

Cyclone Hazard: A Plea for Danger Reduction Programme

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SINCE time immemorial the coastal areas of Bangladesh have witnessed the worst kinds of disasters owing to cyclonic storms and associated coastal flooding. Of greater importance is the fact that frequent cyclones and associated flooding have posed a constant threat to coastal resource management issues, leading to the deterioration of the general standard of living of the people in that area and the quality of their environment. Not the least important are the social consequences. However, the actual loss in terms of money and the human fatality figure for the past cyclones could not be ascertained due to ineffective and inadequate damage assessment procedures. The provisional damage estimates were neither reliable nor easily available.

Frequency of Cyclonic Storms

The oldest account of a severe cyclonic storm lashing the district of Barisal is contained in *Ain-i-Akhbari* (1584). It has been reported that over 20,000 living creatures perished during the calamity. There are information in some detail about cyclones which occurred since the 18th century. The first of these occurring in 1797, affecting the islands of greater Noakhali district, has been described as the most severe. Available records show that since 1797 there have been frequent cyclones of comparatively small magnitude.

In the later period, two very destructive cyclones in the year 1822 and 1876 caused colossal damages, surpassing any other that occurred before them. The 1822 cyclone hit the coasts of Noakhali and Barisal in the early part of June, rather unusual for the occurrence of cyclone in this month. The damage in Hatia was reported to be colossal due to inundation caused by tidal surges. In the district of Bakerganj human fatality estimated to be over 72,000; cattle loss over 90,000.

The cyclone which occurred on 31 October, 1876, has been regarded as the deadliest, surpassing all previous records. The coastal districts of Bakerganj, Noakhali and Chittagong were devastated very badly. The cause of destruction was attributed to high storm waves or storm surges. The depth of inundation at places was recorded to be over 40 ft. Elsewhere the flooding varied from 15 to 25 feet high. 50 to 75 per cent of the people living in different off shore islands were affected. In the three districts of Bakerganj, Noakhali and Chittagong a total of 215,000 persons (roughly 20%) were estimated to be drowned covering an estimated area of about 3000 square miles.

According to available

records, cyclones of smaller magnitudes affecting small local areas were seen to be frequent throughout the 19th century. Such cyclones occurred in 1825, 1832, 1855, 1867, 1869, 1870, 1893 and 1895. In 1869, however, the district of Bakerganj was ravaged twice within a period of less than a month.

This century has witnessed a number of destructive cy-

curring in 1960, 1961, 1963, 1965 and 1970.

Occurring after 84 years of the last great cyclone flooding of 1876, the October cyclone of 1960 manifested several peculiarities. The cyclone occurred twice in quick succession, on 9-10 October and again on 30-31 October. On both the occasions the same areas were hit, and that the affected areas were almost

identical as in 1876, the depth of inundation being much less this time. The cyclones attained the hurricane strength, i.e. the wind speed exceeded 70-75 miles/hour, the maximum being over 120 miles/hour. The cyclone storm of 30-31 October, 1960, was more destructive as compared to the earlier one. Its diameter was estimated to be about 250-300 miles, with the core about 50 miles in di-

ameter. Although information on surge height was not complete, it is reported that the Storm Warning Centre at Patenga was flooded to a depth of about 6 ft. or the water level was nearly 15ft. on the ground. The flooding was about 5ft. over the run-way and the ground level of the Airport premises.

In 1965 also the coastal area was ravaged twice (May 11 and December 14) but the greatest calamity was caused in November 12-13, 1970, cyclone when over 500,000 people died. The cyclone with 224 km/hour wind speed struck the coast — the peak of the storm surge nearly coinciding with high tide — and reached a maximum of almost 7 meters above normal high tide it swept over the eastern coast of Bhola Island.

The decade of 1980 saw at least two cyclones devastating coastal areas. May 1985 cyclone attained a wind speed of 152 km/hour with 10-15ft. storm surge height. The number of deaths reported was over 11,000. By comparison, November 1988 cyclone was a moderate one with a storm surge height of 5-10ft. although the wind speed exceeded 160 km/hour.

Although the effect of the 29 April, 1991 cyclone is being assessed, it is already reported that by now over one lakh twenty five thousand people are dead and nearly 500,000 are at risk suffering from cholera and diarrhoea. In fine, it is now known that during the last 125 years or so as many as 40 cyclones ravaged the coastal area. Prior to the April, 1991, devastating cyclone, 13 such cyclones occurred in the last three decades, and as stated before, both the November 12-13, 1970, and April 1991 cyclones have been unprecedented in the history of this area in the level of damage caused.

