

Cyclone Hazard: A Plea for Danger Reduction Programme— II

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Morphological Changes

THE element of hazard has been increased in recent years by a combination of natural and cultural processes leading to the modification of natural coastal environment. Relatively rapid changes in landforms due to erosion and sedimentation have occurred in the coastal areas. Physical evidence of changing conditions is apparent in eroding river banks; areas of new deposition and consequent changes in landforms are also present. Coupled with these, the high upland discharge with heavy sediment load, severe tidal activity at the head of the Bay of Bengal, monsoonal piling up of water at the coast are some of the extreme conditions including rapid morphological instability of the area.

Since the map of Renell (1789), it is evident that within the time span of about 200 years the estuary has gone through shape changes, channel migration and southward growth of islands (Map 1). The speed at which some of these drastic land changes are occurring is extremely rapid. New lands, or chars as they are called locally, can be formed overnight while some coastlines were estimated to be receding at rates of up to 240 m per year (EPIWTA, 1964). However, delta building which is a continuous process, as seen in the area, has been substantially altered by human intervention.

The construction of Cross Dams No. 1 in 1957 connecting North Hattia Island (Rangati) with Noakhali mainland has accelerated largely the siltation process in the channel. Further, as a result of the completion of the Meghna Cross Dam No. 2 in 1964 in conjunction with the coastal embankment project, the river Meghna has receded further to the south. These two cross dams accelerated the accretion of over 5000 sq. km of land area. Nearly all of this area is presently under cultivation and new settlements have sprung up. The siltation of the Bamni river has isolated Sandwip channel from the

main river flow system with a short cut channel between Sandwip and Noakhali mainland. This on the other hand has accelerated the erosion rates of Hattia and Sandwip in the south. In addition there is the Land Reclamation Project of the Bangladesh Water Development Board and the programme of accretion promotion measures. Thereby, a new damage potential is also being created at an accelerating rate by occupation of coastal areas subject to high winds, wave actions and salt water flooding associated with storms.

Public Choice of Adjustment (Mitigating measures)

With the rising toll of storm damage and annual coastal flooding has come public pressure for increased protection, relief and insurance against waves and associated wind damage. Just after the cyclone which ravaged the coastal area twice in the same months in the year 1960 the Government of the Then East Pakistan adopted an elaborate plan for remedial as well as preventive measures. This is embodied in "Long Term Rehabilitation Programme for the Cyclone Affected Areas in East Pakistan". Detailed instruction for dealing with the cases of distress caused by natural calamities are contained in the Famine Code and the Famine Manual. Further instructions for dealing with situations arising out of cyclones have been laid down in the 'Emergency Standing Orders for Cyclones' and 'Emergency Standing Order for Relief' published in 1961 and 1962 respectively. Suggestions with regard to the reconstruction of the cyclone affected areas in

the form of 'Special Programme of Action and Basic Reconstruction Programme' are also contained in the report of the 'East Pakistan Housing Programme: Preliminary Suggestions for the Reconstruction of the Cyclone Affected Area.'

In all these reports a lengthy discussion is provided with regard to various damage reduction adjustments. The content of the reports, however, emphasize the following lines with regard to remedial as well as preventive measures

a. The position on loss bearing is, though only implied, follows from the re-

quirement that protection must show benefits in excess of costs, and is that such an adjustment be the cheaper one in the long run.

b. The public programme strongly supports a network of effective warning system and emergency action such as a mass evacuation and provision of shelter in safer places such as community centres. But here also the emphasis has been on the meteorological department to provide and disseminate warnings to local communities for their action through several information media.

c. Protective embankments along with afforestation pro-

gramme are the favoured adjustments of the several public agencies. Embankments, regarded as the most positive means of protection, consist of structure which will physically reduce or prevent the inundation of land by tidal flood water. The technical know-how and supervision will be arranged by the Water Development Board and the Forest Department for embankment and afforestation respectively.

d. Design of structures, land use change and guidance are also included as important methods of damage reduction programme. Zoning regulations demand that no perma-

nent building is constructed within the hazardous shore lines and that adequate building standards are made to minimize damages during extremely severe storms. Land acquisition is also included in the major programme of damage reduction.

