DISASTER MITIGATION STRATEGIES IN BANGLADESH

Although the disaster cycle involves several components such as prevention, preparedness, mitigation, rescue, relief, rehabilitation, reconstruction, response, and recovery, disaster mitigation strategies fall mainly in two categories[10, 11, 12, 13]:

1. Preparedness - to provide warnings, establish contingency plans, and develop capacity for emergency response.

2. Prevention/Mitigation Measures - to reduce vulnerability and risk on a long-term and permanent basis.

Development of a comprehensive approach and an appropriate methodology for mitigating disasters in Bangladesh is a complex task because of heavy population pressure and high population density. Due to the pressing problems of overpopulation, disaster-prone areas cannot be transformed into disaster-free areas in a cost-effective way. Nor can the population boom be stopped in a reasonably distant future. Factors to consider in evolving disaster mitigation strategies in Bangladesh include how the people perceive disasters and their occurrence, how housing quality and style have evolved as a result of this perception, what disaster management strategies have been in the past and how society has evolved over the centuries in response to historical disasters.

The policy framework for disaster mitigation involves these aspects:

1. Risk assessment of the types and magnitudes of disasters that may occur.

2. Planning and decision-making on the response to these risks.

3. Implementation of the plans and decisions at field level.

These three important activities cannot operate in a vacuum. There must be a fourth aspect, i.e., the government administration which provides opportunities and constraints in planning for disaster mitigation. Effective disaster mitigation does not just happen but is achieved by hard work with governmental and non-governmental organizations striving to reduce loss of life and property caused by natural disasters.

Various governmental and non-governmental organizations are involved in disaster mitigation activities in Bangladesh. The existing disaster warning systems are as follows:

The Bangladesh Meteorological Department is responsible for normal day-to-day weather forecasting and cyclone/storm warning. Its Storm Warning Center is the focal point for these activities.

The Bangladesh Water Development Board forecasts floods and the Department of Environment tackles environmental problems.

The National Council on Disaster Management (NCDM) is responsible for policy guidance, inter-ministerial coordination, and disaster relief operations. The Ministry of Disaster Management and Relief (formerly the Ministry of Relief and Rehabilitation) coordinates relief and rehabilitation activities. A number of other governmental agencies and non-governmental organizations are also involved with disaster management and relief and rehabilitation operations.

The Bangladesh Space Research and Remote Sensing Organization has the facilities for RS-GIS (remote sensing and geographic information system) which have been used to predict and warn about the 1987 and 1988 floods and cyclones, particularly the 1991 super cyclone which had been tracked since April 23, 1991, though it hit on the night of 29-30 April 1991. RS-GIS facilities in other organizations like the Bangladesh Agricultural Research Council, Local Government Engineering Department (LGED) have also been used for rehabilitation and reconstruction activities. RS-GIS along with socioeconomic and other conventional information or data are being used as resource database for planning, monitoring, management of development activities in the country.

A few key existing disaster-related institutes are described briefly:

1. Bangladesh Meteorological Department (BMD)

BMD provides information and products on meteorological disaster monitoring and forecasts as well as scientific products used for disaster prevention and preparedness. Moreover, it issues long-range forecasts for agricultural aspects and floods. It also receives data and bulletins from other countries through the Global Telecommunication System (GTS) and satellite pictures (NOAA and GMS 4) as an aid to forecasting from the Bangladesh Space Research and Remote Sensing Organization. It has functional linkage with the Cyclone Preparedness Programme.

BMD should aim to strengthen the observational network and improve research and development activities. For effective disaster management, it could work more closely with the Bangladesh Water Development Board.

2. Bangladesh Space Research and Remote Sensing Organization (SPARRSO)

SPARRSO uses remote sensing data, performs resource surveys, monitors natural hazards (such as floods and cyclones), and creates various products such as specialized thematic maps, resource inventory maps, etc. Institutional and research facilities developed in SPARRSO are used in conducting research and studies on resource survey and mapping on agriculture, forestry, fisheries, water resources, floods, cyclones, etc. In general, SPARRSO has continuously studied and

monitored weather and natural hazards. More interaction and collaboration are needed among SPARRSO, BMD and BWDB for disaster management.

