

Unabated earthquake fear

In Bangladesh, warnings have been on against high-rise construction spree in view of the frequent mild tremors. But none seems to have taken note of such warnings. Although the intensity range is still minor, the fear of devastating earthquake has not abated.

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EARTHQUAKES happen when forces deep within our planet cause movement of the earth's outer layer called the crust. The rock plates that make up the earth's crust number about 20. Most earthquakes occur along the boundaries of major plates. As the mantle moves plates slowly around the globe, the plates may crumple against each other. Sometimes pressure along the edges becomes so great that something has to give way. Then the land trembles with an earthquake.

Geologists believe that the Himalayas were formed when the plate carrying India bumped into the one carrying the rest of Asia. The mantle may also pull plates apart. That is what is causing North America to drift ever further away from Europe. Most earthquakes happen along boundaries between coastal plates which are thick slabs of rocks. At the boundaries, the plates sometimes grind against each other, setting up strains that can result in earthquakes. Since most of the plate boundaries are on the ocean floor, most earthquakes actually occur under the ocean. More than 50 per cent of all earthquakes occur at the edge of the Pacific plates.

All segments of our people may find interest in study on earthquake which occurred in quick succession recently in pretty fearful Richter scale, portending grave danger to our high-rise buildings constructed without caring for preventive scales of construction. We need to vitalise administrative functionaries and seismic scientists to come with remedial suggestions to avoid the disastrous effects of earthquake with possible help from UNO and any other international agency.

Basic to survival in the event of an earthquake is adequate warning. We should endeavour to learn to mitigate sufferings and destructions, for which timely and correct warning, its dissemination and action thereon are of particular importance. It is a major national concern to keep close contact with international agencies as an earthquake-prone country.

We should not be surprised to learn that in USA seismic scientists

study behaviour patterns of animals and cockroaches, using sensitive equipment designed to record movement of plates. It turns out that horses and cockroaches are usually active just before earthquakes. A professor of California University reported that domestic and farm animals give signal of an impending earthquake. His contention was verified by an animal behaviourist. People reported that their dogs and cats remain very close to their sides posing nervous. It was also verified that a horse was found kicking a wall of the stall about four hours before an earthquake. Peculiar pre-quake animal behaviour has often been reported by the Chinese who are not still clear about relationship to draw any conclusion as to whether or not such a behaviour is a precursor of a major earthquake. Throughout China, people watch insects and animals, and report their unusual behaviour to seismic scientists. In 1975, China scientists observing animal behaviour and other signs predicted that an earthquake would hit soon. Officials evacuated 100,000 people from the city of Haicheng. A few hours later, a large quake levelled the city. Such accurate predictions are still rare. A few years later, a major earthquake struck central China without warning, killing 700,000 people in the city of Tangshan.

Frequency of mild earthquake in Chittagong, Chittagong Hill Tracts in recent years alarmed the people, because the quakes measured more than 5 Richter scale and did harm by flattening houses. According to local people, at least 50 after-shocks had shaken the areas in these districts, forcing a lot of people to shift to safety. The epicentre of a recent quake was located at Kalabunia on the Indo-Bangladesh border. Four-storey buildings in Chittagong port developed multiple cracks after the tremor with 5.31 on the Richter scale hit the region on August 12, 2003, the highest ever Richter scale in the world being perhaps 8.8. Besides, the roof of the Power Development Board sub-station in Chittagong city collapsed. The frequent jolts and the petty damages have already raised the concern of the government and the seismic experts and frightened

people across Bangladesh.

Experts on earthquake generally feel that Bangladesh may have a big earthquake in the Chittagong area whose impact may be felt in Dhaka also in the form of collapse of a lot multi-storeyed buildings or in some other forms.

Record shows that Madhupur gar and haor of Sylhet were the creation of earthquake in 1762. Tista river changed its course as a result of an earthquake of 1787. 40,000 sq miles of Khasia hill areas were destroyed by the earthquake of 1891 and the course of Brahmaputra river was also changed.

An earthquake is judged by the dimensions of the slipped area of the fault and the intensity and duration of ground shaking which combinedly damage buildings and structures. Shocks of energy release cause greater loss when the earthquake occurs in the city instead of a sparsely populated region. When freeways are crowded, when many people are on the streets casualties may rise from falling debris and automobile accidents. An earthquake, however, reveals certain weaknesses in engineering and construction practices, calling for corrective measures by appropriate improvements in safety regulations, in building codes and in preparation for an emergency.