Against this background of public choices it is interesting to see the prevalence of the adjustments as perceived and adopted by the coastal dwellers in addition to their extent, diversity and efficiency in reducing damage from storms and storm surges.

Empirical Studies

As part of the programme of the International Geographical Union Commission on Man and Environment which proposed international collaboration in a series of comparative studies of human adjustment to natural hazards, this author was encouraged to undertake a comparative study of cyclone hazards in Bangladesh. The study programme (1968) included an attempt to assess the significance and role of cyclone hazard in the national economy and society. Some of the findings, arising out of the sample field surveys in different offshore islands, are discussed below.

In spite of the many disadvantages associated with coastal occupancy most residents expressed their willingness to continue living where they are now settled. This indicates to their indifference to the cyclones hazard despite their recognitions of it. Fatalistic attitude towards the environment combined with the absence of any alternative choice, particularly better

economic opportunities elsewhere, have been the main factors in determining their continuous habitation in the hazardous zone. Certain specific economic opportunities offered by the coastal occupancy have induced others, particularly the upper class, to take risks of the uncertain environment. Such opportunities are associated with, for example, bumper rice production in the deltaic coasts and abundant marine resources in the Chittagong coast. These factors even attract some outside population during harvesting and fishing seasons who work as hired labourers. And as was seen in such field sites as Galachipa, Char Jabbar and Hattia, the migrant harvesters having to live in temporary sheds almost at the sea-level, usually become the most potential victims in the event of a cyclone striking the coast during the harvesting time, as happened in 1970.

Empirical findings revealed that among the variety of possible adjustments only a few were taken into consideration in coastal resource management with particular reference to local factors and prevailing condition. A brief review of the choice of adjustments suggested that public policies relating to the reduction of damage did not work fruitfully. The reason for such failure could be attributed not only to the attitude, tradition, and culture of the coastal dwellers, but also to the lack of provision for basic facilities as envisaged within the framework of public policy.

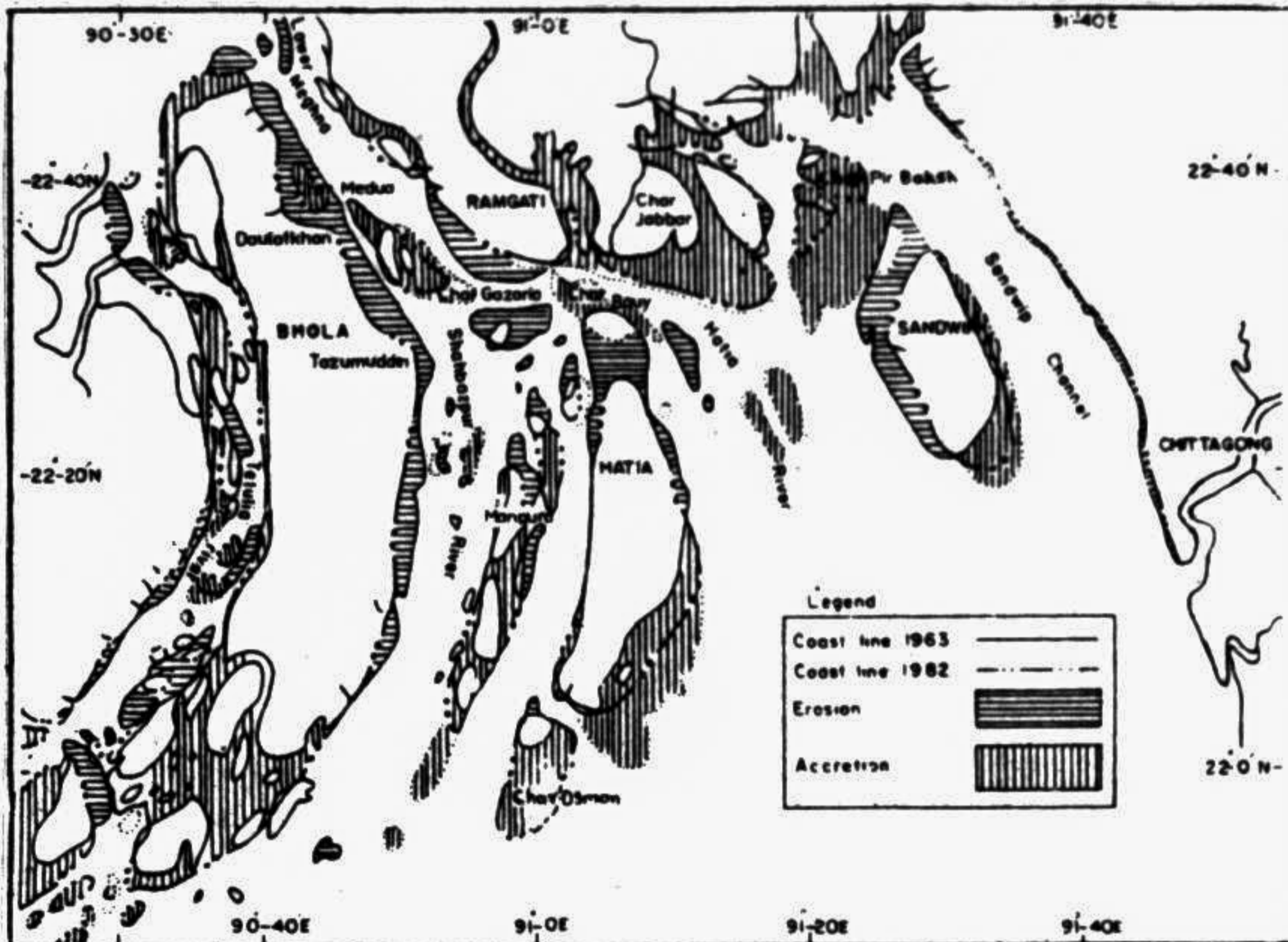
Moreover, adoption of some possible public adjustments like changes in land use and zoning of the coastal land could not be undertaken because of the resulting difficul-

