haors in Bangladesh comprising an area of about 8000 km<sup>2</sup> dispersed over the districts of Sylhet, Sunamganj, Moulvibazar, Habiganj, Netrokona and Kishoreganj. The haors of the northeast present a complex picture of the vulnerabilities of the relatively poor people to socio-economic disasters. The picture is about the land and water use, one defying the interest of the other and ignoring the basic ecosystem of haors.

Haors are bowl-shaped depressions of considerable aerial extent lying between natural levees of the rivers or high lands of the northeast region of Bangladesh. In most cases, haors have formed as a result of peripheral faulting leading to the depression of an area. In the wet seasons, the haors are full of water, but during dry seasons, they are dried up.

There are presently as many as 4.8 million people (which is likely to increase to 6.10 million by 2015) in the northeast region dependent on the deeply flooded haors for their livelihoods. The area is enriched with various aquatic biodiversities along with 140 species of fish and about 8000 migratory wild birds that visit the area annually.

The region is frequently affected by the flash floods generated in the steep uplands catchments adjacent to the region in India. These flash floods spill onto low-lying floodplain lands in the region, inundating crops, damaging infrastructure by erosion and channel shifting and causing misery to many lives. Channel shifts and avulsions during flash floods often result in substantial quantities of coarse sand deposited on agricultural land or in drainage channels.

The major economic activities of the haor basin depend on agriculture. Rice is the main crop grown in the haor basin. All rice crops are vulnerable to floods both during pre-monsoon and monsoon. Most household income is derived from agricultural production. The basin is also rich in fish resources. During monsoon, the landless population depends mostly on fishing for their livelihoods. Navigational transportation is an essential part of social and economic activities of the basin, without which it is impossible for the population to carry on even their day-to-day activities. The industrial base is underdeveloped.

The literacy rate in most of the upazilas located within the haor basin is lower than the national average. The overall health and sanitation condition is also poor here. The basin is characterised by large-scale landlessness, limited labour opportunities and frequent crop failure, coupled with a feudal social power structure. All these factors have led to a state of poverty in the haor basin. Poor communication linkages and difficult living conditions have resulted in the limited presence of NGOs, with the result that targeted poverty alleviation programmes have not been developed in the haor areas to any significant extent.

Given this situation, the following recommendations may be made to preserve the haor eco-system:

1. Prepare a Masterplan for the comprehensive development of haors integrating all sectors, e.g., water resources, fisheries, navigation, forestry, wetland, etc.
2. Preserve the wetland characteristics and eco-systems while implementing different development activities

through raising awareness and involving the local community and other stakeholders.

3. Plant hijal, koroch and other types of trees to restore the ecological balance of the haor basin.
4. Rationalise the existing flood control, drainage and irrigation projects to maximize the benefits of existing FCD/I projects.
5. Implement the Kalni-Kushiyara River Management Project as proposed by BWDB to improve the drainage of the Kalni-Kushiyara River systems.
6. Re-excavate and de-silt the rivers, khals and waterways to improve drainage as well as navigation in the haor basins.
7. Develop village platforms with the dredged spoils from rivers and khals in order to build residential, commercial, educational and recreational facilities above flood levels.
8. Develop hard-surface submersible roads, where feasible, to quicken the transportation of harvests using mechanical transports.