Old buildings generally constitute the most serious threats of public safety because of the probability of their collapse during strong earthquakes. Such buildings should naturally be brought up to modern standards of seismic resistance or they should be demolished. To carry out such a programme, priorities as to relative use, location and nature of construction should be established.

In some countries appropriate tax relief or other incentives to help ease the economic burden have been suitably organised. Old earthen dams, highway structures and building codes have undergone revision to conform to the current state of knowledge of earthquake engineering. Structures and facilities vital in emergency such as hospitals, emergency power installations, emergency operating centres, public safety facilities and essential elements of key communications systems have also been designed and constructed or



remodeled to withstand strong earthquake shaking. Similarly, need has been felt to review and revise standards of designing and constructing utility systems so that future damage may be within acceptable limits. Bangladesh may undertake similar measures.

Most undeveloped countries like Bangladesh do not have safe educational institutions for students, designed to resist earthquakes and other natural disasters. Yet, these are in most cases the structures where shelters and post-disaster operations are organised. The hazard to student life is hardly given importance in Bangladesh. Educational institutions lacking safety should be prohibited until these are brought up to modern standards of safety. If these cannot be made safe, these should be vacated and classes should be held in tents. It has been the general experience that most typical, modern one-storey wood-frame houses perform better during earthquake ground shaking.

Bangladesh has undertaken comprehensive programmes of rapid economic development. It seems necessary that Bangladesh considers carefully its land-use planning without proceeding hastily with land-use programmes in vulnerable areas. Precise traces of faults by geologists and its accurate mapping of breaks are essential prerequisites for land-use planning. Thorough geological investigation can expose the hazards to critical structures like a new dam, a fertilizer factory, academic buildings, hospitals etc. All structures designed for public assembly need to be treated as subjects of special geological studies. Experts in geology, soil mechanics

and engineering may in due course be able to define precisely geological hazards. Meanwhile, vigorous enforcement of improved building code may be taken as the most effective measure to reduce the earthquake hazards.

In the United States, deficiencies in old masonry structures have been largely corrected through the passage and enforcement of "Parapet Laws" which require hazardous parapets and cornices to be strengthened or removed in order to reduce hazards to occupants and pedestrians from debris. The usual weakness in Bangladesh buildings can be located in poor quality of brick, brick joints being improperly filled with mortar, absence of mechanical ties between parallel layers of brick, absence of reinforcing steel in the walls, inadequate structural ties connecting floors, roofs and walls to each other. So, we need to bring standard buildings and structures to the current international levels of safety. Such a programme will, of course, involve economic and human disruption to occupants in densely populated areas.

In Bangladesh, warnings have been on against high-rise construction spree in view of the frequent mild tremors. But none seems to have taken note of such warnings. Although the intensity range is still minor, the fear of devastating earthquake has not abated. The damage inflicted by such earthquake may be catastrophic. In advanced countries various insurance programme are at work to protect earthquake victims. The underwriters reinsure some fractions of their total exposure.

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Dhaka has very high air pollution level

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AIR pollution has become a matter of great concern for us in recent years. Those who are living in cities in Asian countries including Dhaka, have already realised how seriously air pollution has been poisoning life and degrading the environment. People living in major towns of Bangladesh experience the problems of air pollution in varied degrees.

Faulty vehicles, especially diesel run vehicles, brick kilns, dust from roads and construction sites and toxic fumes from industries contribute to air pollution. Industrialisation and mechanized vehicles are two major sources of air pollution in any country. Those are unavoidable accompaniments of increased economic activity of any country. The number of automobiles has been increasing in Dhaka city at the rate of at least 10 per cent annually, which has been contributing to air pollution on the one hand and traffic congestion on the other.

The main pollutants from gasoline powered internal combustion engines are carbon monoxide, hydrocarbons, nitrogen oxides, sulphur dioxide particulates of lead compound and unburned carbon particles. Emissions from diesel engines are smoke, carbon monoxide, unburned carbon, nitrogen oxides and sulphur dioxide.

Air pollution seriously affects the respiratory tract and causes irritation, headache, asthma, high blood pressure, heart ailments and even cancer. If this trend of air pollution continued, those living in major cities including the metropolis, will become exposed to these ailments and also other complications. The mental faculty of children will be adversely affected by lead pollution, which can also affect the central nervous system and cause renal damage and hypertension.

In this context, it can be recalled that the average annual deaths from air pollution-related diseases in Delhi increased to 10,000 from the level of 7,500 in early 1990s as was revealed in a World Bank study in late 1990s. The level of small particles -- less than 10 micron -- present in the air was very high, which could cause severe lung cancer, according to Delhi based Centre for Science and Environment (CSE).

