DISASTER MANAGEMENT IN BANGLADESH - CONCENTRATING ON DISASTER PREPAREDNESS

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Introduction

Bangladesh has an area of about 144,000 sq km with a 4,685 km long boundary of which the coastline is 710 km long, all are lying along the Bay of Bengal. The country is well within the tropics bounded by latitude 20°34'N to 26°38'N and longitude 88°01'E to 92°41'E. The land is the largest delta in the world formed by mighty rivers: the Padma (known as the Ganges in India), the Brahmaputra, and the Meghna. The delta is characterized by flat terrain of alluvial soil cris-crossed with an intricate system of over 230 rivers, canals, and streams. The country has a high density population which is more than 855 per sq Km. The socio-economic imperative for planned development of the country is mainly alleviation of poverty of this huge population, a large majority of which lives in villages situated on marginal lands exposed to the threats of recurring floods and cyclones with associated storm surges.

Outline of Disasters in Bangladesh

Bangladesh has a long list of natural disasters. Of these, the most important ones are the following:

1. **Cyclones:** Cyclones are recurring phenomena in Bangladesh. In the past, some of the cyclones turned out to be national catastrophes. On November 12, 1970, Bangladesh was hit by a killer cyclone of the century taking a toll of human lives of 300,000 people with property losses of more than US$ 1 billion. Again on April 29, 1991 a terrible cyclone struck the Bangladesh coast causing the death of 140,000 people and property losses exceeding US$ 2 billions. The cyclones of 1876, 1919, 1961, 1963, 1965, 1985, 1988, and 1997 were also of severe nature.

2. **Floods:** Floods are another recurring phenomena in Bangladesh. In August to September, 1988 Bangladesh experienced an unprecedented flood, which inundated three-fourth of the country covering 89,900 sq km in areas of 52 districts causing loss of 1,517 lives. Again during the period July to September, 1998 three-fourth of the country was inundated by the worst flood in recorded history and of the longest duration of the century covering an area of 1,00,000 sq km; the death toll of human lives due to the flood rose to 918. In all these floods, the entire economy of the country was shattered. Besides these recent floods, the great floods of 1922, 1954, 1955, 1974, and 1984 are worth mentioning.

3. **Droughts**: Bangladesh also experiences drought conditions at various intervals of time. Records show that Bangladesh had, in the recent past, drought conditions having disastrous crop failure. In 1979, Bangladesh passed through a major drought year, which was termed by many as the worst in the recent past. Droughts in 1957 and 1972 were also of severe nature. Crop failure by drought causes a significant strain to the socio-economic structure of Bangladesh.

4. **Earthquakes:** Bangladesh has potentiality for earthquake hazards according to its recorded history. Bangladesh as a whole lies in the earthquake zone, of which two-third comes under major and moderate faulting. Very recently, on 21 November, 1997 an earthquake with an intensity of 6.1 on

the Richter Scale shook the entire Chittagong region; the force of which was felt up to Dhaka. As a result, a five storied building in Chittagong sank up to its first floor, causing a human death toll of 23 and sizable property damage.

5 **River-Bank Erosion:** Along the courses of the mighty rivers, like the Jamuna, Meghna and others, erosion every year takes away land causing displacement of large numbers of people and loss of property. Due to recurrence of such erosion, displaced people are forced to move to cities for their livelihood. This adds to the growth of urban slum areas, scarcity of land in the cities, and creates various social problems.

Disaster Forecasting, Early Warning, and Simulation

There are two national organizations, namely the Bangladesh Meteorological Department (BMD) and the Bangladesh Water Development Board (BWDB) responsible for disaster forecasting and early warning services. The BMD is responsible for meteorological observations, preparation of weather charts, and issuance of forecasts for disastrous weather systems such as cyclones, and other severe weather events. The BWDB has the responsibility for overall water management in the country including flood forecasting. Both organizations have a long tradition of service to the community with technical knowledge and skill that has developed during the past several decades.