3. Bangladesh Water Development Board (BWDB)

BWDB is mainly concerned with water resources management and development, irrigation, flood control and flood forecasting. Its Flood Forecasting and Warning Center serves as the focal point for forecasting and warning of floods.

4. Department of Environment (DOE)

DOE was created in 1989 with a wider mandate when the then Department of Environment Pollution Control (DEPC), established in 1977, was upgraded. It is under the administrative control of the newly created Ministry of Environment and Forest.

DOE's major functions are to tackle the country's overall environmental issues, review the Environment Impact Assessment (EIA) of other projects and issue no-objection certificates to various projects and industries. It is the focal point for all environmental activities and their management including environmental laws, regulations, legislation, etc.

5. Disaster Management Bureau (DMB)

DMB has been established in Bangladesh under the administrative control of the Ministry of Disaster Management and Relief (MODMR), the focal point for coordinating disaster-related activities[14]. The Disaster Coordination Monitoring Unit (DCMU) under UNDP assistance has been created within the MODMR. The MODMR also acts as the secretariat of the high-powered National Council on Disaster Management (NCDM).

6. Community Groups and Non-government Organizations

Community groups, i.e., social, professional, private-voluntary, cultural, political, commercial, educational and religious groups, actively participate in disaster relief and rehabilitation activities. Disaster mitigation activities play an important role in donor assistance and NGO programs. The Red Crescent Society of Bangladesh and several NGOs are engaged in disaster preparedness, public response and mitigation work in terms of relief and rehabilitation. The Red Crescent Society of Bangladesh and GOB jointly carry out cyclone protection measures through the Cyclone Preparedness Programme with the help of its vast communication network down to the field level and 27,000 volunteers in the coastal areas. These non-conventional organizations forged their all out endeavors to launch massive programs during the post-disaster period.

It should be mentioned that interactions among government organizations (GO), non-government organizations (NGO), people's organizations (PO), donor agencies and communities are important for disaster management, socioeconomic enhancement and improvement in the quality of life of the people.

The disaster mitigation projects undertaken by the Bangladesh Water Development Board and other agencies in the early 1960s and 1970s lacked three important components:

1. Involvement and participation of local people in the design and implementation of the project

2. Environment impact assessment (EIA)

3. Clear statement of the project's negative points and aftereffects instead of highlighting only the good points/benefits.

Lack of consideration of these points resulted in manifold problems for many projects. Some projects are now showing negative effects such as the Right Bank Embankment of the Brahmaputra River (water logging and drainage problems and delay in discharge of monsoon water cause delay in Aman paddy plantation producing less yield) and the Beel Dakatia project (water logging and siltation). The Water Development Board is now trying to rectify these problems.

Plantation in the coastal areas of Bangladesh

DISASTER MANAGEMENT CODES IN BANGLADESH

The Government of Bangladesh has no laws specifically designed for disaster management. However, there are Standing Order for Flood (1984), Standing Order for Cyclone (1985), Drought Code (1980) and Famine Manual (1967). These need updating and incorporating of modern ideas, technology and other related issues.

Salient features of these Disaster Codes and Standing Orders are described briefly[9]:

FLOOD CODE

It covers instructions for 32 ministries and their subordinate agencies. Only some of the tasks laid down for some of the ministries/agencies are reported here.

The Relief and Rehabilitation Division (at present, Ministry of Disaster Management and Relief) will inter alia perform the following tasks:

a. Establish a control room in the relief and rehabilitation division with a wireless system network with the division, district and *thana* (sub-district) headquarters.

b. Inform the Central Coordination Committee of all relief operations.

c. Convene the meeting of representatives of voluntary organizations and other agencies concerned for mobilization and coordination of relief efforts by voluntary organizations/agencies.

d. Prepare maps showing the latest flood situations in the Relief Control Room.

e. Mobilize available relief stock in flood-prone areas.

f. Conduct detailed survey of the damage.

g. Continue all relief and rehabilitation efforts until the situation returns to normal.