The air quality of Dhaka city shows that the concentration of suspended particles in the ambient air is many times higher than normal. This air, which the city dwellers and road users regularly breathe, contains lead in concentrations reportedly almost ten times higher than the government safety standard set by the Department of Environment (DOE).

About 50 tons of lead are emitted into Dhaka city's air annually and the emission reaches its highest level in dry season (November-January), revealed a study con-



ducted by scientists of Bangladesh Atomic Energy Commission (BAEC). The density of lead in the air of Dhaka city in dry season reaches 463 nanograms, the highest in the world. The lead concentration in the polluted air of Mexico city is 383 nanograms and in Mumbai, India it is 360 nanograms per cubic metre.

The Environment Conservation Act, 1995 and the Environment Conservation Rules, 1997 have been enacted by the Parliament. Under the Rules of 1997, Ambient Air Quality Standards, Vehicular Exhaust Emission Standards, River Transport (Mechanized) Emission Standards and Gaseous Emission for Industries or Projects Standards have been set.

The Environment Conservation Act, 1995 also contains laws as regards the protection of environmental health and control of environmental pollution. The Supreme Court in two cases held that the "right to life", which is enshrined as a fundamental right, includes the right to a healthy environment.

What we find is either absence or little effective cooperation of the members of the public and the concerned agencies with the Department of Environment (DOE) in implementation of laws and regulations to help reduce air pollution. DOE gets little cooperation also from the transport owners and their employees including drivers in this regard. DOE's initiatives for daily monitoring of vehicles at certain city points sometimes do not succeed due to non-availability of members of law enforcing agencies.

It may be recalled here that New Delhi in an attempt to reduce air pollution prohibited initially 20 year old vehicles from plying on city streets in late 1990s. They started phasing out 17 year old vehicles from the end of 1998. It was followed by elimination of 15 year old vehicles in 1999.

Besides registration of new auto-rickshaws with front engines was banned from 1996 and registration of old defence service and government auctioned vehicles was banned from 1998. All these steps of the New Delhi authorities have created some favourable impacts in reducing air pollution and in the process have been improving the air quality.

The pollutants in the ambient air of Delhi decreased by 4-40 per cent in case of SO₂, 4-13 per cent in case of NO₂, 6-17 per cent in case of particulate matter, 3 per cent in case of Carbon Monoxide and 11-60 per cent in case of lead during 1998. Centre for Science and Environment (CSE), a Delhi based non-government organisation estimate showed.

In the past our attempts to prohibit plying of old vehicles in city streets failed either for political reasons or in the face of resistance by transport owners and their employees. But if our neighboring countries can improve air quality of their cities by banning use of old vehicles and also relocating some of their polluting industries, authorities in Bangladesh can also do so.

It is time to phase out old and black smoke emitting vehicles from city roads as our right to live in healthy environment largely depends on it. Good governance helped curb air pollution in cities like Bangkok, Kolkata, Kathmandu and Lahore while weak administration caused the increase of air pollution in Dhaka and Karachi. The problem should be high on the agenda of the government as well as political parties. Let us hope that the issue gets the priority it deserves.

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Linking environment with development

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BANGLADESH is going through a social and economic transformation. These rapid changes in the economic, social and political life have enormous impact on country's ecosystems and resources. Operationalising the concept of sustainable development requires integrating economic, social and environmental objectives and negotiating and managing trade offs. The future of sustainable development lies in the evolution of the character of governance -- the ensemble of social ethics, public policies and institutions which structure how government, people and the civil society interact with the environment. We are to find ways how to pursue active economic development without further degrading their environment and ecosystem resources. In the midst of widespread poverty and natural resources depletion in the country, the government strives to produce a proper mix of pro-environment and pro-development policies. We are also to give attention to other important strategic

dimensions such as the integration of disaster risk reduction into sustainable development policies and plans.

Achieving sustainable development and addressing emerging needs and development challenges of Bangladesh require deep and sound structural changes for inclusive and pro-poor growth with equity and justice, solid democratic reforms, new ways of environmental governance in market-based economies, sustainable natural resource management and assertive measures towards ensuring consensus around a common goal. Integration of environmental priorities into national strategies and policy processes for poverty eradication and sustainable development through improved capacity of national/sectoral authorities is a missing part which needs special attention. We are to seek answer to the issue of removing barriers toward strengthening capacities at individual, institutional, systemic level to implement the national policies and programmes toward sustainable development.