ties in relocating the affected population. Thus, the intricate relationship that exists between man and nature is a manifestation of an adjustment process where decision-making of any kind has not been a function of the natural events systems. Also there does not appear to be a correspondence between the perception of cyclone hazard and adoption of specific adjustments by the resource managers of the hazardous zones. The trend so far noticed is that coastal hazard from the point of view of the users of the coastal plain has not been evaluated. In common with flood hazard, the public policy has so long neglected the behavioural attributes of the people.

The potential for adjustment to the hazard of coastal flooding has not hitherto been systematically explored, nor has the effectiveness of damage reducing actions ever been carefully estimated. The lack of such enquiry probably arises out of the divisions of responsibility among various governmental agencies for managing coastal flood damages. With regard to both remedial and preventive actions as envisaged in the public policy, one finds that there has been in general a lack of a comprehensive and coordinated programme of damage reduction. So far, to government agency has been charged with a comprehensive programme of damage reduction. The studies further indicated the need for better coordination between private and public actions with respect to cyclone hazards.

In essence, the field studies revealed that reliance on a narrow range of adjustments to cyclone hazard, the employment of technology in the absence of adequate knowledge of its social effect, and the neglect of possible alternative adjustments, is increasing losses from cyclone hazards in the coastal areas, and also threaten to create potential disaster situations.

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COASTLINE CHANGES 1963-1982 SCALE 1:640 000

Climate Change and Developing Countries

THE consequences of climate change will affect every aspect of society, and every corner of the planet. Developing countries have contributed little to the problem of global warming, yet they will be hardest hit by its impacts.

Developing countries do not possess the financial and technical resources to adapt to the coming climate change. And it is the developing nations who are most vulnerable to impacts of climate change such as rising sea levels, increasing incidences of droughts and floods, and more savage and more frequent storms. Developing nations are much more dependent on natural resources such as crop and grazing lands, forests, fisheries and monsoon patterns.

All these natural systems are much more vulnerable to changes in climate than are the industrially-based eco-

nomically developed nations. Moreover, poorer countries are already struggling to survive — a person who lacks water, or food, or shelter, is not likely to be interested in taking actions that benefit the world in general.

Such a preponderance of adverse impacts on those who have done least to cause this problem is clearly inequitable. And yet it is this very inequity that gives hope to developing countries. Climate change is a global problem that can only be solved through global solutions — solutions which must include the forging of a partnership between industrialized and developing nations.

