Climate change and action plan

The future success of Bangladesh's strategy for adaptation against climate change will mainly depend on how successfully the government of Bangladesh can persuade the government of India and other co-riparian countries to come up with an integrated water and sediment resources management plan that will ensure necessary water and sediment inflow in coastal areas during all seasons in the future.

MD. KHALEQUZZAMAN

THE analysis of the outcome of the climate change summit held in Copenhagen pointed out a stark reality for Bangladesh and other most vulnerable countries (MVCs) that we can't just rely on greenhouse gas (GHG) emitting developed countries to come to our salvage. We will have to increase our domestic capability in terms of adaptation and mitigation plans. The formulation of Bangladesh Climate Change Strategy and Action Plan (BCCSAP) is a valuable document and a step in the right direction. This document outlines many action plans including strategy for flood protection and management schemes, coastal green belt, cyclone shelters, resilience of vulnerable groups, centre for research on climate change, climate change resilient crops, and coastal embankments.

The infrastructure theme and repair and maintenance of existing polders program (T3P3) of the BCCSAP call for repair, rehabilitation, and building of over 7,000 km of coastal embankments to prevent tidal flooding and incursion of saline water. In a press conference following the Copenhagen conference, the state minister of forestry and environment, Dr. Hasan Mahmud, has reiterated the plan for building more polders and embankments in coastal region. This writer believes that building of coastal embankments and polders as an adaptation scheme against climate change will not be an effective measure. Instead, such action will aggravate the situation on a long run, and will provide a false sense of security to the people living in low-lying coastal regions of Bangladesh.

This writer views the climate change in the context of "big picture." The climate change that we are experiencing is a part of the natural cycle; however, the rate of such change is accelerated by human interference. We are living in a warming phase of climate for the last 10,000 years, and this trend will continue for at least several hundred years into the future. During this rise in sea-level, the delta region of Bangladesh (and for that any other low-lying coastal areas in the world) will undergo increased rate of submergence. Whether or not this submergence will be countered by land-growth will depend on the rates of sedimentation facilitated by tidal and flooding inundations.

Coastal lands grow vertically at the rate of millimeter by millimeter through sediment-capture from such tidal and flooding inundations. If the rates of such sediment-capture on land are higher than the rates of sea-level rise then coastal lands will grow both vertically and seaward at faster rates. As a result, sea-level rise will not submerge coastal lands on a long run. Such land growth, both upward and seaward, against the rising sea-level has been occurring for the last 10, 000 years in Bangladesh.

For example, the location of our shorelines was near Madhupur Tract in Tangail and Barind near Rajshahi about 125,000 years ago. Bangladesh has gained all these lands between Madhupur-Barind and today's shorelines during this time period. Water-flow in all major rivers and their tributaries brought sediments that were dispersed over coastal lands by tides and floods. It is through these natural processes that most of what we know as Bangladesh was created over geologic time. Although sea-level rose by 300 feet over the last 10,000, the shoreline did not migrate landward from its current position. In fact shoreline migrated seaward up until about 200 years ago.

Isolation of coastal areas from tidal inundation and flooding by building embankments and polders may provide temporary relief from the rising sea-level, but over time the coastal lands will be deprived from natural processes of sediment-capture that is necessary to cope with such rise in sea-level. Sediment deprivation on coastal lands will result in lowering of elevations below the sea-level. This phenomenon can be observed first hand in Bhabadah, Jessore, as well as in coastal areas of Louisina, USA, and in the Netherlands. Since sea-level rise will continue for the next several hundred years, we need to facilitate, if not accelerate, the sediment-capture process over coastal lands.

It may sound counter intuitive to allow more flooding and tidal inundation when people in coastal areas are trying to get relief from the rising sea-level. However, alternatives are more disastrous. If coastal lands are isolated from tidal inundation then only thing that will go up is the sea level - not the coastal lands. Not only the lands behind embankments and polders will decline in elevations over time, the salinity will increase in groundwater supply and will it not be potable any longer.

Drainage and sanitation will also become ineffective in those areas. The problem of drainage congestion has been recognized in the infrastructure theme and adaptation against future cyclones (T3P6) programme of the BCCSAP. In addition, if even the people living in areas behind embankments and polders will feel protected from natural sea-level rise, in reality those lands will occasionally get inundated by storm-surges and cyclones. When that happens, the salty waters entering behind the embankments and polders will have no place to go as the elevations within such polders will be lower than the sea-level and river-beds that are located outside of such protected areas.

Under impact of cyclone Aila.

The cyclone Aila has already devastated many of the existing embankments and polders. Such episodic inundations by cyclones will turn areas behind embankments into permanently water-logged in the future. The situation in New Orleans, Louisiana, following the devastation of the Hurricane Katrina in 2005, exemplifies this phenomenon.