It is also relevant to contextualise the significance of proper imple-

Sustainable development is vital in securing a win-win situation in both poverty alleviation and sustainable environmental management. In a country like Bangladesh where competition for resources is intense and the carrying capacity of the natural resource base is under severe strain, the concept of eco-system restoration and regeneration has immense potential to relieve social tension and improve public well being.

mentation of the National Capacity Development Action Plan for environmental governance, National Adaptation Programme of Action for Climate Change, National Biodiversity Strategy & Action Plan of the Ministry of Environment and Forest. Harmonisation and implementation of other sectoral plans and policies such as National Water Management Plan, Land Use Policy, Fisheries & Livestock and Agriculture Policy are equally important in achieving sustainable development in Bangladesh. The PRSP Phase II under formulation provides us an opportunity to integrate these policies with poverty-environment nexus prevailing in Bangladesh. Against this backdrop a key question to ask: how can we go for building partnerships and supporting learning and knowledge-sharing at local and national levels to ensure more effective ways to

implement those policies and plans and integrate the social, economic and environmental priorities of the poor into national strategies and policy processes for poverty eradication?

Millennium Development Goals
Over the last 15 years Bangladesh has made impressive gains in key human development indicators. In the 2007 UNDP Human Development Report, Bangladesh ranked 138 among 177 countries with an HDI score of 0.509, which places it among countries considered to have achieved medium human development. This is the result of macroeconomic stability, slower population growth, a boost in women's empowerment, reduction in aid dependency, achieving food self sufficiency (exceptions during unusual disasters), better disaster management capacity,

effective non-governmental organisations (NGOs), and a vibrant, pluralist, democratic civil society marked by cultural activism and developmental debates supported by an active, free press.

Despite impressive gains in key human development indicators, Bangladesh faces considerable challenges. Achieving the MDGs within the next decade will require Bangladesh to develop and implement more ambitious and effective strategies. Although it has spurred rapid economic growth and migration, urban poverty has risen accompanied by lack of decent work and adequate shelter. Much needs to be done to ensure the right to survival and to achieve the MDG target of halving the proportion of the poor, and the hungry and malnourished. It is important to repeat that the critical challenges of attaining environmental sustainability

(MDG Goal 7) are still inadequately addressed. These challenges are multi-dimensional and visible in the forms of water and air pollution, land degradation, extreme degradation of terrestrial and aquatic ecosystems, unsustainable agricultural practices and unplanned urban growth. This is further deteriorated by absence of land zoning and weak environmental governance in Bangladesh. Climate change has compounded problems of environmental degradation and has led to serious deterioration of ecosystems adding yet another dimension to the persistence of poverty.

Local governance
There is a growing consent that democratic governance creates the conditions for sustainable development and poverty reduction. Local governments can play a major role by ensuring more effective local resource management including

land, water and environmental resources and also infrastructure and service delivery for the poor. Improvement in the dialogue between the state, citizens and their communities, and the private sector is also a requisite.

Local and regional development strategy involves building partnerships with and between national and local authorities, community organisations, civil society, and the private sector. This strategy also involves promoting policy and institutional reforms to enable the transfer of powers and financial resources to more effective and accountable sub-national spheres of government. However, there is a need for technical advisory body for the services to be provided within the framework of the following policy objectives: (i) strengthening the capacities of local governments in mainstreaming the principle of sustainable development into policy as well as planning, budgeting and implementing projects and programmes; (ii) supporting central governments to formulate policies promoting administrative, political and fiscal decentralisation to foster enabling natural resource management, legal and administrative

environments, and to strengthen local economic development; and (iii) empowering the organisations of local civil society particularly women's associations and users of natural resources.

In conclusion, sustainable development is vital in securing a win-win situation in both poverty alleviation and sustainable environmental management. In a country like Bangladesh where competition for resources is intense and the carrying capacity of the natural resource base is under severe strain, the concept of eco-system restoration and regeneration, particularly through participatory management of common pool resources, sustainable land and water management has immense potential to relieve social tension and improve public well being. Let us give concerted efforts to demonstrate the linkages of environment with poverty, economic growth, human health and governance for sustainable development.

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Time to check salinity intrusion in the Sundarbans

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SUNDARBAN Mangrove forest of Bangladesh covers an area of about 6017 sq. km which is 62 per cent of its total area whereas other 38 per cent is situated in the West Bengal province of India. The average elevation from the mean sea level varies between 0.9 and 2.1 m. The rise in sea level and availability of less fresh water particularly during winter will cause inland intrusion of saline water.

