

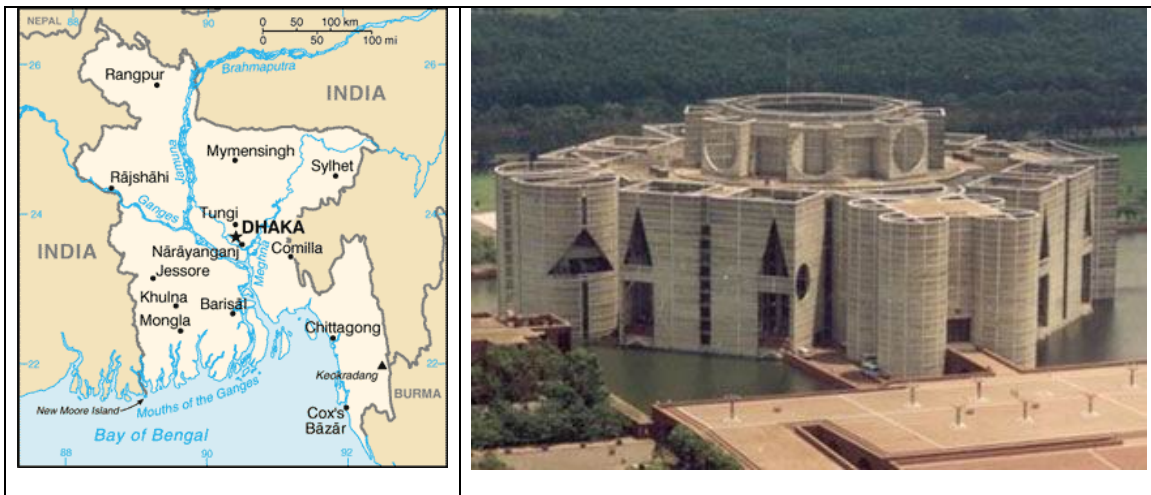
Dhaka, Bangladesh Disaster Risk Management Profile

Last Update July, 2006

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Dhaka, Bangladesh

Disaster Risk Management Profile



1 INTRODUCTION

Demographic, economic, social and cultural characteristics

Bangladesh is a unitary, independent and sovereign Republic known as the People's Republic of Bangladesh. Bangladesh emerged as an independent country on March 26, 1971. The war of liberation ended on 16 December 1971 with the victory of Bangladesh forces and the surrender of the occupying Pakistani Army. The area was under Muslim rule for five and a half centuries and passed into British rule in 1757 AD. During the British rule it was a part of the British Indian province of Bengal and Assam. In August 1947 it gained independence from British rule along with the rest of India and formed part of Pakistan known as East Pakistan until it became independent.¹

The country is an alluvial deltaic plain divided into three zones, namely hills, terraces, and flood plains. The country has an approximate area of 147,570 sq km bounded between India and Burma and bordering the Bay of Bengal. It has a unique geographical location on the lower part of the basins of three powerful rivers, the Padma, Brahmaputra, and Meghna.

The total population of Bangladesh presently (August 2005) is 144 million, about 98% of who are ethnic Bengali and speak Bangla, and are called Bangladeshis. Urdu-speaking, non-Bengali Muslims of Indian origin, and various tribal groups, mostly in the Chittagong Hill Tracts, comprise the remainder. Most Bangladeshis (about 88.3%) are Muslims, but Hindus constitute a sizable (10.5%) minority. There also are a small number of Buddhists, Christians, and animists. English is spoken in urban areas and among the educated.² Bangladesh has a rich historical and cultural past, combining Dravidian, Indo-Aryan, Mongol/Mughul, Arab, Persian, Turkic, and Western European cultures.

Bangladesh's economy depends predominantly on agriculture, which has a strong linkage with seasonal weather systems. Many people are landless and are forced to live on and cultivate flood-prone land. Despite growth being a steady 5% for the past several years, Bangladesh remains poor and overpopulated. Even though half of the national GDP is generated through the service sector, nearly two-thirds of Bangladeshis are employed in the agriculture sector, with rice as the single-most-important product. Major impediments to growth include frequent cyclones and floods, inadequate port facilities, and a rapidly growing labor force that cannot be absorbed by agriculture.

Governance style

The President, while chief of state, holds a largely ceremonial post; the real power is held by the Prime Minister, who is the head of government. The President is elected by the legislature (Parliament) every five years. The President's limited powers are substantially expanded during the tenure of the caretaker government. Under the 13th Amendment of the Constitution, which Parliament passed in March 1996, a caretaker government assumes power temporarily to oversee general elections after dissolution of the Parliament. In the caretaker government, the President has control over the Ministry of Defense, the authority to declare a state of emergency, and the power to dismiss the Chief Adviser and other members of the caretaker government. Once elections have been held and a new government and Parliament are in place, the President's powers and position revert to their largely ceremonial level.

The Prime Minister is appointed by the President and must be a Member of Parliament (MP) whom the President feels commands the confidence of the majority of other MPs. The cabinet is composed of ministers selected by the Prime Minister and appointed by the President. At least 90% of the ministers must be MPs. The other 10% may be non-MP experts or "technocrats" who are not otherwise disqualified from being elected MPs. According to the constitution, the President can dissolve Parliament upon the written request of the Prime Minister.

The legislature is a unicameral, 300-seat body. All of its members are elected by universal suffrage at least every five years. Parliament amended the constitution in May 2004, making a provision for adding 45 seats reserved for women and to be distributed among political parties in proportion to their numerical strength in Parliament. The next general election is scheduled to take place no later than January 2007.

Bangladesh's judiciary is a civil court system based on the British model where the highest court of appeal is the Appellate Bench of the Supreme Court. On the local government level, the country is divided into divisions, districts, subdistricts, unions, and villages. Local officials are elected at the union level and selected at the village level. All larger administrative units are run by members of the civil service.³

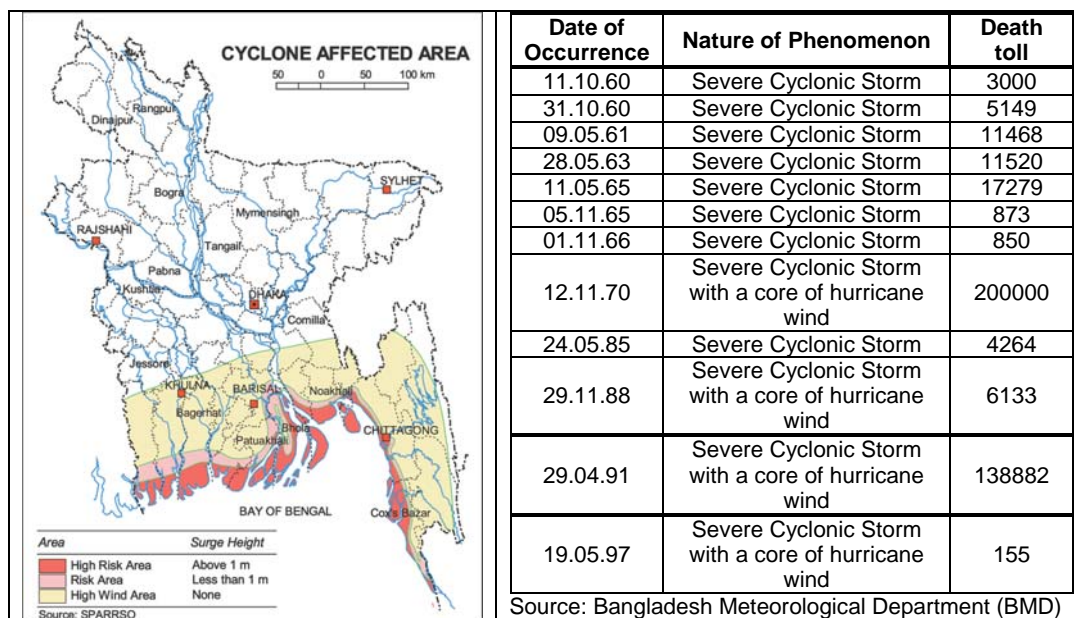
National hazardscape

Cyclones and floods pose the greatest risk to Bangladesh on a national level. Sub nationally, the northern and eastern regions of the country are susceptible to earthquakes while the southeast is particularly vulnerable to cyclones, floods, droughts, and earthquake. Bangladesh is also vulnerable to other natural and man-made hazards, such as river bank erosion, tornadoes, tsunami, high arsenic

contents in ground water, water logging, water and soil salinity, etc. Bangladesh is also at a great risk from global climate change impacts because of its low elevation and exposure to various climate related hazards. Although the magnitude of these changes may appear to be small, they could substantially increase the frequency and intensity of existing climatic events, such as floods, droughts, cyclones etc.