Meteorological Forecasting and Warning Systems

Traditional methods of disastrous weather forecasting are in existence in Bangladesh in which various weather charts like synoptic surface and upper air charts, consultant pressure charts, isobaric charts, and prognostic charts are analyzed manually on a routine basis to extract information about the behavioral tendency of hazardous weather systems including cyclones, nor'west storms, the SW monsoon, and other rain events for prediction and issuance of early flood warning. While making forecasts and early warnings forecasters also have the help of 1) climatological charts, 2) radar echoes, 3) satellite imagery and 4) computer information. In fact, old methods of weather forecasting are gradually being replaced by more advanced and sophisticated systems and techniques developed around such technological innovations as weather satellites, radar, computer, and other technologies particularly for tracking and prediction of the landing of tropical cyclones in the Bay of Bengal. Forecasters at the BMD along with the meteorological facilities available to them also use a good number of techniques, such as 1) persistence techniques, 2) climatological techniques, 3) statistical techniques, and 4) satellite techniques in their predictions. In the whole process of forecast and warning preparation, the BMD has a modern meteorological communication facility known as the National Meteorological Communication Centre (NMCC) which is linked up with a Global Telecommunical System (GTS) through a line capacity of 2,400 bps. However, it has not yet been possible to make computer simulations of cyclones, and other severe weather events in the country.

Flood Forecasting and Warning Operations

The Flood Forecasting and Warning Centre (FFWC) under BWDB was established in 1972 Under a project for "Expansion of Flood Forecasting and Warming Services" with the Danish Hydraulic Institute (DHI) as the main consultant the system of flood forecasting and warning operations bas been modernized and made operational. Under the project, the MIKE 11 flood forecasting model (Super Model) has been constructed to cover the entire northern half of Bangladesh, an area of 82,000 sq km with 7,270 km of rivers and flood plains. The preparation of flood forecasts and the issue of flood warnings by FFWC follows a sequence of operations. These are.

1. Data transmission and reception;
2. Satellite image reception and processing,
3. Flood forecasting, and
4. Preparation and issue of flood warnings

The procedure is computer based, and has been highly automated ensuring that each operation is correctly executed. This allows more time to the key technical players to concentrate on the components that still require their judgement and experience for decision making.

Major Accomplishments in Disaster Forecasting

The Government of Bangladesh has given priority to improve the warning issuing capacity of the concerned Government Organizations such as the Storm Warning Centre (SWC) of the Bangladesh Meteorological Department (BMD), and the Flood Forecasting and Warning Centre (FFWC) of the Bangladesh Water Development Board (BWDB). As a result:

- Micro-wave links between SWC in Dhaka to Radar Stations at Cox's Bazar and Khepupara have already been established to improve the early warning system in case of cyclones.
- With the grant of the Government of Japan, replacement of the weather radars at Agargaon, and Dhaka, and the establishment of a new radar at Rangpur and a satellite ground receiving station at SWC, Dhaka are in the process of implementation; all to be completed by the last quarter of this year (1999)
- There has already been substantial progress in the expansion of flood forecasting and warning services (FAP-10) in the country under a project with the Danish Hydraulic Institute (DHI) as the main consultant. The Project was completed at the end of December 1998.

Disaster Mitigation, Theory, and Practice

Previously disaster mitigation tended to be viewed in Bangladesh as structural mitigation measures. This concept has changed through the past few years. The Government of Bangladesh, at present, gives equal importance to both structural as well as to non-structural disaster mitigation measures. It is strongly believed by the Government of Bangladesh that non-structural mitigation measures need to be complemented by structural mitigation measures in order to modify or reduce disaster effects.

Structural Mitigation

As a part of structural mitigation measures, the Government of Bangladesh with its own and external resources has so far constructed 1,841 cyclone shelters and 200 flood shelters for evacuation of people exposed to cyclones as well as to floods. In addition, about 3,930 km of coastal embankments have been built to protect coastal land from inundation by tidal waves and storm surge; and drainage channels of a total length of 4,774 km have been constructed, again for protected of coastal land from inundation

Non-Structural Mitigation

For non-structural mitigation, the Government of Bangladesh has given emphasis to the following strategies:

- Legislation
- Training and public awareness
- Institution building
- Warning systems

A new Disaster Management Legislation Act has already been drafted. The Act will provide for the formulation of disaster management policy and planing relating to preparedness and emergency measures; and rehabilitation programmes to deal with disasters.