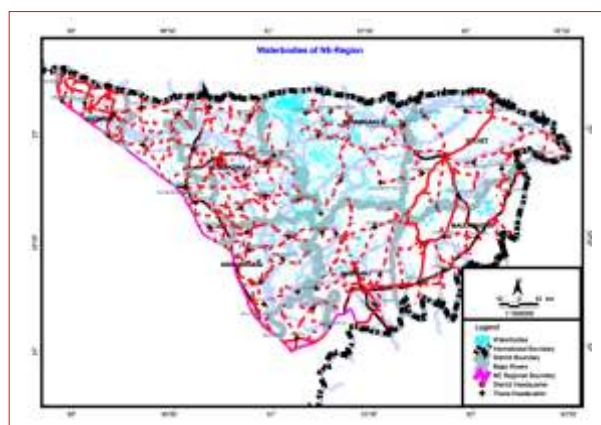


Figure 8: Water bodies in the northeastern region

9. Activate fully the Haor and Wetland Development Board to coordinate the development activities in the haor basin.
10. Develop an early warning system for flash floods in the haor basin to reduce the extent of flood damage.
11. Create a suitable institutional framework like the Meghna River Basin Organization jointly with India for fostering regional cooperation for collaborative management of water and floods.
12. Conduct a study for removing the drainage blockage at the Meghna River at Bhairab Bazaar in order to facilitate drainage of the haor basin.
13. Develop a database of haor resources by using Remote Sensing, GIS and other modern tools.

## CEGIS develops Arsenic Decision Support System



Figure 9: ADSS Database Interface

CEGIS has developed an "Arsenic Decision Support System (ADSS) and extended Database " for the Department of Public Health Engineering (DPHE). The overall objectives of the project, supported and funded by UNICEF, was to develop an extended arsenic database for three selected upazilas namely Muradnagar of Comilla District, Sirajdikhan of Munshiganj District and Bhanga of Faridpur District and develop a prototype decision support system (DSS) to help users retrieve and analyze arsenic related information, identify vulnerable communities, plan mitigation and monitor the impact of arsenic mitigation work.

Consultation workshops, data collection from field and secondary sources, and arsenic concentration level tests using a field test kit were all carried out to develop the ADSS. Through the workshops an initial framework of the DSS was developed, data needs were assessed and the indicators were finalized including their parameters and weight. The Delphi Process (in which participants give written feedback for interaction through a statistical comparison to eventually obtain consensus) was utilized to calculate the weight and parameters of the indicators. Furthermore, through intensive field work, community perception regarding hazards, awareness and expectation was also obtained for use in the ADSS.

The final outputs of this study include (i) union wise vulnerability maps, (ii) extended arsenic database and (iii) computer-based Prototype ADSS for vulnerability analysis. The ADSS is user friendly and dynamic and, if required data is provided, can be used for any specific arsenic affected area. The ADSS has the following capabilities:

- Options for exploring and visualizing arsenic and related data
- Options for entering new data for arsenic vulnerability computation
- Analysis of vulnerability index at different administrative units (upazila or union level)
- Facility to browse existing safe water option technologies (maps, photograph etc.)
- Production of vulnerability maps etc.



### A Special Visit

Dr. Jetze Heun, Associate Professor, Water Resources Management and Director Partnership for Water Education and Research UNESCO-IHE, Delft, The Netherlands met Mr. Giasuddin Ahmed Choudhury, Executive Director, CEGIS on December 11, 2005. On his visit, Dr. Jetze Heun discussed mutual issues of their respective training programmes.

## CEGIS at Sustainable Development Conference

CEGIS participated at the Eighth Sustainable Development Conference (SDC) of the Sustainable Development Policy Institute (SDPI) held from 7-9 December 2005 in Islamabad, Pakistan. The Anthropologist/Livelihoods Specialist from CEGIS, Mr. Atiq Kainan Ahmed, attended the conference as a panel speaker in the South Asian Livelihoods at Risk panel. Several Pakistani newspapers (i.e. the Islamabad Dawn, the Islamabad Post) have quoted Mr. Ahmed's paper along with a summary of his discussions at the livelihoods panel. The conference participants expressed a great deal of interest in CEGIS' work in the recent few years on livelihoods and vulnerability assessments.



Mr. Atiq Kainan Ahmed, Anthropologist/Livelihoods Specialist, CEGIS seen with a fellow organizer.

The Eighth SDC has examined the multiple facets of sustainable development in the contexts of South Asia. The speakers discussed how the problems and issues in South Asia could be dealt with effectively at various levels based on prior experience of successful policy interventions. The conference called for bringing together theorists, researchers, activists, policy-makers, and academicians from around the world to debate the issues of sustainable development in an era of globalization.

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