Cyclone and storm surge

The Bay of Bengal is the breeding ground for tropical cyclones and Bangladesh is the worst victim in terms of fatalities and economic losses incurred. The global distribution of cyclones shows that only 1% of all the cyclones that form every year strike Bangladesh, but, unfortunately, the fatalities they cause are 53% of the whole world total.⁴ The following table lists a few of the devastating cyclones that have affected Bangladesh.

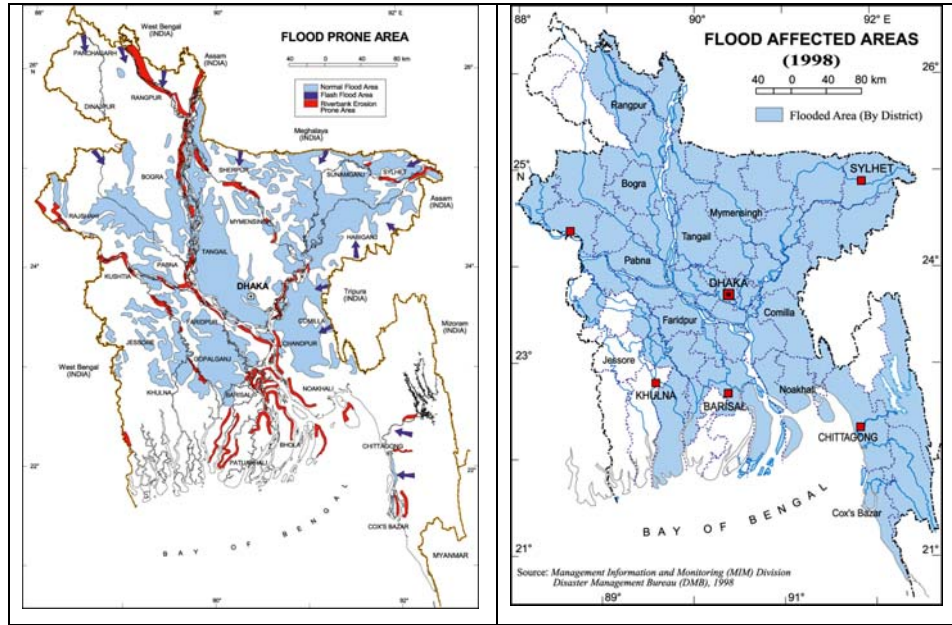


Flood

Bangladesh is a low land country. Most of it is located within the flood plains of three great rivers, which is the Ganges, the Brahmaputra, and the Meghna, their tributaries, and distributaries. The river systems drain a total area of about 1.72 million square kilometers in India, China, Nepal, Bhutan, and Bangladesh. Only 8% of this area lies within Bangladesh. As a result, huge inflows of water, which Bangladesh has no control, enter the country. The lack of control is a critical problem because Bangladesh has an agrarian economy dependent on water. At different times and in an unpredictable manner it has too much or too little water. The intricate network of alluvial rivers carries a huge annual discharge and sediment load, causing channel shifting and bank erosion. Withdrawals in upstream areas seriously affect socioeconomic growth, the environment, and the ecology. The habitat of fish, which is a major source of protein for the rural poor, is under threat from the increasing conversion of land to agricultural use. Inland navigation is hindered by blockages in the river delta. Meanwhile, the need for pure water is increasing along with the salinization of the coastal belt and the degradation of ecosystems.

As an example of the above described situation, during the July 2004 event, the Megna River peaked, and Jamuna and Padma Rivers burst their banks. As a result, 36 million

people, 25% of the total population, was affected, and 38% of the whole area of the country was flooded for nearly 55 days. To further complicate the scenario, in September of the same year, monsoon rains three times larger than normal flooded new areas.⁵



The flood of 1988 during August-September inundated an area of 89,000 sq km of 52 districts of the country and caused a loss of 1,517 human lives. The 1998 flood in Bangladesh with an unprecedented duration of 65 days inundated 53 districts, covering about 100,000 sq km, and took the lives of 918 people. Beside this, the severe floods of 1822, 1854, 1922, 1955, 1966, 1974, 1987, and 2002 are worth mentioning.⁶

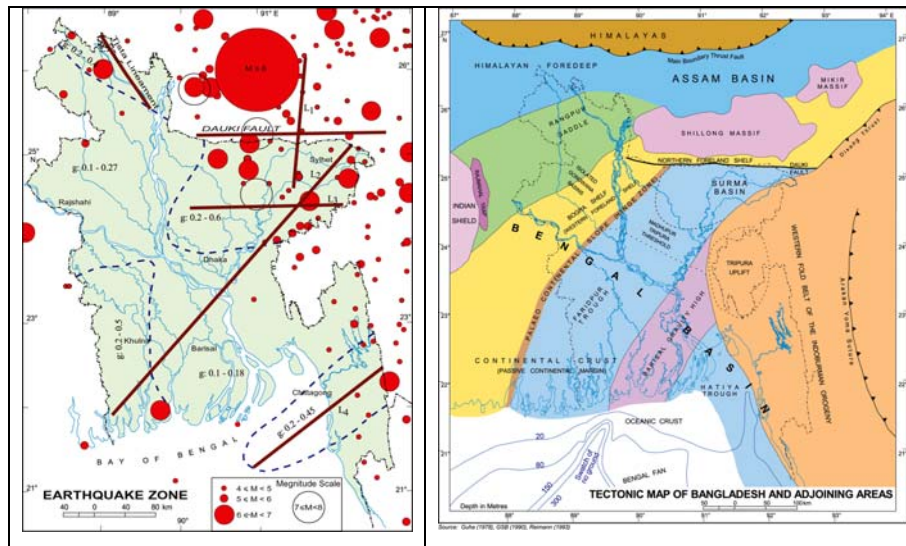
Earthquake

List of Major Earthquakes Affecting Bangladesh

Date	Name of Earthquake	Magnitude (Richter)	Intensity at Dhaka (EMS)	Epicentral Distance from Dhaka (km)
10 January, 1869	Cachar Earthquake	7.5	V	250
14 July, 1885	Bengal Earthquake	7.0	VII	170
12 June, 1897	Great Indian Earthquake	8.7*	VIII+	230
8 July, 1918	Srimongal Earthquake	7.6	VI	150
2 July, 1930	Dhubri Earthquake	7.1	V+	250
15 January, 1934	Bihar-Nepal Earthquake	8.3	IV	510
15 August, 1950	Assam Earthquake	8.5	IV	780

Bangladesh lies in the Burma basin, which was formed by the continent-continent collision of India to the north, and subduction of ocean crust beneath the Burma continental crust to the east. Bangladesh is surrounded by regions of high seismicity, which include the Himalayan Arc and Shillong Plateau in the north, the Burmese Arc, Arakan Yoma anticlinorium in the east, and complex Naga-