If industrialized nations do not agree to transfer additional resources and new, cleaner technologies, to the developing world, global warming will continue to gain momentum,

and the impacts of climate change will continue to worsen. Historically, industrialized countries, are responsible for almost all the extra greenhouse gases which have started global warming. However, developing nations are now rapidly increasing their own emission rates.

Today, although the industrialized world emits 75 per cent of all greenhouse gas emissions arising from human activity, their emissions are now increasing at a rate of less than one per cent each year. In contrast, developing countries, where 75 per cent of the world's population lives, are increasing their emissions at a rate of 6 per cent a year.

If developing nations continue their present path towards greater economic expansion, installing the same polluting technologies that made the industrialized na-



Climate change Need for global partnership

World Environment Day 1991

tions rich, their contribution towards global warming will soon outstrip that of industrialized nations. Even if the industrialized world were to completely stop all emissions of greenhouse gases, global warming would continue to accelerate.

Global problems, in fact,

have created an indisputable argument for greater equity. For the first time since the start of the industrial revolution, the industrialized world needs the co-operation of the developing world just as much as the developing world needs industrialized nations' assistance. As Benjamin Franklin said, "We must hang together or assuredly we will hang separately."

Global warming demands specific commitments to specific actions. If the world is to jointly take action to forestall this growing threat of global warming and associated climate change, industrialized nations must agree to concrete proposals for providing additional financial and technological assistance to developing nations.

Transfer of technology is an essential part of the solution. It is one, also, which offers new

hope to poorer nations. Industrialized nations will in many cases have to modify existing technologies before they begin large-scale implementation of renewable energy sources. With additional assistance from the industrialized world, however, developing nations could leapfrog these older technologies and develop expertise in the next generation of clean, new technologies.

Technology transfer could put developing nations in the forefront in the use of renewable energy sources such as solar energy, biofuels and other renewable technologies. The steps that must be taken to slow and then stop global warming would bring many other benefits to industrialized and developing nations alike. These benefits include reduced erosion and flooding, improved water supplies, less

desertification, alleviation of poverty, enhanced agricultural production in a sustainable way, thus boosting food security, preservation of the biological wealth of the tropics, and reduced urban air pollution and acid rain.

Any effective global agreement will have to detail where the financial resources for this global survival strategy can be found. Policies being canvassed include immediate debt write-offs, a fairer trading system, stable commodity prices, a decent target in per capita income and real popular participation. The needs and interests of developing countries must be reconciled with the knowledge and wealth of industrialized nations — because a greater equity between rich and poor is the only path we can take if we wish to preserve this planet of ours for future generations.

Scheme for Metallic Birds

ALTHOUGH only one to two per cent to the pollutants released into the atmosphere by transportation activities can be attributed to air traffic, these are emitted into a critical area, the high atmosphere.

Therefore, everything must be done to reduce this share drastically.

German industrial firms and research institutes in the field of aerospace have wholeheartedly accepted this challenge.

At the end of October 1990, under the direction of the Deutsche Forschungsanstalt für Luft- und Raumfahrt DLR (German Aerospace Research Institute), they presented the Federal Government with a research program which listed in detail all the possibilities for saving fuel and reducing pollutants as well as the predicted financial requirements — 200 to 300 million DM. This large-scale national project with the title of pollutants in Air Traffic — Effects and Prevention, is of particular importance in light of the current prediction that air traffic will double by the year 2005.

A further argument to getting this program to improve aeronautic environmental compatibility underway as quickly as possible, are the long lead times typical of the aerospace industry. The design and manufacture of a large aircraft, for instance, takes about ten years, and replacing obsolete machines often takes another 25 to 30 years.

As this ten-year research project is not likely to yield any results which are useful for airplane design before five years have passed, positive effects on the environment can be expected at the earliest in 20 years.

Assuming that lawmakers ensured, through appropriate legislation, that the hoped-for project results were implemented, the necessary expenses would be extraordinarily high. The costs for the development of a new engine, for instance, are in the billions.

Aircraft engines, like other combustion engines, produce the usual spectrum of pollutants: carbon dioxide, water vapor, nitrogen oxides, carbon monoxide and hydrocarbons. With improvement of fuel utilization, the portion of carbon monoxides and hydrocarbons have already been reduced to insignificant levels.