The Water Development Board will:

a. Establish and run the Flood Information Centre from 1 May to 30 September.
b. Issue daily flood information report to all concerned including the following:

    - President's Secretariat (at present, the Prime Minister's Office)
    - Relief and Rehabilitation Division (at present, Ministry of Disaster Management and Relief)
    - Director General (Television and Radio)
    - Secretary, Agriculture Division
    - Secretary, Irrigation and Flood Control Division
    - All Deputy Commissioners.

c. Mobilize all technical personnel and material resources to repair any damage, dislocation of installation, supply sources, etc.

The Ministry of Health, Population Control and Family Planning among other things will:

a. Organize stand-by medical teams with necessary medicines, vaccines, instruments and equipment.

b. Arrange mobile and temporary small-scale hospitals.

c. Start mass inoculation and vaccination against cholera and typhoid.

d. Deal effectively with any epidemic that may occur in the area.

CYCLONE CODE

The Standing Order for Cyclone was issued by the Ministry of Relief and Rehabilitation in November 1985. A total of 225 tasks have been assigned to 29 ministries/agencies/administrations. A few of the tasks of some of the ministries/divisions are reported here.

The Bangladesh Meteorological Directorate will:

a. Issue warning message for each of the following stages at the specified time:

    - Warning: 24 hours in advance
    - Danger: at least 18 hours in advance
    - Great danger: at least 10 hours in advance.

b. Include the following information in the warning message:

    - Position of storm center
    - Direction and rate of movement
    - Area likely to be affected
    - Approximate time of commencement of gale wind
    - Maximum wind speed expected
    - Expected height of storm surge.

c. Issue warning messages to Radio Bangladesh for broadcast from all radio stations and to Bangladesh Television for telecast from all television stations.

The Director General of Relief and Rehabilitation will:

a. Identify cyclone-prone areas and estimate the population likely to be affected.

b. Ensure complete mobilization of relief goods.

c. Provide assistance to local administration in evacuation and rescue operations.

d. Continue all relief and rehabilitation efforts until the situation returns to normal.

The Cyclone Preparedness Programme will:

a. Organize preparedness programs in cyclone-prone areas on a continuing basis.

b. Create awareness among the people about the Cyclone Preparedness Programme and various types of warning signals and popularize preparedness measures through meetings, discussions, posters, leaflets and film shows.

c. Transmit special weather bulletins to all *thana* field offices.

d. Use siren, megaphone, signal light and signal flares to give final warning to the people.

e. Advise volunteers to help people in taking shelters when an evacuation order is given.

f. Assist the local administration in the distribution of relief goods and in rehabilitation efforts.

DROUGHT CODE

In 1980, a drought management policy and program was formulated at the national level with the Secretary of the Ministry of Agriculture and Forest at the helm. The duties and responsibilities of different tiers, i.e., from the union level to *thana* level then to district and national levels, were laid down. The drought management is formulated as follows:

a. The Union Council is responsible for primary information on drought, warning, precautions, etc., and for apprising the *thana* administration.

b. The *thana* administration assesses the drought situation, mobilizes all resources to fight the drought, and apprises the district authority.

c. In the district level, the Deputy Commissioner convenes the meeting of the district authority to tackle the situation. He takes appropriate steps to fight the drought through the organizational tier stated above. He also apprises the government of the situation in national level for meeting all emergency needs.

d. The Secretary of Agriculture and Forests takes all steps at the national level related to agricultural production.

FAMINE CODE

The famine and relief code was first published in 1888. The code was subsequently updated and its latest edition was circulated in 1967. The code specifies duties and responsibilities of the government, district administration and village administration in case of a famine due to flood, cyclone or drought. There are 120 rules on the preparations for a famine and relief operations during a famine.

Bangladesh has an established and experienced disaster management system, both formal and informal. Improvements are needed in[15]:

a. Inter-agency cooperation and coordination;

b. Timely provision of hydrological and rainfall data from India for flood forecasting;

c. Allocation of adequate funds for preventive maintenance of water control, road and railway structures and for stockpiling of materials and equipment for use in emergencies;

d. Procedures for managing emergencies on water control projects, especially for flood fighting and evacuation;

e. Flood-proofing of domestic water supplies;

f. Provision of adequate flood and cyclone shelters in remote areas; and

g. Organizing flood volunteers and imparting training to them as in the case of cyclone volunteers.