The obvious question that begs answer is, how can the people continue to live in areas that are undergoing submergence due to sea-level rise? The answer to this question really depends on the balance between the rates of future sea-level rise and the growth of lands by such inundations. Adaptation and mitigation measures against climate change need to include plans that will accelerate sediment-capture mechanism and land reclamation process in coastal areas. If such measures cannot ensure sedimentation rates that exceed the rates of sea-level rise then the people will have to consider relocating or adapting to new ways of living and livelihood in coastal zones.

People will also need to follow the "dig-elevate-dwell" principle as long as they can manage to live in coastal areas. The bottom line is, the sea-level will continue to rise for several hundred years into the future, and we have to learn to live with this natural process. Isolation of lands by embankments will only accelerate the process of submergence and water-logging. Now the question is, will the people respect the nature and live in harmony with it, or will they defy the natural forces and will be doomed as many civilizations did in the past?

The future success of Bangladesh's strategy for adaptation against climate change will mainly depend on how successfully the government of Bangladesh can persuade the government of India and other co-riparian countries to come up with an integrated water and sediment resources management plan that will ensure necessary water and sediment inflow in coastal areas during all seasons in the future. As it stands now, India has unilateral control over water resources in all common rivers and doesn't allow enough water (and sediment) flow during dry season, which results in more salinity ingress in coastal rivers.

Several studies documented that the amount of sediment-flow in rivers entering Bangladesh form upper riparian countries has declined from 2 billion tons per years in the 1960s to about 1 billion tons per year in the 1990s. This reduction in sediment-influx has resulted in higher coastal erosion and lower land formation. Once agricultural lands are inundated with salty water from storm surges or cyclones then they are rendered useless for regular food-grain production. On the other hand, when India releases too much water during rainy season from dams and reservoirs then Bangladesh receives flood more than the land can handle.

The government representatives from Bangladesh should raise the issue of integrated water and sediment resources management plan in the context of climate change during negotiations at all levels with India and other upper riparian countries. As a friend, Bangladesh should expect India to respect the principles of water resources management science, i.e. to follow the globally accepted norm of watershed or basin-scale management of water resources. If one looks at the water control structures on all common rivers that enter Bangladesh from India, it will be obvious that India could never implement those water control structures against her own people, because neither science nor politics will support such actions. Bangladesh should seek equality and justice from India and other co-riparian nations, because our survival depends on it.

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Caring for green: Thai experience

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LAST time, when I was in Bangkok for a few days, my friend Mr. Siriraks and his daughter Candy took me to a tree plantation project in Thailand's Samut Prakarn province and I stayed there for about two days. This was a great experience for me. At the start, I was reluctant to go there but my friend was a very tenacious fellow. Finally, I nodded to his request to pass a good amount of time there. When I reached there, I found the place to be a real greenery which will remain imprinted in my mind for many years to come. I had an amazing time. Thanks to my friend and his daughter so much for giving me the opportunity to experience such a beautiful greenery.

This is a project of planting 2000 trees, giving the opportunity to all volunteer participants to contribute an extra effort by adopting additional trees for this project. Almost 400 volunteer employees, customers, friends and families joined and contributed their time and effort to complete planting of about 5,000 native trees. The aims of this project are to increase awareness, help protect Thailand's environment and show the people's dedication to fight global warming by participating in reforesting efforts. The trees planted in this project are of various species. The project office provides environmental education and tackles climate change by restoring natural forests.

The planting site is within the Si Nakorn Khuan Park lying just across the river from central Bangkok in Bang Krachao district of Samut Prakarn. The area is often referred to as the "lungs" of Bangkok due to its wide expanse of greenery. The park is managed by Thailand's Royal Forestry Department which has joined in numerous tree planting efforts in the past. The project will ensure protection and management of the area for years to come.

You will appreciate that human activities are increasing and so the concentration of greenhouse gases in the atmosphere. These additional gases are like additional blankets around the earth. They allow the sun's energy to reach the earth's surface, but prevent more heat from escaping. This means that the earth is slowly heating up. This enhanced greenhouse effect is causing global warming and changing our climate. Carbon dioxide is the biggest contributor to this enhanced greenhouse effect (about 70%). The amount of carbon dioxide in the atmosphere is about 30% higher now than it was 200 years ago. As a result of climate change temperatures could markedly rise by the next 50 years. Sea levels could rise considerably by the end of the century.

Two billion tonnes of carbon are released in the atmosphere each year due to deforestation. Deforestation accounts for 25 percent of all man-made emissions carbon dioxide. Worldwide, deforestation continues at an alarming rate. Most deforestation is for conversion of forests to agricultural land. It is learnt that the rainforests cover only 7 per cent of the land on earth but they contain nearly half of all the trees on earth. They generate about 40 per cent of the world's oxygen. How important is their conservation!