No Logging

Despite its almost total dependence on revenues from the timber trade, the Malaysian state of Kelantan is standing pat on its decision to clamp down on logging to preserve its dwindling forest reserves. Howie Severino of IPS reports.

RANTAU Panjang, Malaysia — On most afternoons in this Malaysian border town with Thailand, up to 75 10-wheel trucks piled high with sawn timber are parked along the highway, their drivers nowhere to be found.

"The drivers are in Thailand enjoying themselves," says Alauddin Shah, a prominent local timber trader.

Many forms of recreation across the border are unavailable here in the heavily Muslim Malaysian state of Kelantan, where a new state government run by fundamentalists has recently banned drinking and gambling in public by Malays.

The trucks return to their timber trucks after nightfall, when customs officers on both sides of the border are said to be "more flexible" in assessing customs duties, according to Shah.

In a nation where Muslims are a 55 per cent majority, other communities are watching to see what happens in Kelantan, where Islamisation coupled with economic development could encourage the spread of a new religious and political order in Malaysia.

The federal government has always been secular in view of the country's ethnic diversity. Most analysts say it will be an uphill climb for the Kelantanese.

Even as it moves to clamp down on the timber trade, the state is under new pressure to raise its revenue, as it struggles to repay a huge debt to the federal government inherited from the previous administration.

Although it poured development funds into the state in the past, Kuala Lumpur is in no mood now to provide Kelantan with additional help after the Barisan Nasional ruling party's humiliating defeat here in last year's general elections.

Kelantan officials expect only a third of the development allocation which had been requested by the previous government.

In some respects, Kelantan's dilemma about its dwindling forest resources mirrors the one facing the federal government, one of whose primary sources of revenue is also the timber trade. Kelantan's situation is markedly different, however, because of its lack of alternatives to timber and because of its political isolation.

LOW-COST PLANTS TURN WATER INTO WATTS

By Prakash Khanal

MICRO-hydro plants are successfully providing remote areas of Nepal with electricity. Advocates argue that they could provide the answer to rural energy needs.

Locally made water turbines power grain-milling and oilseed-pressing during the day, and brighten nights with electric light when the day's milling is done.

For centuries, people living in the hills and the Himalayas have harnessed the power of Nepal's 6,000 rivers and waterways to drive paani ghattas,

traditional wooden water mills, to grind corn. Some 25,000 paani ghattas are still in use. The new technology builds on this tradition.