Disang-Haflong thrust zone in the northeast.⁷



The country has a long history of seismic activity related to its proximity to the Himalayas. Three great earthquakes of magnitudes exceeding 8 were felt in 1897, 1934, and 1950, and another four earthquakes exceeding magnitude 7 were felt between 1869 and 1950. Major seismic sources are the Meghalaya (8.0), Tripura (7.0), Sub-Dauki (7.3), and Bogra (7.0), all of them with associated earthquakes of expected magnitudes higher or equal to 7.0.⁸

National disaster management structure and relevant legislation

Administrative system

Ministry of Food and Disaster Management (MoFDM) is the national focal point for disaster management in Bangladesh. It manages disasters through its three agencies: Disaster Management Bureau (DMB), Directorate of Relief and Rehabilitation (DRR), and Directorate General of Food. It is assisted by other government agencies, such as Fire Services and Civil Defense Department, Disaster Emergency Centre of Armed Forces Division, Bangladesh Meteorological Department (BMD), Flood Forecasting and Warning Center (FFWC), Bangladesh Police, Rapid Action Battalion (RAB), Cyclone Preparedness Programme (CPP), etc. It has technical and scientific partnership with Space Research and Remote Sensing Organization (SPARSO), Geological Survey of Bangladesh, Centre for Environmental and Geological Information System (CEGIS), Water Resources Planning Organization (WARPO), Institute of Water Modeling (IWM), Bangladesh University of Engineering and Technology (BUET), etc. At the field level, the Office of the Deputy Commissioner at the district level, the Office of the Upazila Nirbahi Officer at the Sub-district level, and the Union Parishad at the lowest level of the administration play crucial roles in disaster management.

Structure of disaster management

Bangladesh has an elaborate system of disaster management. A series of inter-related institutions, at both national and sub-national levels have been created to ensure effective planning and coordination of disaster management and emergency response events.

Organizational structure at the national level

i. National Disaster Management Council (NDMC): It is headed by the Hon'ble Prime Minister to formulate and review the disaster management policies and issue directives to all concerns.

ii. Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC): It is headed by the Hon'ble Minister in charge of the Ministry of Food and Disaster Management (MoFDM) to implement disaster management policies and decisions of NDMC / Government.

iii. National Disaster Management Advisory Committee (NDMAC): It is to be headed by an experienced person having been nominated by the Hon'ble Prime Minister.

iv. Cyclone Preparedness Program Implementation Board (CPPIB): It is headed by the Secretary, Ministry of Food, and Disaster Management to review the preparedness activities in the face of initial stage of an impending cyclone.

v. Disaster Management Training and Public Awareness Building Task Force (DMTATF): It is headed by the Director General of Disaster Management Bureau (DMB) to coordinate the disaster related training and public awareness activities of the Government, NGOs, and other organizations.

vi. Focal Point Operation Coordination Group of Disaster Management (FPOCG): It is headed by the Director General of DMB to review and coordinate the activities of various departments and agencies related to disaster management and also to review the Contingency Plan prepared by concerned departments.

vii. NGO Coordination Committee on Disaster Management (NGOCC): It is headed by the Director General of DMB to review and coordinate the activities of concerned NGOs in the country.

viii. Committee for Speedy Dissemination of Disaster Related Warning/ Signals (CSDDWS): It is headed by the Director General of DMB to examine, ensure, and determine the ways and means for the speedy dissemination of warning signals among the people.

Organizational structure at sub-national levels

i. District Disaster Management Committee (DDMC): It is headed by the Deputy Commissioner (DC) to coordinate and review the disaster management activities at the district level.

ii. Upazila Disaster Management Committee (UZDMC): It is headed by the Upazila Nirbahi Officer (UNO) to coordinate and review the disaster management activities at the Upazila level.

iii. Union Disaster Management Committee (UDMC): It is headed by the Chairman of the Union Parishad to coordinate, review, and implement the disaster management activities of the concerned union.

iv. Pourashava Disaster Management Committee (PDMC): It is headed by Chairman of Pourashava (municipality) to coordinate, review, and implement the disaster management activities within its area of jurisdiction.

v. City Corporation Disaster Management Committee (CCDMC): It is headed by the Mayor of City Corporations to coordinate, review, and implement the disaster management activities within its area of jurisdiction.

Legal system

While Allocation of Business of the Rules of Business of the Government assigns roles and responsibilities to various ministries of the government, the Standing Order on Disasters (SOD) assigns roles and responsibilities to relevant government agencies as well as to Disaster Management Committees (DMCs) at all levels. The enactment of a disaster management law is currently in progress.

The SOD provides detailed roles and responsibilities of all disaster management committees, relevant ministries, divisions, departments, and agencies at all levels for normal period risk reduction and during emergency response periods.

Priority on disaster risk management

The government acknowledges the need for disaster risk reduction as opposed to the earlier concepts of responding after a disaster, as a necessary and cost-effective approach. Thus priority has been to focus on community level preparedness, response, recovery, and rehabilitation. Programs to train people living in disaster prone areas for improving their capability to cope with natural disasters will be highlighted.

Bangladesh has created a simplistic model to guide the design of disaster management programs, including development or review of policy and training course material. The model has three key elements and ensures that the move to a more comprehensive risk reduction culture remains central to all efforts.

(1) Defining the risk environment – This element of the model promotes the use of scientific analysis (including climate change impacts) as the basis for accurately determining the future risk environment related to all hazards, all sectors, and all geographical areas. Bangladesh has adopted the process outlined in the International Risk Management Standard AS/NZS: 4360-1999 to guide all community risk assessments.

(2) Managing the risk environment – Promotes the design of risk reduction strategies (Community Based Adaptation Programmes) as an outcome of the risk assessment process. This ensures Prevention, Preparedness, Response, and Recovery programs are multi hazard focused and they move from being hazard generic in nature to risk specific. This will enable communities to better understand their changing risk environment and thus become more resilient through proactive risk reduction efforts.

(3) Responding to the threat environment – This involves responding to an actual threat situation. It helps Bangladesh disaster management officials to clearly articulate the difference between risk reduction and emergency response and how accurately defining risk environments can influence and enhance emergency response systems and decisions.

Disaster Management Plan

The MoFDM Corporate Plan: Framework for Action 2005 – 2009. This document sets out the priorities and broad strategies for achieving reform within the disaster management sector and ensures that there are strong linkages with the priorities of the government in respect to the achievement of goals associated with national (PRSP) and international drivers such as the MDGs, WCDR, and ISDR. Each of the three operational agencies (Disaster Management Bureau, Directorate of Relief and Rehabilitation, Directorate General of Food) of the Ministry have prepared 2-3 year Strategic Plans based on the Corporate Plan and an Operations Plan detailing the priorities for each twelve month period. These plans are used to assist the MoFDM and its agencies to formulate collaborative partnerships, particularly with NGOs, for sustainable delivery of services relative to each strategy.

This is an administrative document. It is expected to get legal coverage under the draft disaster management act.

The Plan recognizes that there are many interdependent elements that make up an effective disaster management system. These elements are listed below as six strategic focus areas. The critical factor is for each of these focus areas to be viewed as being individual inputs to a bigger picture with the outputs of one or more elements, being inputs to other focus area programs.

- Focus Area 1: Professionalizing the disaster management system
- Focus Area 2: Mainstreaming of risk management programming (partnership development)
- Focus Area 3: Strengthening of community institutional mechanisms (community empowerment)
- Focus Area 4: Expanding Risk Reduction programming across a broader range of hazards.
- Focus Area 5: Strengthening emergency response systems
- Focus Area 6: Maintaining and strengthening the national food security system - with a focus on ensuring access to sustainable food supplies.