Training and public awareness is an important component of the project "Support to Comprehensive Disaster Management". Up to December, 1998 a total of 183 courses, workshops and seminars were conducted under a project managed by the Disaster Management Bureau (DMB), a specialized organization under the Ministry of Disaster Management and Relief. About 10,100 participants have attended these programmes. Trainees included Government and Semi-Government officials at different levels, public representatives, NGO officials, local leaders, representatives of the mass media, teachers, Imam of mosques, and members of the fishermen community.

Also, DMB has supported disaster management training workshops in other institutes. As part of public awareness, booklets containing public information about cyclones, floods, and other disasters, as well as calendars and posters depicting disaster issues have been regularly printed and distributed down to the grass-roots level.

To raise awareness among grade school students on various hazards and on disaster management, as part of

the Government of Bangladesh policy, a chapter on disaster management has been included this year in the educational curricula from class V to XII The Government of Bangladesh has also decided to make compulsory a session of at least 2 hours on disaster management in the training curricula of all types of Training Programs for government officials and non-officials

Emergency Preparedness for Catastrophic Disasters

With the devastating floods of the late 1980s, and the killer cyclone of 1991, the concept of overall disaster preparedness in the country became clearer through discussions on a variety of complex and inter-sectoral issues which showed up in the course of implementation of a short-term project: "Assistance to the Ministry of Relief in the Co-ordination of Cyclone Rehabilitation". As a result, the Government of Bangladesh has taken a number of significant steps during the last few years for building up institutional arrangements from national to union levels for effective and systematic disaster preparedness in the country. These are:

1. Establishment of a disaster management organization called the Disaster Management Bureau (DMB) in 1993.
2. Renaming of the Ministry of Relief and Rehabilitation as the Ministry of Disaster Management and Relief (MDMR).
3. Establishment of Councils and Committees at the national, district, thana and union levels for overall disaster management.

Emergency Preparedness Organizations at the National Levels

- National Disaster Management Council (NDMC), headed by the Prime Minister
- Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC), headed by the Minister in charge of the Ministry of Disaster Management Relief (MDMR).
- Cyclone Preparedness Programme Implementation Board (CPPIB) headed by the Secretary, Ministry of Disaster Management and Relief
- Disaster Management Training and Public Awareness Building Task Force (DMTTF), headed by the Director General of DMB.
- Focal Point Operational Co-ordination Group on Disaster Management (FPCG), also headed by the Director General of DMB
- NGO Co-ordination Committee on Disaster Management (NGOCC), headed by the Director General of DMB.
- Committee for Speedy Dissemination of Disaster Related Warning and Signals (CSDDWS), headed by the Director General of DMB.

Emergency Preparedness Organizations at the Field Levels

- District Disaster Management Committees (DDMC), headed by the Deputy Commissioner (DC) to co-ordinate and review disaster related activities at the district level
- Thana, Disaster Management Committee (TDMC), headed by the Thana Nirbahi Officer (TNO) to co-ordinate and review disaster related activities at the district level.
- Union Disaster Management Committee (UDMC), headed by the Chairman of the Union Parishad, to co-ordinate and review disaster related activities at the thana level.

Disaster Preparedness Mechanisms

To maintain proper co-ordination among the concerned Ministries, Government organizations, and line agencies, and also to ensure their proper functioning during disaster emergencies, the Government of Bangladesh has formulated a set of mechanisms. For the mechanisms to be operative, a guidebook entired *Standing Orders on Disaster* has been designed as a basic implementation tool. The *Standing Orders* outline the activities of each Ministry, major agencies and departments to handle emergency situations efficiently. In the efforts of making the mechanisms effective and clear, a Comprehensive National Policy on Disaster Management and a National Disaster Management Plan have been designed in draft form for consideration by the Government

The entire disaster preparedness mechanism meets the requirements of clear policies, provides scope for

implementation of NDMC policies, promotes decisions by high-level IMDMCC on an inter-ministerial basis, incorporates the role of the MDMR as the responsible line Ministry, provides for the integration of the Armed Forces, and reflects the crucial role of the DDMC's, TDMC's and UDMC's. The action plans for DDMC's, TDMC's, and UDMC's are in the process of preparation to make these into local based Disaster Management Committees to prepare and protect people at grass-root levels, and to increase local people's capacities to cope with, and recover from disasters.