Trees play very important role in our environment: From absorbing carbon dioxide from atmosphere and helping to combat global warming to soil and water conservation, and providing livelihoods for communities. Forests act as important 'carbon sinks'. Replanting and protecting forests is an important step in combating climate change. However, grassroots level measures for conservation and education about the environment are an integral part of this Thai project. Afforestation of the waste lands near villages and within residential and common areas of the villages is also undertaken.

The Centre which is looking after the project, is an initiative to preserve the rich ecological heritage of the country. In the past two years measures have been undertaken to conserve the ecology of the nearby areas of the park and at the same time create facilities for the local visitors, thus catering both to man and environment. Cleaning campaigns focusing on removing plastic wastes and educating the visitors on the hazards of toxic wastes being dumped in the outfalls form a part of ongoing efforts to inculcate nature awareness amongst the masses. As an endeavour to preserve and propagate the area's rich environmental resources, the Centre is also carrying on tree plantation and supports protection and propagation of native wildlife.

To create awareness amongst children about conserving their rich natural heritage, the centre conducts four-day residential Nature Awareness Programmes involving live demonstrations, guest lectures, audio-visual presentations, field trips and a hands-on experience in scientific documentation and photography. In addition, trekking and outings in the wilderness would be an essential component of this programme. Measures against poaching of wildlife, illegal felling of trees, and trade in wildlife products will be initiated at the village level. Schemes for water conservation and rainwater harvesting at individual households and the community as a whole are also implemented.

Nearby the project, there is a canal which is with added natural touch. Along it there are birds, like kingfishers, mornbills, black-headedd ibis, blue crowned parrots, coppersmith barbet, green pecker, black napped oriole, owls, jungle mynas, mangroove pitta, yellow bittern and so on. All these combined together, there is the sweetest chirping music of those birds which my ears have ever been treated to.

There are several resorts in and around the project site. There is also a beautiful walk-in waterfall. This place might not be for everybody, but for those that are seeking peace and tranquillity this might be the right prescription.

What a wonderful job the Thai people have done! And that is believable once it is seen only. If several such projects can be implemented in Bangladesh, I believe we can reduce impact of so many natural calamities that we usually face every year causing us heavy losses.

The writer is a nature lover.

Conserving the wetland resources

MD. RANA ABBAS

WETLANDS are invaluable components of the environment, ecology, resource potential and biodiversity in Bangladesh. They are integral part of the local ecosystem based cultures. These consist of wide variety of types ranging from lakes, rivers, coastal forests to deepwater paddy fields and ponds. All these wetlands form a unique mosaic of habitats with extremely rich diversity of flora and fauna, much of which as yet biologically undiscovered. The wetlands also support the livelihood of millions of people engaged in such diverse activities as fishing to collecting honey, thatching materials and fuel wood.

Resources

The abundance of water and wetlands has always been the geographical and historical destiny of Bangladesh. More than two thirds of Bangladesh may be classified as wetland according to the definition enunciated in the 'Ramsar' convention (The 'Ramsar' convention was named after the town of Ramsar, Iran, where wetlands were defined as "areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salty, including areas of marine water the depth of which at low tide does not exceed six meters".)

About half of the area of the country can be considered as wetlands. About 6.7 percent of Bangladesh is always under water, 21 percent is deeply flooded (more that 90 cm) and 35 percent experiences shallow inundation. The average discharge of water in Bangladesh delta in the flooding season is more than five million cusec. Wetlands in Bangladesh encompass a wide verity of dynamic ecosystems ranging from mangrove forest (about 577, 100 ha), natural lakes, man-made reservoir (Kaptai lake), freshwater marshes (about 400 haors), oxbow lakes (about 54488 ha, locally known as baors), freshwater depressions (about 1,000 beels), fish ponds and tanks (about 147, 000 ha), estuaries and seasonal inundated extensive floodplains (Akonda, 1989; cited in Akbar Ali Khan 1993 and DoF 1985).