Projects on disaster reduction headed by MoFDM

- (1) Comprehensive Disaster Management Programme (CDMP)
- (2) Risk Reduction Program
- (3) Construction of Multi Purpose Disaster Shelters
- (4) Strengthening the emergency response system through enhancing search and rescue capability (Procurement of equipment)
- (5) Food policy capacity strengthening program

National land use management system and relevant legislation

After the emergence of Bangladesh as a sovereign state in 1971, the Revenue Department of the provincial government of East Pakistan was reconstituted into Land Administration and Land Reforms Division under the Ministry of Law and Land Reforms, which was concerned mainly with policy decisions.

The Ministry of Law and Land Reforms was renamed as the Ministry of Land in early 1987. The newly designated ministry focused on policymaking, supervision, and monitoring of land reforms.

A separate body, namely, the Land Reforms Board, was set up at the national level under the Land Reforms Board Act 1989 (Act XXIII of 1989). Under Section 5 of the Land Reforms Board Act 1989, the board may perform such functions and discharge such duties in respect of land reforms and land management as the government may entrust to it. The board may also exercise such power and perform such duties as may be entrusted to it by or under any law.

The primary function of the board is to supervise the functioning of the field offices and the implementation of land reforms measures. This involves supervision of land administration offices down to the union land office, settlement of agricultural *khas* land to the landless peasants, assessment of land development tax, management of Court of Wards, creation of new union land offices, establishment of record rooms at the district and upazila levels, their supervision and inspection, and preparation of development. Plans for matters relating to land management, their implementation and supervision, and matters relating to the board's establishment, record room, and library are some of the functions entrusted by the Ministry of Land to the Land Reforms Board.

It is the responsibility of the Directorate of Land Records and Surveys under the Ministry of Land to prepare and publish maps and update record of rights. The director general, Land Records and Surveys, with the assistance of a number of directors, deputy directors, assistant directors, settlement officers, assistant settlement officers, and a large number of trained and technical staff, obtains the maps and records prepared and revised under the provisions of the EAST BENGAL STATE ACQUISITION AND TENANCY ACT 1950, and hands them over to the collectors (deputy commissioners). The collectors maintain them and keep them corrected by incorporating the changes due to transfer, inheritance, or otherwise.⁹

Integration of disaster risk management in development programs

Development planning in Bangladesh, where vulnerability to natural and environmental hazards must be taken into account, has addressed risk reduction into some sectoral plans. For example, extensive river flooding causes disruption and damage to infrastructure, agriculture, and livelihood. The National Water Management Plan underlines the importance of implementing effective non-structural measures to reduce the impact of floods and erosion. Recent policies and plans have recognized the importance of participatory planning that focuses on sustaining people's livelihood. Drought induced famine, global warming, cyclonic storms, and other hazards have required Government to factor in strategic planning into the national development cycle. The National Environment Management Action Plan (NEMAP) takes into account the disaster management and risk reduction as a

vital component and need. The Integrated Coastal Zone Management (ICZM) program has built-in components to address risk reduction. However, there remains a need to create a holistic and comprehensive risk reduction culture within national policies and strategies for disaster risk reduction. The Ministry of Food and Disaster Management's Comprehensive Disaster Management Program will begin to develop and strengthen human and institutional capacities, increase public participation in risk reduction activities, and educate policy makers to achieve a wider acceptance of disaster risk reduction concepts to address national and human development problems.

Disaster risk reduction has been incorporated into the Interim Poverty Reduction Strategy Paper (I-PRSP) as Annex 9 Disaster Vulnerability and Risk Management. The Government strategy acknowledges that disaster management would involve the management of both risks and consequences of disasters that would include prevention, emergency response, and post-disaster recovery. It is expected that the final PRSP, known as Medium-Term Macro-Economic Framework (MTMF), will dwell at length on these issues and devise a plan of action. The risk reduction approach has not yet reached the point of becoming mainstreamed in the development process. The National Environment Management Action Plan (NEMAP) formulation process has, however, encompassed disaster risk reduction. The National Adaptation Plan of Action (NAPA) is in the process of development by representatives of the scientific community under the leadership of the Ministry of Environment and Forest. Bangladesh is represented at the United Nations Framework Convention on Climate Change forums.

The NAPA will focus attention on three impacts associated with climate change: increasing sea-level rise, changing rainfall patterns, and increases in the frequency and intensity of extreme events. In the World Summit on Sustainable Development the Bangladesh delegation, lead by the Minister of Finance and Planning, called for greater support from developed nations to address critical issues hindering the economic and social development of the less developed nations.¹⁰

Significance of the city to the nation

Dhaka is the largest city in Bangladesh and enjoys distinct primacy in the national urban hierarchy. Administrative headquarters and civil employments, financial and banking services, international commerce, and business except port functions, are all largely concentrated in Dhaka. Educational, cultural, and research activities are also concentrated in the capital area. A disproportionately large concentration of industrial and various public sector investments have been made in the area. In spite of the declared governmental policy of decentralized administrative and economic development introduced in the 1980s, the actual development in the huge export oriented ready-made garments industries sector during the eighties shows an overwhelming concentration in Dhaka City. More than 80 percent of the garment industries of the country are located here. In case of several other large industrial sectors, Dhaka has more than 80 percent of the national enterprises. The dominance of Dhaka is even more overwhelming in several of the smaller manufacturing activities, such as rubber produces in which Dhaka contributes nearly 100 percent of the total jobs, furniture (97 percent), publishing (96 percent), footwear (84 percent), leather goods (82 percent) and electrical machinery (72 percent).

The unique position of being at once the oldest, historically largest, most centrally located, as well as the capital city, Dhaka has the finest linkages with its immediate rural hinterland and the rest of the country. It attracts migrants from all around the country. In addition to being a permanent destination of migrants, Dhaka also attracts hundreds and thousands of daily commuters and circular migrants from the neighboring rural districts.¹¹

The following information taken from Dhaka City Corporation website (www.dhakacity.org) provides a very good summary of key characteristics of the city:

Latitude - 23 43' N
Longitude -90 24' E

Climate : Tropical with heavy rain and bright sunshine in the monsoon and warm for the greater part of the year. The winter months, from November to March are however, most likeable, cool and pleasant.

Temperature :		Max.	Min.
	Summer	6.7 c	3 21.1 c
	Winter	31.7 c	10.5 c
Rainfall :	2540 mm annually		
Humidity :	80 per cent (approx)		
Type of Clothing :	Tropical in summer and light woolen in winter.		
Language :	Bangla, English is widely spoken and understood.		
Area :	Metropolitan City - 360 sq. km		
Population :	9.3 million - Metropolitan Area. 6.0 million - Dhaka City Corporation.		
Growth of Population :	6% per year.		
Working force :	50% of the population aged 10 year and above are in gain full employment		
Informal Activities :	21%		
Household Work :	28%		
Other Service :	25%		
Unemployed :	23%		
Garment Workers and Household Work (Women)	0.8% million.		
Per Capita Income :	US\$ 550		
Literacy Rate :	63.2%		

Geographical setting of the City

Dhaka is situated between latitudes 23°42' and 23°54'N and longitudes 90°20' and 90°28'E. The city is bounded by the rivers Buriganga to the south, Turag to the west, Balu to the east, and Tongi Khal to the north. The city has three distinct seasons: winter (November-February), dry with temperatures ranging from 10° to 20°C; the pre-monsoon season (March-May), with some rain and hot temperature reaching up to 40°C; and the monsoon (June-October), which is very wet with temperatures around 30°C. Dhaka experiences about 2,000 mm of rain annually, of which about 80% falls during the monsoon.