Emergency and Relief Management

For the purpose of emergency information exchange and relief management, an Emergency Operations Centre (EOC) has been established at the Ministry of Disaster Management and Relief (MDMR). EOC as the operational unit of the MDMR becomes activated with the first information of an impending disaster emergency situation; and works with the overall direction from MDMR/IMDMCC for handling all aspects of the emergency situation, setting priorities and criteria for allocation of resources from the NDMC. The emergency and relief management system during cyclonic storms, catastrophic floods, or any other disastrous weather events in the country recognizes the key role of the Cabinet Secretary in inter-Ministerial co-ordination and in supervising the district administration; and makes possible the services of the Armed Forces as well as NGOs working in the country. Under this system, there exists a well established organization named the Directorate of Relief and Rehabilitation (DRR) within the administrative control of the MDMR. The DRR acts during emergency situations and provides relief for distribution to remote field levels under the supervision of the controlling Ministry. The MDMR has a small dynamic professional unit known as the DMB to perform specialist functions at the time of emergencies to help EOC by extending technical support services through MIS/GIS for information exchange In addition, a functioning Cyclone Preparedness Programme (CPP) also plays a very useful emergency and relief management role during cyclones.

Early Recovery and Immediate Rehabilitation

The Government of Bangladesh has an elaborate system for needs assessment at the grass-root level in which Union Disaster Management Committees (UDMCs) and TDMCs play an important role. For quick assessment for both immediate and long-term needs, pre-designed demand forms are made available to the management committees at the field levels to be filled in and sent to the DDMCs for onward transmission to the MDMR/IMDMCC. Immediately after each disaster, the process starts operating and continues till the time the affected people become able to return to their normal economic activities.

In the case of the 1998 flood in Bangladesh, the first meeting of the NDMC was held on July 24, 1998 under the Chairmanship of the Prime Minister to take stock of the flood situation and to instruct all concerned Departments to speed up emergency relief operations towards mitigating the sufferings of marooned people. Immediately after the start of the flood, the Government of Bangladesh made contingency plans to deal with the damage caused by the flood with whatever inputs were available from its own resources. In view of the aggravated flood situation reaching an alarming stage, the Government of Bangladesh on August 26, 1998 appealed to the Intentional Community for both emergency relief and rehabilitation assistance. To mitigate the sufferings of flood affected people, the Government of Bangladesh operated a massive relief operation for early relief recovery and to start immediate rehabilitation. Some of the details of this relief and rehabilitation are given in Table1:

Table 1

Distributed of Relief Goods in the 1998 Floods in Bangladesh

No.	Programme	Items of Relief	Quantity/Amount
1	Gratuitous relief	Rice	65000 M Tons
2	Gratuitous relief	Cash	Tk. 54 million
3	House building assistance	Cash	Tk. 250 million
4	Vulnerable group feeding (provided to 4 2 million families from August 1998 to April 1999)	Rice & Wheat	498,000 M Tons
5	Other relief activities and ssistance	Medicine Dry food	Provided to almost all affected people; very large quantity

Side by side with the Government of Bangladesh, the Red Crescent Society of Bangladesh and NGOs carried out emergency relief operations in flood affected areas. In total, 163 local, national, and intentional NGOs were involved in the emergency relief operations. Over 2.4 million families were provided with relief and medical facilities by the NGOs.

Long-term Rehabilitation and Reconstruction

Rehabilitation and reconstruction for short-term as well as for the longer term for sustained development requires social and environmental balance and favourable natural conditions. But national disasters causes human, material, and environmental losses and leaves behind people with a shattered mental condition. Immediate short-term help followed up by longer-term rehabilitation and reconstruction helps people to get back to their normal condition so that the people can take part in national economic activities at the individual as well as the community level to begin the process of promoting overall national development.