Cyclone Tracks

The accompanying diagrams (A and B) show the number as well as monthly distribution of severe cyclones by ten year period 1780-1970. They show that the incidence of severe cyclones increased since 1890's reaching peak in the period between 60s and 70s. Since 1970, the intensity of both the cyclones of 1985 and 1991 has been unprecedented in the history of Bangladesh.

Diagram B shows very clearly that the coastal areas of Bangladesh are practically free from cyclonic storms during the months of January, February and March. The storms in the month of April have not been seen to be that severe, but in the month of May the cyclones have been very severe and are of comparatively frequent occurrence — 9 severe cyclones in 90 years. These cyclones often as seen in the map of the period 1905-70, initially moved N, then turned to the NE, and

struck the coast of Chittagong and also affected the coastal belt of Noakhali, almost a similar track followed by the cyclone of April 1991.

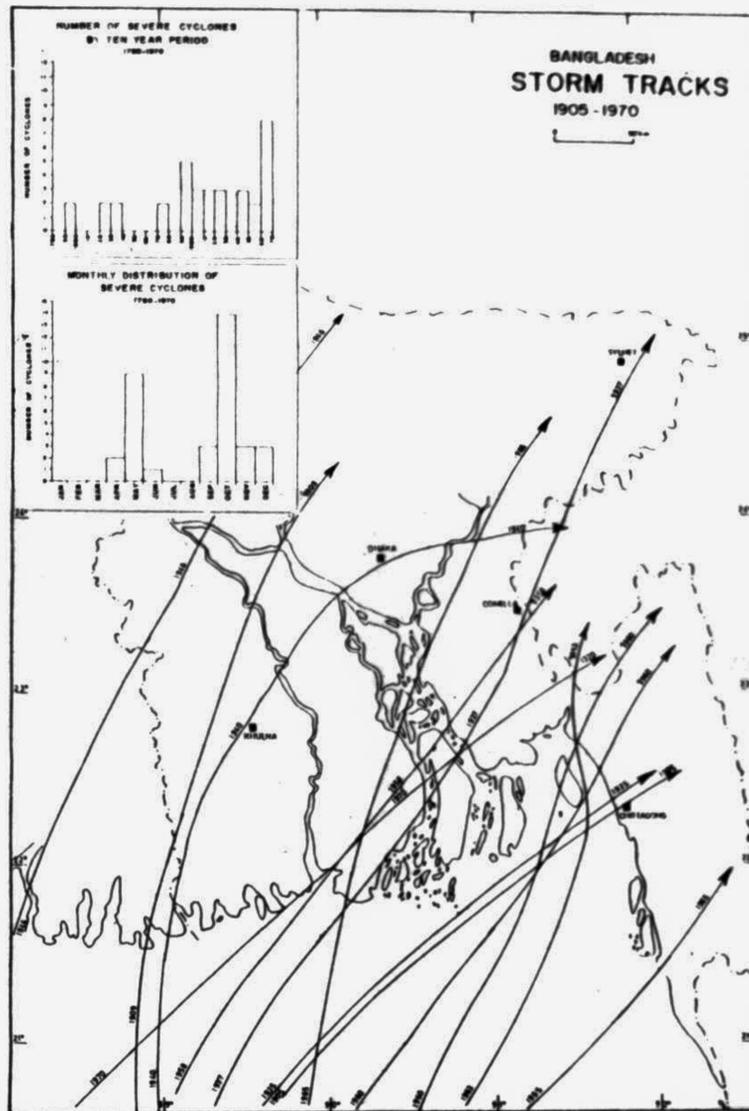
In the monsoon months of June, July and August the storms form at the head of the Bay of Bengal. They are mostly depressions and are of moderate intensity. They move in Westerly(W) or North-Westerly (NW) directions to Orissa and West Bengal coasts and generally cause heavy rainfall. In the month of September, the storms are generally of moderate intensity but sometimes attain violent force. They generally affect the district of Khulna and adjoining coastal areas of the greater Bakerganj district.

The storms in the month of October are most frequent and most destructive. They generally move from deep down in the Bay in a Northerly direction with a tendency to recurve to the NE at their later stage. Barring a few cases, most of the damages caused to the coastal areas of Bakerganj and Noakhali districts have been by the cyclones in the month of October (14 in 90 years). In the month of November storms are a little frequent but are generally very severe in intensity, as in 1970 when over 500,000 people perished. The cyclones in these months move in NW to N direction and then recurve to the NE. Cyclones are much less frequent in the month of December.