Urbanization in Dhaka is restricted mostly to the north bank of the river Buriganga. The four-hundred-year history of Dhaka city can be divided into five different stages of development: Pre-Mughal period, Mughal period, British period, Pakistan period, and Bangladesh period.

Rapid urbanization without considering the geological aspects has brought significant changes in the geo-environment of the city area. Water logging, pollution, changes in the hydrogeological system, localized land subsidence, and building collapse are the hazards associated with these changes in the geo-environment. Groundwater withdrawal has increased more than 90% over the last 30 years resulting in groundwater mining and lowering of the water level by 20 m. Water resources of the city are being polluted by the indiscriminate disposal of untreated industrial and municipal wastes in swamps and natural channels in and around the city.

Dhaka is situated on the southern tip of a Pleistocene terrace, the Madhupur Tract. Two characteristic geological units cover the city and surrounding areas; the Madhupur Clay of the Pleistocene age and alluvial deposits of recent age. The Madhupur Clay is the oldest sediment exposed in and around the city area having characteristic topography and drainage. The major geomorphic units of the city are: the high land or the Dhaka terrace, the low lands or floodplains, depressions, and abandoned channels. Low lying swamps and marshes located in and around the city are other major topographic features.

The subsurface sedimentary sequence, up to the explored depth of 300 m, shows three distinct entities: one is the Madhupur Clay of the Pleistocene age, characterized by reddish plastic clay with silt and very fine sand particles. This Madhupur Clay unconformably overlies the Dupi Tila Formation of the Plio-Pleistocene age, which is composed of medium to coarse yellowish brown sand and occasional gravel. The incised channels and depressions within the city are floored by recent alluvial floodplain deposits and are further subdivided into Lowland Alluvium and Highland Alluvium.

The Dhaka city area does not show any surface folding. However, a large number of faults and lineaments strike N-S and E-W. Aerial photography interpretation and the nature of the stream courses recognize NE-SW and NW-SE trends. All four sides of the city are bounded by major faults.

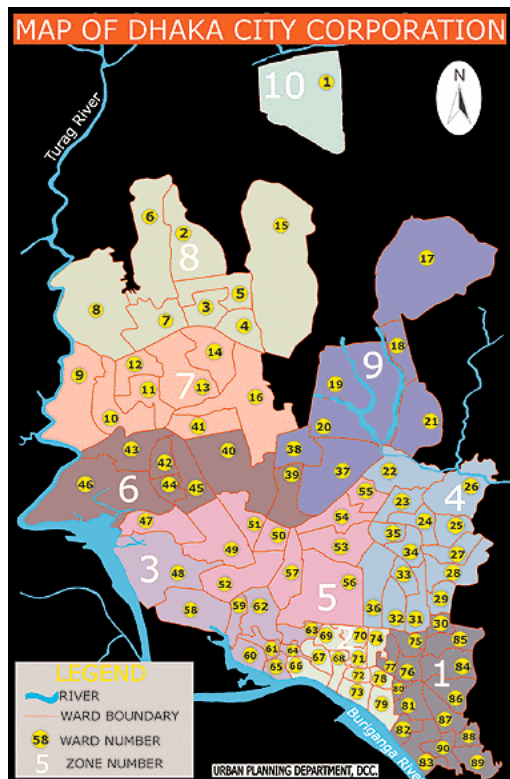
Geotechnical Characteristics of the Madhupur Clay in Dhaka city and its surroundings vary significantly both aerially and vertically. The evaluated parameters, particularly its low strength and high compressibility values indicate that the clay, to

some extent, is problematic for engineering construction. The moisture content and plastic limit results show that Madhupur Clay is normally consolidated to over-consolidate. The clay is normal to active and has intermediate to high plasticity. The compressibility values suggest that the clay ranges from very low to highly compressible at different locations.

The Dupi Tila sands aquifer is the main source of water in Dhaka city. Madhupur Clay overlies the aquifer with a thickness of 8 to 45 m (averaging 10 m). The aquifer varies in thickness from 100 to 200 m (averaging 140 m). Groundwater occurs at a depth of 25 to 30 m in the central part of the city. In the periphery the ground water lies at a depth of 15 to 20 m. Under the present conditions the peripheral rivers act as sources of recharge where the Dupi Tila sands are exposed along the riverbeds. Other sources of recharge are vertical percolation of rain and flood water, leakage from water mains and the sewer system, and seepage from standing water bodies within the city.¹²

2 INTER-CITY LINKAGES

Internal division of the City¹³



Dhaka City Corporation (renamed in 1990) is a self-governing corporation that is associated with the task of running the affairs of the city. The incorporated area is currently 360 sq km divided into 10 Zones and 90 Wards.

The DCC consists of a Mayor, 90 Ward Commissioners, 30 Reserved Woman Commissioners and five "Official Commissioners." The five Official Commissioners are representatives of RAJUK (Chairman), DWASA (Chairman), DPHE (Chief Engineer), Health Services (Director General) and Power Board (Chief Engineer).

The Mayor and Ward Commissioners are all elected by direct election, which are held every five years on the basis of adult suffrage. Women Commissioners are elected by Ward Commissioners, which are chosen from the female residents of the City Corporation Area.

The population within the Corporation area according to the DCC website is 6 million people, and 9.3 million in the whole metropolitan area.

Governance/management style

The executive power of DCC is vested in and exercised by the Mayor. All executive powers are concentrated at the head office of DCC. The chief executive Officer (CEO) assists the Mayor. The secretary assists the CEO. The custodian of DCC and all other employees are subordinate to him.

Under the CEO, there are 16 departments. Departmental heads are administratively responsible to the CEO for their activities and for discharging their duties. The CEO supervises the functions of departmental heads. The Secretary heads the general Administration and Establishment Department.

The Chief Revenue Officer heads the Revenue Department, which is responsible for the collection of revenue and the assessment of taxes. The Chief Accounts Officer, the Chief Health Officer, the chief Conservancy Officer, and the Chief Engineer are the administrative heads of the Accounts, Health, Conservancy, and Engineering Departments respectively.

Besides these, there are the Slum Development Department, Transport Department, Law Department, Public relations, Protocol Department, Store and Purchase, Urban Planning Development, and Security Department.

The DCC administrative set-up is decentralized into ten (10) Zonal Offices. However, as of now, there are no Ward Offices. As such, only Ward Commissioners' Offices and Ward level Municipal Services are directed, managed, and monitored from the Zonal Offices. The total manpower including temporary/muster roll staff of DCC is 11,006 of which 2,476 staff is on Muster Roll, while 4,918 Officers and Staff work on a permanent basis.

The table shows the overall breakdown and distribution of different DCC personnel and staff in terms of class structure and distributed between the Headquarter, Zone, and Ward levels.

Category	Services
Building Control	Regulation of Buildings;
Streets	Public Streets, Streets, General provision about streets, Encroachment, Street lighting, Street watering, Traffic control, Public Vehicles;
Public Safety	Civil Defense, Floods, Famine, Dangerous and offensive articles and trades, Burial and burning places;
Trees, Parks, Gardens and Forests	Arboriculture, Gardens, Open Spaces, Forests, Nuisances pertaining to tree and plantation, Tanks and low-lying areas;
Education	Education, Compulsory education, General provision about education;
Culture	Culture, Library, Fairs and shows;
Social welfare	Social welfare;
Development	Development plans, Community development projects, Commercial schemes, Health development project, Slum Development;

Public Health	Sanitation, Removal and disposal of refuse, Unsanitary Buildings, Latrines and Urinals, Birth, Deaths and Marriages, Infectious Diseases Health and maternity centers, Public Health, Hospital and Dispensaries, Medical aid and relief, promotion of medical education;
Water Supply and Drainage	Water supply, Private Sources of water supply, Drainage schemes, Bathing and washing places, Dhobi ghats & washer men, Public water courses, Public Ferries, Public Fisheries;
Articles of Food and Drinks	Bye laws, Milk supply, Public Markets, Private Markets, Slaughterhouse;
Animals	Animal husbandry, Stray animals, Animal homes and farms, Registration of sale of cattle, Livestock improvement, Dangerous animals, Cattle show, zoos etc., Disposal of carcasses;
Urban Planning	Master Plan, Site Development schemes, Execution of site development scheme.