In the past, our planners and economists had prepared *Perspective Plans as well as Five Year Plans* for the country But almost every time, our plan targets are jeopardized by one or another natural calamity of severe magnitude. In Bangladesh there is an established Planning Commission of the Government of at the national level for designing the Five Years Plan for national development. Table 2 below presents our Five Year Plans since independence and gives an idea about our national development planning and actual implementation based on due consideration given to the impacts of disaster mitigation and prevention:

Table 2

National Development Planed Expenditures and Actual Expenditures Reduced from the Need to Respond to Natural Disasters

Plan	Years	Proposed budget (In crores of Taka)	Budget* (In crores of Taka)
First Five Year Plan	1973 - 1978	4,455	2,074
Two Year Plan	1978 - 1980	3,861	3,359
Second Five Year Plan	1980 - 1985	17,200	15,297
Third Five Year Plan	19885 - 1990	38,600	27,011
Fourth Five Year Plan	1990 - 1995	62,000	59,848
Fifth Five Year Plan	1997 - 2002	195,962	To be determined

* *Reduction due to the effects of natural disasters*

This Table is sufficient to show how our economic planning and development aimed at national development gets overturned by the occurrence of natural disasters from year to year. Our economic and physical planners are fully conscious about this reality and emphasize linking disaster mitigation and prevention with long-term national rehabilitation, and reconstruction as the pre-requisite to sustainable national development

But for example, only for the flood in 1998 which lasted for 65 days, over 31 million people were affected directly or indirectly. The flood damaged standing corps on nearly 1.4 million acres of land, effected over 10 thousand km of roads, damaged or destroyed over 4 thousand km of embankments and over 2 thousand bridges & culverts, damaged about one million houses; all besides other national and individual losses. The Ministry of Disaster Management and Relief (MDRM) under the programme known *as Test Relief and Food for Work Programme* (FWP) has allocated 100.000 M tons and 175.000 M tons of wheat for repair and reconstruction of rural infrastructure; which in turn created job opportunities for the affected people leading to their early recovery and rehabilitation. This help will continue till the end of the financial year Similarly other concerned Ministries have also undertaken massive rehabilitation programmes in their respective sectors.

Sustainable development, of which rehabilitation and reconstruction are important factors, has also been given due importance in the Perspective Plan of Bangladesh (1995 - 2010) and has been linked with environmental and ecological sustainability. This Perspective Plan recognizes revitalization of programmes like the Bangladesh Water and Flood Management Strategy (BWFMS), Flood Action Plan (FAP), National Water Management Plan (NWMP), and others. The Perspective Plan also includes the idea of extending the scope of establishing a green belt of trees along the entire coastal region, an effort which is borne out of the need for coastal flood mitigation and prevention. The Government of Bangladesh is seriously considering the option of Disaster Impact Assessment (DIA) to be a part of the initial design of all development plans, including long-term rehabilitation and reconstruction projects.

Conclusions

The entire coastal belt of Bangladesh from the Raimongal River in the west and the Teknaf in the Southeast, is exposed to the potential danger of tropical cyclones with associated storm surge: With 92.5% of the total 1.7 million sq km of this catchement area lying across the territory, the country has a vast flood plain where flooding during the South West monsoon from June to September is an annual occurrence. Living in such conditions, the Government of Bangladesh has been continuously endeavoring to find innovative solutions towards coping with the recurring sequence of natural disasters to help ensure sustainable development of the country as a whole. The Government of Bangladesh recognizes that building greater self-reliance and awareness of the people must be a cornerstone of disaster management policy and strategies for the future.

In the past, disaster management in Bangladesh had its main focus on post-disaster situations. The Government of Bangladesh, NGOs, donors, and local governments are all involved in disaster relief. The present Government has given prime importance in increasing pre-disaster programmes and in improving institutional arrangements. As a result, it has been possible to establish an elaborate disaster management system from the national level down to the union level in the country. It is hoped that the international community will come forward for closer collaboration, including resource mobilization, to help the Government of Bangladesh in its efforts for further improvement of structural and non-structural measures of disaster management and mitigation in Bangladesh.