It may be stated here that not all low pressures formed into the Bay of Bengal near about the equator are deepened into depressions and severe cyclones in their path. It has been observed that during 1890-1959, in each year 5 to 15 such depressions originated, but of which one-third developed into storms of varying intensities. Data compiled from various sources show that during 1793-1959, a total of 32 destructive storms had developed, of which 12 such severe cyclones intensified in the month of May, and 14 in the month of October. The other severe cyclones occurred in the months of November and December. General requirements for development include sea-surface temperature, exceeding about 27°C and a location several degrees from the equator to ensure cyclonic rotation. When the storm moves over land or cool seas it decays rapidly. But the fact that owing to difficulties of collecting data in the historical past, there may have been events of calamity unrecorded in our climatic annals.

Storm Surge

However, the two months of May and October seem to be very critical as far as the cyclone hazard in Bangladesh is concerned. Further, the hazard is exacerbated owing to the funnel shaped coastline



resulting in swelling of water in the process. The wave driven by cyclonic wind moving across the shallow continental shelf causes storm surge of considerable height which has been responsible

storm in the sea. The amount of extra rise depends on the intensity (velocity) of the storm and at a particular place along the direction of the wind.

The maximum tide level is

the sea towards the land, resulting in sea water pressing towards the land.

The other is dependent upon sea-level fluctuations and various other correlated factors, particularly those relating to the morphology of coastal regions, on account of which yearly damages as a result of storms and salt water flooding of the coastal areas seem to have increased.

Furthermore, the fact that the cyclones of the recent decades caused greater damages to lives and property than those occurring in 1876 and 1897, or than any cyclone occurring prior to the 1960s, reflects greater density of population coupled with more extensive use of a vast stretch of newly formed and reclaimed coastal lands in comparatively recent years.

NEXT WEEK : Morphological changes.

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for flooding of the cultivated lands with saline water making those unfit for cultivation and contaminating the ground tanks with saline water making it unusable. The storm surge is also responsible for the destruction of homesteads and property damages.

Considerable damage is also attributed to the occurrence of tides alone. The normal inundation has been estimated to be about 4ft. during the months of July, August and September. Normal tide range in the hazardous zones in about 11ft. The tide level of the sea is always increased by

reached in the months of July, August and September when there is flood water flow from the land side towards the sea — a season when the cyclonic wind is at a minimum.

It has been observed that the rise of sea level becomes severe only when it is subjected to a storm or cyclone at a speed exceeding 80 miles/hour or more. The tide level which exceeds the monsoon high tide level is generally caused by a wind speed of about 100 miles/hour. The cyclonic wind is roughly from the S to the N, that is from

New Horns Bring Hope for Rhinos

Scientists have found an effective substitute for the rhino horn, an essential ingredient in Chinese folk medicine, which could save the endangered animal from extinction. Yojana Sharma of IPS reports.

SCIENTISTS at the University of Hong Kong believe they have found workable substitutes for medicines made from rhinoceros horns which are used in Chinese medicine to reduce fever.

The popularity of rhino horn in Chinese folk medicine has contributed to the near-extinction of the species and more recently to the wanton destruction of thousands of valuable works of art to obtain rhino horn for pills.

Medicines made from ground rhino horn command a high price as an effective cure for nosebleeds and fevers — although not as an aphrodisiac as popular myth in the West often suggests.

Three of the existing species are in Asia — India, Sumatra and Java. There are only 1,500 Indian rhino, 800 Sumatra and just 50 Javan.

The World Wildlife Fund for Nature (WWF) which has been promoting the use of alternatives believes substitution is feasible and says But's findings provide real hope for conservation.

"We now seem to have some scientific evidence that indicates the use of alternatives is feasible", said David Melville of the WWF in Hong Kong.

Country to other research into the effects of ingesting animal horn. But's team has backed the claims of generations of Chinese doctors and their patients — that rhino horn does actually work in reducing fevers.

"I am convinced there is some effect and of course the herbalists who have been using it swear by it," said But.

IT is estimated that elephant poaching loses Zambia up to \$100 million each year. A similar amount is thought to be lost through the slaughter of other species.

The killing continues despite a ban on the trading of ivory, and the voices of those who are critics of the ban appear to be gaining ground.

Zambia has now joined with four other members of the Southern Africa Development Coordination Conference (SADCC) — Zimbabwe, Malawi, Namibia and Botswana — to form a marketing authority for elephant products.

The critics have been asking whether, in the absence of an effective anti-poaching campaign, it is right to pretend that the ban might be saving targeted and dwindling species like the elephant and rhinoceros.

Prominent among these critics are those who believe that a programme of selective culling, as in Zimbabwe, is the correct course, and one that will help ensure elephant survival through motivated self-interest.