Formal arrangements¹⁴

Dhaka has a multiplicity of organizations at different levels. As many as 42 organizations of national, sectoral, special, and local levels are effectively involved in planning and development of urban affairs in Dhaka Metropolitan Area.

The national level agencies are the National Economic Council (NEC), the Planning Commission (PC), the Urban Planning Directorate (UDD) and the Board of Investment (BOI). Each plays an important role in urban development decision making for Dhaka.

The special agencies for urban development, which are involved in Dhaka, are the Rajdhani Unnayan Kartripakhya (RAJUK), the Dhaka Water and Sewerage Authority (DWASA), the Dhaka Electric Supply Authority (DESA), the Dhaka Metropolitan Police (DMP), and the Cantonment Board (CB).

The various sectoral agencies responsible for extension of services within the city include: Ministries of Finance, Industry, Education, Health, Commerce, Works, Defense, Irrigation, Water and Flood Control, Agriculture, Land, Youth and Sports etc. All have specific sectoral functions.

The local level Agencies involved with planning and development of Dhaka Metropolitan Area (DMA) is the Dhaka City Corporation (DCC) and the Cantonment Board.

Among all these institutions the more comprehensive and obvious responsibilities lie with DCC and RAJUK along with important roles played by the Housing and Settlement Directorate (HSD) for housing, Power Development Board (PDB) for electricity, WASA for water and sewerage, Titas Gas and Transmission Company Ltd. For gas, Road and Highways Department (RHD) for major inter-city roads, and the DMP for traffic management and maintenance of law and order.

Relevant legislation/regulations

To be added...

3 LAND USE MANAGEMENT

Existing Urban Land Use Practices in Bangladesh¹⁵

The precarious land-man ratio has made land the most precious resource in Bangladesh, especially in the urban areas. The extremely rapid rise in the urban population in the recent decades, mainly through rural to urban migration, has made the urban land situation more critical. The supply of urban land is highly limited and subject to many competing claims, such as for commercial, industrial, administrative, educational, recreational, military, roads, and most of all residential purposes. Indeed, land for shelter or housing development is increasingly becoming difficult to obtain. As a consequence of this the urban areas, particularly the large metropolitan cities, are experiencing problems of proliferation of slums and squatter settlements. While the urban population has increased at an abnormally high rate, the ability of urban local governments or development authorities has not improved and hence expansion of urban areas has taken place mostly in a haphazard manner. The most precious of our resources has been allowed to be used or misused in the most careless ways.

A large number of government agencies are involved in the management of urban land. In case of land policy and administration, the responsibilities of concerned agencies are not clearly defined. It is even difficult on the part of the agency concerned to apply their own policy as there is no urban land use policy in Bangladesh.

Before 1953, there was no regulation to develop the urban areas of Bangladesh for its planned development. Town Improvement Act was promulgated in 1953, and for planned urban development of big cities, planning and development authorities i.e. RAJUK for Dhaka, CDA for Chittagong, KDA for Khulna, RDA for Rajshahi were established in the years 1957, 1959, 1961, and 197 respectively through separate ordinances. Accordingly, the prescribed authorities prepared master and structure plans for their own city and took initiatives to develop their cities through the implementation of development projects.

Other than these four big cities, there is no specific land use policy for the other cities. Paurashava (Municipality) is basically responsible for the planning and development on the local level, and mandated to prepare master plan/land and impose building control. The ordinances also empower the Paurashava authority to prepare site development schemes and implement them within their town areas. Practically the problem is that the Paurashavas do not have any town planner and technically skilled manpower to prepare Master Plan/Land Use Plan.

During 1980s when Upazila was selected as a local level administrative unit, the Urban Development Directorate (UDD) prepared Land Use Plan/Master Plan for the secondary towns of Bangladesh, but these were not implemented. Due to lack of legal status and financial constraints the plans remained unimplemented. These towns are now growing in a haphazard manner.

Relevant legislation¹⁶**The Town Improvement Act 1953:**

City area is changing continuously through development activities by different actors like government agencies, private developers, individuals, and others. Planned urban growth is mainly based on the development control measures. Land use control in urban areas of Bangladesh is initiated with the adoption of the Town Improvement Act 1953.

The East Bengal Building Construction Act 1952:

The East Bengal Building Construction Act, 1952, (amended 1987) is also considered a legal document for development control. Rules, regulations, and ordinances of the City Authorities are also being exercised for this purpose. Every construction requires permission as per provision of 'The East Bengal Building Construction Act 1952 (amended 1987) (EBBC Act 1952).' The developing agencies are empowered for planning permission and approval of building plans and prevent illegal constructions in the metropolitan areas.

Land Use Planning Rules:

Statutory rules control land use according to planning standards. It is based on land use policies including local plans, such as control of residential density, road standards, maintenance providing of infrastructure, and services. The acts and the master plans of the cities are the principal legal instruments, which force and exercise planning control and standards.

The land use of metropolitan Dhaka ought to follow the provision of the City Master Plan. Housing, commercial, and industrial project buildings that need planning permission are generally practiced. It must be in conformity with the land use provision of the Master Plan.

Building Construction Rules:

According to the 'East Bengal Building Construction Act-1952 (amended 1987)' each and every building within the designated areas of City 'Master Plan' needs approval from the City Development Agencies. As per Acts, the definition of building is: 'Building includes a house, hut, wall, and any other structure where of masonry bricks, corrugated iron sheet, metal tires wood, bamboo, mud, leaves, grass, thatch, or any other materials whatsoever.'

The Act has empowered to initiate building rules under section 18, EBSC Act 1952 which has been updated, based on public interest, regularly since 1954, (in 1984 and 1996). It has been formulated through the Government of Bangladesh exercising the power of the Act.

DHAKA STRUCTURE PLAN (1995-2015)¹⁷

As a part of the Dhaka Metropolitan Development Plan, it provides a long-term strategy for the 20 years for the development of the greater Dhaka sub-zone with a population target of 15 million. The plan consists of a written report and policy documents with support maps of appropriate scale. It identifies the order of magnitude and direction of anticipated urban growth and defines a broad set of policies considered necessary to achieve overall plan objectives. It considers the micro environmental aspects of Dhaka, both in its existing urban form as well as for future development to keep the city free from all sorts of natural and man made hazards. The plan recognizes the positive and sustainable role of green belts, preservation of high quality wet and agricultural lands and existing rivers in and around the city limits and their continuous upgrading and evaluation and thus recommends for building a circular waterways round the city. The plan also earmarks a number of retention ponds around the city limits for retaining rain water as well as for maintains an ecological balance too and a healthy environment.