Table -Types of wetlands and their estimated area during the wet season

Wetland Types	Area (000 ha)
Permanent rivers and streams	480
Estuarine and mangrove swamps	610
Shallow lakes and marshes	120-290
Large water storage reservoirs	90
Small tanks and fish ponds	150-180
Shrimp ponds	90-115
Seasonally- flooded flood plains	5,770

Source: A Directory of Asian Wetlands (1989) *cit. in.* Khan (2001)

Ecosystem services

The wetlands in Bangladesh have great ecological, economic, commercial and socio-economic importance. They contain very rich components of biodiversity of local, national and regional significance. Among the estimated 5,000 species of flowering plants and 1,500 of vertebrates in the country, up to 300 plant species and some 400 vertebrate species are judged to be dependent on wetlands for all or part of their life span. Wetlands also provide habitat for a variety of resident and migratory waterfowls, a significant number of endangered species of international interest, and a large number of commercially important ones. The inland capture fishery is based on the vast freshwater resources with some 260 species of fin fishes and 25 shell fishes. There is substantial basis for the view that the country's natural resources, especially the Sundarbans, could support development of richer tourism.

Wetlands also support a significant range of other activities such as extraction of reed, harvesting of edible aquatic vegetation and their products, medicinal herbs, shells etc.

Bangladesh wetlands also play an important role in flood control and storm surge protection. Wetlands are unique for their rich biodiversity and cultural heritage. It is the combination of all these functions, yields and values that make wetlands so important to the society.

Maintaining livelihood system

Wetlands are one of the most productive and resourceful areas, which provide food, non-food aquatic resources and retain the ecological balance for the local residents as well as for the nation. Wetlands of Bangladesh provide one of the major scopes for livelihoods particularly for cultivating food crops, vegetables, fishing, and pasture for cattle. Cultivation of rice is a major livelihood activity in and around the wetlands of Ganges- Brahmaputra floodplain and haor basin.

Structure of the rural livelihood system depends on the inland open water fisheries, status of protein intake and health problem of rural population, and economic importance (trading, marketing and business) of the floodplain fish.

Fishing is the second largest livelihood activities in the country. The majority of rural population depends on fishing. The available information indicate that this sector employs about 2 million people who remain fully engaged in fishing, handling, packaging, transporting, distribution and marketing of fish. An estimate shows that about 10 million people are engaged as part-time fishermen to supplement their income or to live on fishing in some part of the year. About ten percent of the population depends on fisheries for their livelihoods in Bangladesh.

Hakaluki Haor.

Degradation of wetlands

Since independence there has been an accelerated expansion of physical infrastructure in the floodplains and haor areas. In recent years, decentralization of administration at the Upazila (sub-district) level also led to a rapid expansion of roads and feeder roads even in the rural areas of the haor basins. These infrastructures were often done without proper planning or without paying due regard to natural water flows. These poorly planed roads and drainage structures created water logging and had serious impact on the water regimes in the flood plains.

Degradation of the wetlands in Bangladesh has created the following impacts:

1) Serious reduction of fish habitat, fish population and diversity; 2) Extinction and reduction of wildlife including birds and reptiles; 3) Extinction of many indigenous varieties of rice with the propagation of high yielding varieties; 4)Loss of many indigenous aquatic plants, weeds and shrubs, 5)Loss of natural soil nutrients;

Deterioration of living conditions; 6) Loss of natural water reservoirs and degeneration of wetland-based ecosystems, occupations, socio-economic institutions and cultures.

Pollution status

The pollution problems mostly originate from 'abuse, misuse or cocktail' use of pesticides and overdose and untimely application of fertilizers and from domestic wastes as well. All the rivers flowing through Bangladesh originate outside the country and these carry heavy loads of silt, sediments and other debris, including domestic, agrochemical and industrial wastes, from far-away places. Together with these, local wastes are added, thus making the water saturated and at times oversaturated with organic and inorganic pollutants. The wetlands of the whole country are the dumping grounds for these sediments and pollutants for flushing out of materials to the sea is quite slow. The result is serious deterioration of the aquatic resources.

Most of the industries and factories are situated on the banks of the rivers or are very close to a river system and the effluents and wastes are mostly thrown directly in the river water without any treatment to make the effluent 'safe' from the biological standpoint. As a result, the depletion of the biotic components near the sources is observed. As the rivers are connected with each other and different mills and factories are situated on their banks, the recovery of the water from the effects of the effluent is very low and during the non-monsoon period, conditions become worse.

Concluding remarks

In the recent history of landscape development, wetlands have been among the most affected ecosystems of Bangladesh. But wetlands play a key role in the country's lifecycle and are highly productive and diverse ecosystems with their irreplaceable role in a sustainable landscape. The continual loss of wetlands threatens the very ability of the land to sustain life resulting in the reduction of wildlife habitat and wetland-based socio-economic activities. Hence, special care must be taken to maintain wetlands with their pristine environment. Wetlands management needs to be incorporated into a system of integrated land and water use and indeed, into the socioeconomic system of the country. Appropriate land and water use policies/strategies related to wetlands need to be adopted and implemented. Land and water managers must pay attention to issues related to wetlands ecosystems. Moreover, public awareness has to be developed for wetland conservation.

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