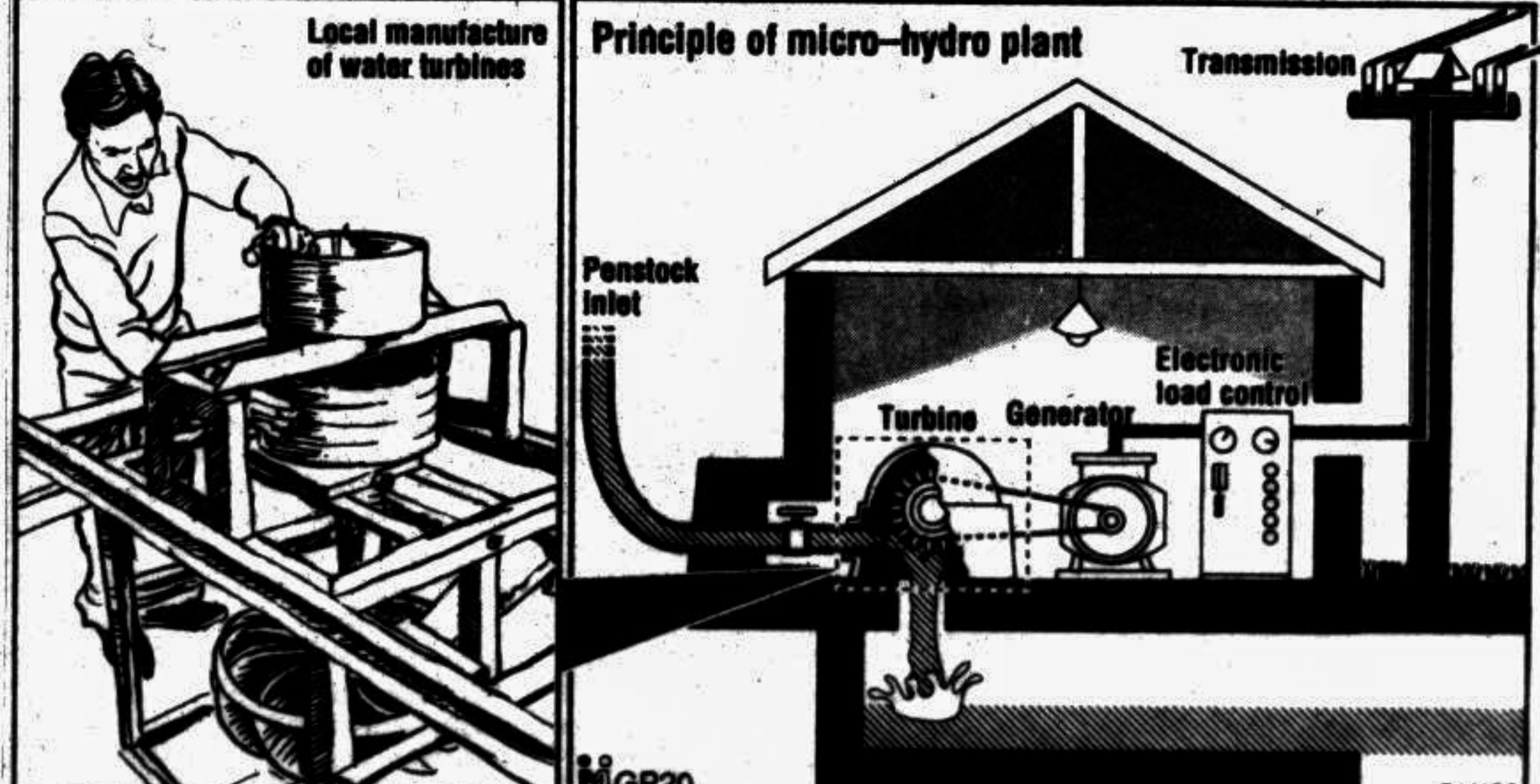
The Agriculture Development Bank of Nepal (ADB/N) has financed 70 micro-hydro plants. It has been involved in developing micro-hydro electric schemes since the 1970s and provides the financing, while feasibility studies are undertaken by independent consultants. Domestic and foreign producers make and help install the turbines.

Says development consultant Deepak Gyawali: "The reason for the relative success of the ADB scheme, and I say relative because there is room for improvement, is that the bank only plays the role of promoter rather than as entire delivery agent."

The 70 plants, ranging from one to 40 kw, have been set up in 58 districts throughout the country. Fifty projects are individually owned and the rest are owned by small farmers' groups. They produce around 700 kw of electricity.

Kiran Man Singh, Chief of

Nepal: micro-hydro electricity



the Appropriate Technology Division of the ADB/N, says about 3000 households have benefitted from the rural electrification projects. More plants are in the pipeline. The bank says 18 projects will be completed this year. Many more are planned and demands for loans to set up plants are increasing.

In the daytime the plants can be used for grain milling and rice milling and are proving much more efficient than mechanical mills for extracting mustard oil, widely used in everyday cooking. For lighting at night, electricity substitutes expensive kerosene.

Micro-hydro electricity also aims to improve the capacity of communities to work small industries, such as apple farming and carpet making.

Light at night is completely changing lifestyles of villagers, who now can be active until 10 pm. Instead of going to bed at 7.00. On the road to Pokara, 200 kms (125 miles) west of Kathmandu, when night falls tea stalls are awash with light from fluorescent lamps.

Almost 13 million rupees (US\$ 4,33,000) have been spent on building the 70 existing projects. Of that, 77% was met by a combination of ADB loans and government subsidies, the rest by local beneficiaries.

The production cost depends on location and power need. On the average, it may cost between 20,000 rupees (US\$660) and 60,000 rupees (US\$2,000) per kilowatt of electricity generated," says Bikas Raj Pandey, Micro-Hydro Consultant for the ITDC.

— PANOS