Key Policies of Dhaka Structure Plan (SP) 1995-2015

The broader strategies of Dhaka Structure Plan 1995-2015 and their different aspects are given below:

URBAN STRATEGIES

- Land Consolidation
- Accelerated Development
- Planned New Area Development
- Long Term Planned New Area Development Opportunities
- Rural and Special Areas Policies
- Areas of High Agricultural Value
- Flood Flow Zones
- River Pollution Control
- Flood Retarding Ponds
- Infrastructure Consolidation
- Fringe Area Growth Acceleration
- Flood Protection Works
- Infrastructure Initiatives
- Community Based Development Initiatives
- Priority Satellite Town/Dhamsona
- Long-term Satellite Town

- Purbachal (Yusufganj) New Town Project
- Special Incentive Zone (Economic Base)

SOCIO-ECONOMIC SECTOR

- Industrial Estates
- Foot Loose Industries
- Polluting Industries
- Informal Sector Activities
- Dispersal of Commercial Activities
- City Open Space

INFRASTRUCTURE SECTOR

- Incremental Network Development
- Eastern By Pass
- Commuter Rail Network
- Subway Development Program
- Water Transport Development Program

Responsible agents and their relationship¹⁸

In case of land policy, land reform, urban area extension, and declaration of rural to urban areas, the relevant agencies are mainly the Parliament, National Economic Council, Planning Commission, Ministry of Land, Ministry of Housing and Public works, and Ministry of Local Government, Rural Development, and Cooperatives.

In the case of town planning responsible organizations at the central level is Urban Development Directorate (UDD). In the metropolitan cities, the respective development authorities are responsible for planning and development activities. Urban Land Management is operated in Bangladesh through various policies, legal, and technical systems.

In the metropolitan cities of Dhaka, Chittagong, Rajshahi, and Khulna, RAJUK, CDA, RDA, and KDA are respectively for planning and development activities and for preparation of Master Plan, Development Plan, and building control regulations of the respective cities. In case of housing and real estate development, National Housing Authority (NHA) under the Ministry of Housing and Works and the Ministry of Land are directly responsible.

In case of development control and building permission, Paurashava (Municipality) authority and metropolitan development authorities are responsible. They exercise their power according to Building Construction Act 1952. But in case of Land Title and Registration the Directorate of Land Records and Surveys is responsible. (*Supporting Urban Governance Reform, LGRDC and ADB 2005*)

Effectiveness of current arrangements¹⁹

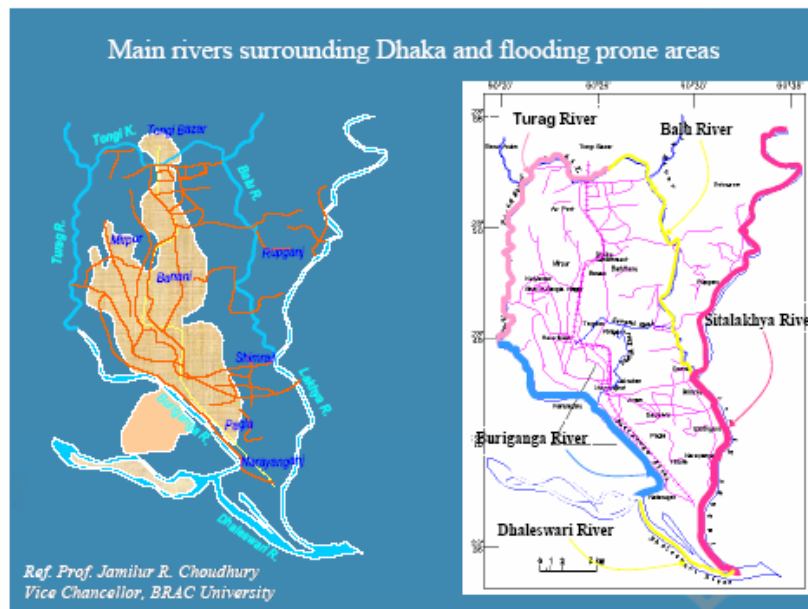
In the context of land use management, Dhaka city has a complex administrative structure with a number of different local and metropolitan authorities. Furthermore, due to overlapping responsibilities and lack of coordination between different national, regional, and municipal government bodies, complex problems in urban land management emerge.

With the existing organizational structure for land management, Dhaka, as well as other cities and towns in Bangladesh face daunting problems in providing shelter, urban utility services, and decent environment for the growing number of urban dwellers. It has gradually become apparent that the management structure is inefficient to meet the growing need. A number of documents and research findings have indicated that the disappointing performance of the public sector and too much centralized responsibilities of central government agencies are major impediments in this respect. (*Supporting Urban Governance Reform, LGRDC and ADB 2005*)

4 VULNERABILITY ISSUES

Hazards and associated vulnerabilities

The main natural hazards affecting Dhaka include floods, which are associated with river water overflow and rain water stagnation, earthquakes, and tornadoes.



Dhaka's topography is a huge issue related to flooding as the elevation of the City varies from 0.5 m to 12 m, with 70% of the total area within 0.5 to 5 m. These low lands, act as temporary detention basin for flood water.

As a consequence, Dhaka is usually flooded by the rivers surrounding the City. Major recent events take account of the 1987 and 1988 flood that lasted for two to

three weeks and affected close to 250 sq km; the 1998 with a duration of six to eight weeks and an affected area of 168 sq km; the 90 sq km flooded in 2004 during a time span of two to three weeks. It is important to notice that the reduced impact is associated to mitigation works done in and around the city.

In addition to flooding, the city can be severely affected by earthquakes as it has already happened in the past. Intensities of VI, VII, and VIII have already been registered in the city. The national building code of Bangladesh (BNBC 1993) includes three seismic zones, and Dhaka is located on the second one with a zoning coefficient equivalent to the 15% of the gravity ($z=0.15g$).



Types of structures:

RC : 5%
 Engineered Masonry: 30%
 Wood & Bamboo: 30%
 Non-engineered masonry: 21%
 Mud Wall: 5%
 GI: 9%

According to the results of the Earthquake Disaster Risk Index (EDRI) project, major earthquake risk is associated with the high vulnerability of the building stock due to both poor materials and poor construction processes.

At-risk groups

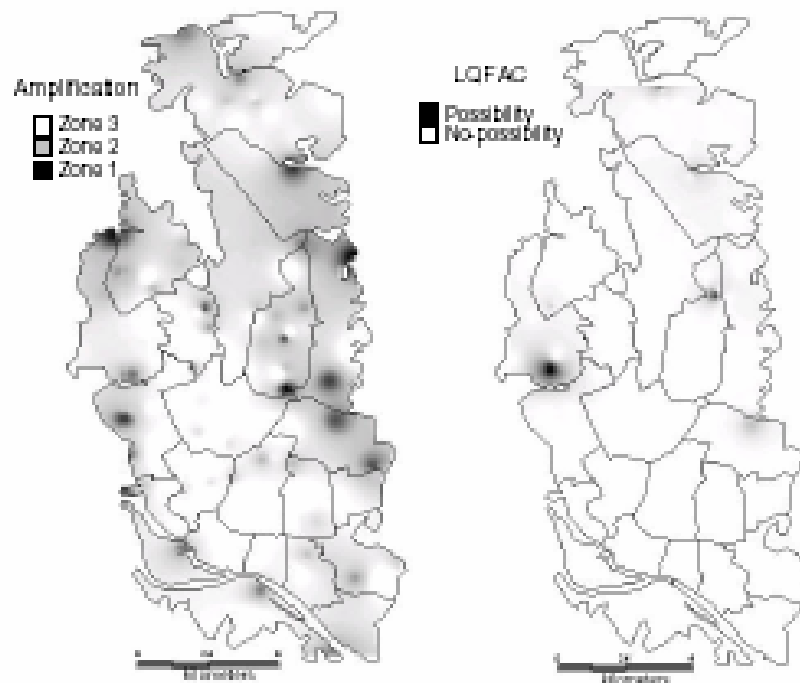
To be added...