Dr Richard Bell, co-ordinator of the Integrated Resource Development Project (IRDP) in Luangwa Valley wildlife area, says Zambia could have earned \$1 billion "to help pay for its \$8 billion foreign debt" over the last 10 years from elephant culling alone.

Instead, the money has gone to poachers. Said one supporter of culling: "It is bad enough that we have saved neither that money nor the elephant, but it's worse to continue thinking that our actions are correct

SAVING ELEPHANTS AND MAKING THEM PAY

Critics in Zambia of the ban on ivory trade appear to have won the day, as the country moves to join other southern African nations in cooperative marketing of elephant products. The example of Zimbabwe, where elephant numbers are increasing and culling for ivory is controlled by the state, may, reports Gemini News Service, be the best way to beat the poachers after all. by Elias Nyakutemba.

when in actual fact the poachers continue to deplete the endangered species."

Richard Bell's research indicates that Zambia's elephant population is down to 15,000-20,000 animals, and facing a poaching onslaught becoming steadily more sophisticated and desperate.

Automatic and semi-automatic weapons are being used against animals and game rangers alike.

In the 10 years to 1989, Bell estimates, an astounding 100,000 elephants were slaughtered.

The rhino population is down from around 1,500 in

1981 to an estimated 100. This may not be enough to regenerate the population.

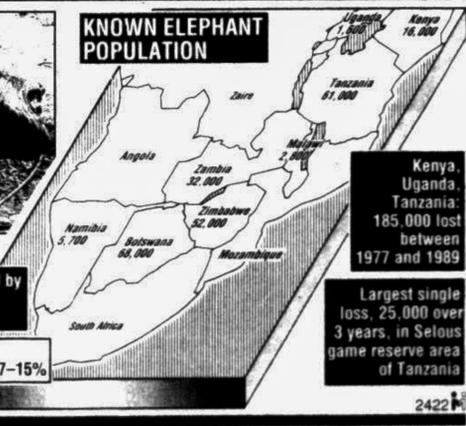
Countries in Africa with the remnants of the once-great elephant herds are fundamentally split on which is the best method of conservation.

One group, led by Kenya, supports a total ban on the

The dying giant



Victim of poaching



trade in ivory through the 1989 Convention on International Trade in Endangered Species (CITES), and has been prepared to back that up with action against poachers that has at times resembled civil war.

Kenya's director of wildlife, Dr Richard Leakey, reported recently a record of success against poaching and the beginnings of a regeneration of the elephant population.

The Zimbabwe approach, for which success is also claimed, holds that state involvement in and control of the ivory trade will rob the illegal trade of its huge profits, and therefore its major incentive. At the same time, selective culling would be a significant financial resource through both trophy hunting and sale of elephant products.

This second approach seems to have been accepted by SADCC member states. In opposing the ban on the ivory trade, the SADCC countries are lined up with more than 60 countries which refuse to acknowledge CITES.

The proposed marketing authority will be based in Botswana and monitor and control elephant products for member states. Marketing will be conducted through a twice-annual public auction.

One immediate effect of the new agreement will be to lessen border tensions between Zimbabwe and Zambia. In the past few years 30 Zambians have been killed as poachers by game rangers in Zimbabwe, particularly in the Zambezi Valley.

There was even a slogan in Zimbabwe, coined as a bitter joke: "Save an elephant, shoot a Zambian."

President Robert Mugabe over allegations from Harare that some Zambian leaders were involved in sending poachers across the Zambezi into Zimbabwe.

Poaching is still a problem of plague proportions in Zambia itself. Recent reports told of running gun battles between poachers and police in North Western Province, resulting in several deaths. The police claim they are out-gunned by the poachers' superior weaponry.

It was also disclosed recently that some security officers had been supplying poachers with Soviet AK47 weapons. Said Dr Patrick Chipungu, Director of the National Parks and Wildlife Service (NPWS): "Some senior security officers are involved. They must stop to save our wildlife."

More than \$5 million of local and international donor funds have been poured into Zambia's wildlife conservation programmes in the past few years. Organisations including the World Wildlife Fund and Norad, the Norwegian aid agency, have pledged about the same amount over the next four years.

The government, meanwhile, trained an extra 250 game scouts last year. It is also overhauling its moribund National Resources Conservation Act, transforming it into the Environmental Protection and Pollution Control Act and allocating \$190,000 for ground work and setting up nine inspectorates to deal with specific issues of conservation development.

A major purpose is to give state agencies more teeth to cope with the poaching scourge, which until now has been almost beyond reach. GEMINI NEWS.