Wetlands played a significant role in the development of human society. The natural productivity of wetlands is an invaluable component of the environment. This wetland consists of a large number of fluvial and tidal landscapes, features created by the three mighty rivers Ganges, Brahmaputra and Meghna (GBM). Annually 2.3 billion tons of sediments are transported by the major rivers having a profound effect on the floodplains and the coastal regions. The mangroves between the GBM deltas are the only contiguous and largest coastal wetland system in the world. Considering the conservational value of the Sundarbans UNESCO has declared part of the forest (1,397 sq km) a World Heritage Site in 1997 and also Ramsar site wetlands (601,700 ha) the largest living wetlands in the world. Sundarbans is one of the oldest systematically managed mangroves in the world. Evidence suggests that this largest contiguous mangrove forest in the world is under stress and showing serious signs of

depletion over the past few decades.

The vegetation in the Sundarbans have the pattern like: Sundri (*Heritiera fomes*)-21 percent, Sundri-Gewa (*Excoecaria agallocha*)- 29 percent, Gewa- 5 percent, Sundri-15 percent, Goran (*Cerops decandra*)- Gewa 14 percent, Gewa-Goran 9 percent, Keora (*Sonneratia apetala*)-1 percent.

It constitutes about 51 percent of the Reserved Forest estates in the country and earns about 41 percent of the forest revenue. It contributes about 45 percent of the total timber and fuel wood produced from the public forests. In addition, diversified non-wood forest products are also exploited from the Sundarbans. Approximately one million people earn their livelihood from the forest. As a shelterbelt, it protects the south-west part of the country against cyclonic storms and tidal surges which is directly evident from the Sidi hit resistance during the last November. The forest also

protects agricultural land in the coast against salt intrusion from the sea. From different available sources it is estimated that around 120,000 visitors visit the Sundarbans world heritage site every year adding to country's revenue.

Our Sundarbans is intersected by elaborated network of rivers, channels and creeks -- a water area of 175,600 ha comprising Passur, Sibsa and Raimongal. There are four estuaries and widths of these are about 10 km, namely Bangra, Kunga, Malancha and Raimongal estuaries. However, the data available from Bangladesh Water Development Board shows the fresh water discharges of Ganges river at the Hardinge Bridge point for the seven months of the dry season in Chart A.

Shafi Noor Islam and Albrecht Gnauck summarised their understanding in an international conference at the Warsaw Agricultural University, Poland as shown in Chart B.

The effects of salinity intrusion

can be manifold, what is visible now like destruction of mangroves and alluring shrimp farming. It is putting the future of our mangrove wetlands ecosystem in doubt. The name Sundarbans is supposed to be derived from the name of the plant, Sundari. Now, nearly 95 percent of the root surface cannot absorb water and nutrients because of salinity. It is only about five percent of the root surface that does the work, endangering the life of the plant. It has been reported that about 45 million Sundari trees have been affected by top dying of which at least 20 million trees have been seriously affected. At this rate this species will be vanished within next 47 years. Now only 20 mangrove species are available out of 70. Large part (45%) of mangroves have already been disappeared. High salinity has brought about a biodiversity loss. Reduction of fish habitat and the tree-top dying process have become the major ailments. 12 species of plants and animals have already become extinct like Javan rhinoceros, Single horned rhinoceros, Water buffalo, Swamp deer, Mugger crocodile, Gaur and Hog deer.

Under the auspices of the present policy the current management plan was formulated in 1998 for the period 1998-2010 under the World Bank-assisted Forest Resources Management Project. The Forest Act was revised in 2000. This follows the principle for sustainable resource

utilisation. However, the national wetlands policy which has been drafted by MoEF is yet to be not implemented. The main features of this policy are:

maintenance of biodiversity; maintenance of ecosystems functions; promotion of economical development.

Till today there are hardly any such studies which directly explain the cause of top dying as well as decline of Sundari from the

Sundarbans. However, suggestions made as to the cause has not been supported by detailed investigation before. So, detailed scientific study is obvious for forestry management regimes to help maintain the decline of ecological pollution in this largest natural ecosystems, and wildlife habitats.