LESSONS LEARNT FROM PAST DISASTERS

The dilemma of structural and nonstructural policy interventions has created a great impact on flood mitigation strategies. Even in advanced countries like the USA and Japan, recent floods have caused havoc in terms of extensive damage to physical property and infrastructure facilities in spite of adequate flood protection measures. But human casualties were fewer compared to similar disasters in developing countries which lack adequate flood protection measures. As such, a combination of structural and nonstructural methods must be undertaken, as appropriate, depending on country-specific situations.

The extent of damage caused by floods is catastrophic (more than US$15 billion in the 1993 Mississippi flood). Sometimes the value of destroyed assets in any one event is greater than the annual budget earmarked for socioeconomic development of that country. The net effects are retardation of development and rebuilding of infrastructure facilities -- which needs huge resources. This is happening in a vicious cycle, resulting in greater poverty and misery of the people.

To illustrate, the experiences of Bangladesh which has a very weak economy (GDP of US$19.6 billion at factor cost of 1990-91) are cited. In the 1970 cyclone, it was estimated that between 300,000 to 500,000 people were killed. Total loss of property amounted to about US$1 billion. The damage due to the 1988 flood was estimated at US$2.4 billion and that due to the 1991 cyclone at US$1.4 billion (with a death toll of 138,000). It is further estimated that the total loss of physical property in Bangladesh due to disasters from 1947 to 1991 is about US$25 billion and that about 5% of national wealth is destroyed every year by disasters in Bangladesh[16].

About a million human lives were claimed by disasters, which is partly due to the high population density. Unquantifiable ecological and environmental degradation were caused by natural disasters in the country.

Other factors of importance in disaster management in Bangladesh are extreme poverty of the people, poor housing structure and haphazard and clustered settlement pattern, inadequate recovery and response strategy for onslaught of disasters, weak industrial base, maximum dependence on agricultural practices, insufficient transport, communication and other infrastructure facilities.

In addition, newly emerged islands which are fertile and productive but not yet fit for human habitation are already inhabited by people. These people are more vulnerable to disasters, particularly cyclonic storms. These

newly accreted islands should be consolidated and stabilized through both natural and artificial techniques like massive afforestation and cross-dams techniques, etc. Until stabilized, these islands should not be inhabited by people. Alternate income-generating projects (e.g., cottage industries, handicrafts, agro-fisheries, tree plantation) may be initiated in phases at non-vulnerable areas so that people could avoid living in the vulnerable and hazardous regions, particularly in the newly emerged islands and highly flood-prone areas. This needs long-term strategic planning that takes into account the population dynamics and availability of potential job opportunities in the country. However, this is a gigantic task for a country like Bangladesh with a weak economic base. International cooperation and massive financial support from donor agencies both on bilateral and multilateral bases will be needed.

Experiences and lessons learnt from disasters are manifold. The most important is the realization of the need for the participation of the people and the involvement of community-based organizations. In Bangladesh there are about 27,000 volunteers in the coastal belt who render valuable services during cyclones. People's participation and helpful attitude to one another during floods have been noticed, particularly in the 1987 and 1988 floods. This concept and the working mechanism need to be strengthened and reinforced throughout the country for future disasters. In addition, unquantifiable environmental degradation and ecological imbalances occurred during a disaster. This needs an extensive and in-depth study immediately after the disaster.

It is also felt that concerted national efforts as well as international cooperation are required for development and implementation of the disaster-mitigation techniques and their associated activities. Major sectors/topics to be investigated and developed are coastal embankments and related structures, bridges, culverts and roads, cyclone shelters, industry and environment, telecommunications, power systems, housing and building, water supply and sanitation, energy, ports and navigation, etc. An integrated approach is needed to attain environmentally sound and sustainable development. It should take into account the effects of disasters in the development process itself and provide strategies for response and quick recovery.

Believing in the philosophy "Live with disasters", the following should be done for disaster mitigation:

- Improving forecasting and monitoring techniques.
- Identifying high-risk regions and disseminating information to the general public.
- Increasing awareness about disasters of policy-makers and general population through the mass media.
- Developing preventive measures on short-term and long-term bases including structural and nonstructural methods.