During the last 100 years the Sundarbans has lost many species of plants and animals. Therefore the community as whole may partici-

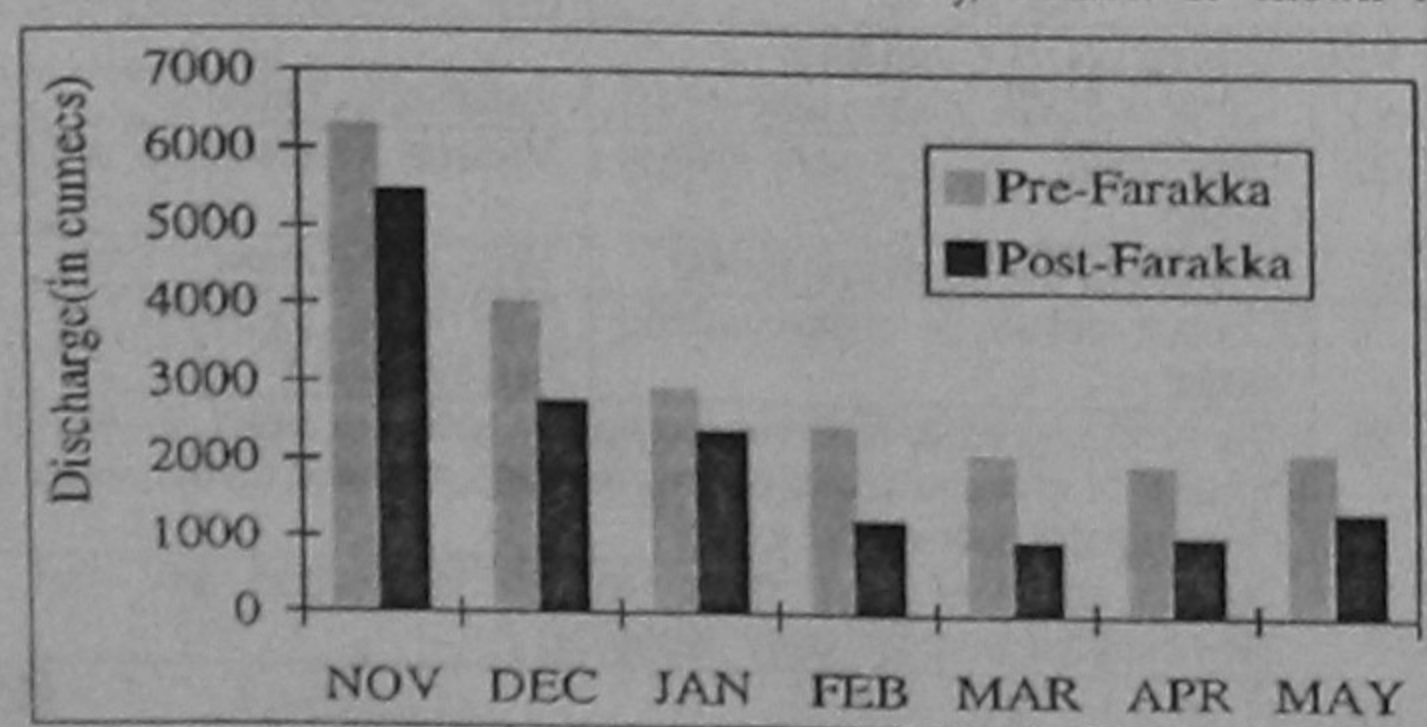
pate in the process of its management, preservation and improvement. Once home to around 450 rivers and canals, several of the water bodies in the Sundarbans have now dried up. The changes have drastically affected the once abundant population of crocodiles, only 200 of whom now remain in the forest, according to a study. Initiatives are needed to develop strategies for adequate management plan based on monitoring of

flora and fauna and water quality with co-operation and appreciation of local people and international community. To protect the mangrove wetlands ecosystems and endangered plant and animal species and their habitats, high water salinity have to be reduced by increasing sweet water input.

Ganges water diversion and sharing is not just a geo-technological issue, it is also a humanitarian problem. Interaction is needed between states where it is a common concern for wise use of Ganges water resources. The threat and causality analysis should be carried out with participation of stakeholders of all level. The present single agency planning process should be modified to accommodate other natural resource management agencies such as the Bangladesh Water Development Board, the Department of Fisheries, the Department of Agriculture etc. to prepare an integrated plan.

Reducing substantial use of mangrove resources and establishing eco-tourism considering 350m buffer zone for tourists and shrimp fry collectors in the heritage site is of utmost importance. Action has to be taken for reforestation, restoration and development of the mangroves. An integrated planning and management tool based on GIS and a wetlands simulation model and water quality indicators should be developed.

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Shortage of Sweet Water Flow and Impact on the Mangrove Ecosystem