At-risk locations

For Earthquake

Seismic microzonation maps for Dhaka (Ansary, 2003) have been prepared by using microtremor observation as well as one-dimensional numerical simulation (SHAKE). The following figures present site amplification and liquefaction potential maps of Dhaka. The site amplification map has three zones with the following characteristics: zone 1 with resonant frequency of less than 3 Hz and mean ground motion amplification of 2.5; zone 2 corresponds to resonance frequencies in a band of 3 to 5 Hz having a ground motion amplification of 1.8; zone 3 corresponds to resonance frequency greater than 5 Hz and mean ground motion amplification of 1.8 Hz. The

liquefaction map has two zones: a zone with liquefaction possibility and the other with no liquefaction possibility.²⁰



For Flooding

After the flood of 1998 a study was conducted (Mohit *et al*) to delineate the effect in different wards of the city. It took into account the damage to five major sectors, namely: Housing, Education, Road, Industry, and Shopping and categorized the damage zones into four groups i.e. No-Damage Zone, Low Damage Zone, Moderate Damage Zone, and High Damage Zone. The findings of the study are presented in the table below:²¹

Category of Damage	Ward Numbers	Total Wards	Percentage
No Damage	1, 7, 10, 12, 13, 14, 16, 33, 36, 43, 44, 45, 47, 49, 52, 56, 57, 62, 69, 71, 72, 74, 77, 79, 81, 88.	26	28.9
Low Damage	2, 4, 6, 8, 9, 11, 15, 17, 19, 24, 29, 30, 31, 32, 35, 38, 39, 40, 41, 42, 50, 51, 53, 54, 55, 58, 59, 60, 61, 63, 64, 65, 66, 67, 68, 73, 78, 79, 80, 82, 83, 84, 86, 87, 90.	45	50.0
Moderate Damage	5, 20, 23, 25, 34, 37, 46, 76, 85.	9	10.0
High Damage	3, 18, 21, 22, 26, 27, 28, 48, 75, 89.	10	11.1

City policies on vulnerability alleviation

Dhaka Structure Plan (1995-2015), as a part of the Dhaka Metropolitan Development Plan (DMDP), identifies the order of magnitude and direction of anticipated urban growth and defines a broad set of policies considered necessary to achieve over all plan objectives. It considers the micro environmental aspects of Dhaka, both in its existing urban form as well as for future development to keep the city free from all sorts of natural and man made hazards.

Considering urban floods, the plan earmarks a number of retention ponds around the city limits for retaining rain water as well as for maintaining an ecological balance and a healthy environment. The plan keeps the provision of controlling Land development within the flood plain designated areas in order to avoid obstructions to flood flow, which might otherwise lead to adverse hydraulic effects.

The Comprehensive Disaster Management Program (CDMP) contains an urban risk research component on urban earthquakes. The objective is to facilitate an expansion of mitigating programs through initiating studies to obtain an in-depth knowledge about the earthquake threat and related risks in the urban areas recommending mitigation measures for selected cities of Bangladesh. Some buildings were also retrofitted by private and government organizations. But no systematic process to retrofit vulnerable structures was undertaken by any government organizations.

Bangladesh Armed Forces Division (AFD) played a significant role in all past disaster management in the light of the tasks assigned in the “Standing Order on Disaster, 1999” circulated by Ministry of Food and Disaster Management. Recently, Bangladesh Armed Forces, in consonance with the national initiative, chalked out a contingency plan for Dhaka city (Rasul, 2003). According to the AFD’s contingency plan, the city is divided into eight sectors with predefined tasks after an earthquake. AFD will also activate “Disaster Management and Relief Monitoring Cell” at Prime Minister’s Office after an earthquake.

5 DISASTER RISK MANAGEMENT ARRANGEMENTS

Dhaka City is yet to formulate a specific disaster risk management plan. The disaster risk management arrangements that have been discussed under this section are the national level arrangements and Dhaka is just being treated as a part of the country, despite the needs of special treatments due to its megacity characteristics.

Functional arrangements

The Standing Order on Disasters (SOD) has the provision of constitution of Disaster Management Committee at the City Corporation level to cope up with the natural Disaster in the concerned City Corporation.

Following the guidelines in the Standing Order on Disaster, the Dhaka City Corporation Disaster Management Committee is comprised of the following officials:

(a) Mayor	Chairman
(b) Chief Executive Officer	Member
(c) Deputy Commissioner	Member
(d) Superintendent of Police	Member
(e) Health Officer of the City Corporation	Member
(f) Representative of Director General, Health Directorate	Member
(g) Representative of Director General, Agriculture Extension Department	Member
(h) Representative of Chief Engineer, LGED	Member
(i) Representative of Chief Engineer, Public Health Engineering Directorate	Member
(j) Chairman/MD, WASA	Member
(k) Representative of Water development Board	Member
(l) Representative of Electricity Supply Authority	Member
(m) Representative of T&T Board	Member
(n) One NGO representative nominated by ADAB	Member
(o) Ward Commissioners	Member
(p) Secretary, City Corporation	Member Secretary

The Honorable Members of the Parliament of the City Corporation area act as the Advisers in the Committee. The Chairman of the Committee may co-opt more members in consideration of local situation and special conditions. The Committee meets at least four times a year. During disasters the Chairman holds the meeting whenever he finds it necessary.

The City Corporation Disaster Management Committee is vested with the following responsibilities regarding disaster management:

During normal time

- To ensure very speedy dissemination of cyclone and flood forecast to all officers, concerned persons/organizations, and other persons having the responsibility about it in the City area.
- To determine safe centers and shelter places and distribute responsibility to different persons for rendering different services in those places.
- To arrange for holding mobilization drill from time to time for disseminating warning signals/forecasts, evacuation, rescue, and primary relief operations in co-operation with the Disaster Management Bureau.

During Disaster

- To operate emergency operations centre (Information centre and control room) for assisting co-ordination of activities relating to evacuation, rescue, relief, and primary rehabilitation in all places of the city area. If necessary, to conduct rescue operations by using locally available resources and also coordinate overall activities including sending reserve teams to highly affected areas for conducting rescue operations.
- To collect data regarding the damages of disasters in pursuance to the directives of Disaster Management Bureau and other National authorities and also dispatching it to appropriate authorities including the Ministry of Disaster Management and Relief.
- To formulate plans on a priority basis and arrange for distribution of the resources received from the Ministry, district, or any other authority objectively. To maintain the accounts relating to the materials concerning relief and rehabilitation, and dispatching it to the relief-giving authority.

Risk Assessment

Hazard mapping/assessments have been undertaken by several disaster management stakeholder agencies to examine the potential risk facing urban and rural populations to specific hazards. A flood hazard map and land development priority map were developed in 2000 using National Oceanographic and Atmospheric Administration (NOAA) Satellite, Advanced Very High Resolution Radiometer (AVHRR), and Geographical Information System (GIS) data. Flood hazard ranks were categorized using the flood affect on land cover, classifications, physiographic, and geologic divisions. The Disaster Management Bureau, with the funding from UNDP, developed a detailed hazard map of the country showing zones affected by flood, cyclone, earthquake, and drought. Donor agencies have also undertaken identification missions to assess specific hazards such as arsenic toxicity, urban vulnerability to earthquakes, and famine as a consequence of food insecurity.

Bangladesh has several academic and scientific institutions with the capabilities of supporting the Government in risk monitoring and risk mapping. Institutions such as the Institute for Water Modeling (IWM), Flood Forecasting and Warning Centers (FFWC), Bangladesh Meteorological Department (BMD), Center for Environmental and Geographic Information Services (CEGIS), Bangladesh University of Engineering and Technology (BUET), and the Space Research and Remote Sensing Organization (SPARRSO) are involved in risk monitoring and risk mapping.

Risk Communication

Bangladesh is in the process of developing a fully functional disaster risk information management system at the moment. The Ministry of Food and Disaster Management has programs developed in cooperation with donor and non-governmental agencies, which are disseminating public information on disaster preparedness and response to specific hazards. The Network for Information, Response, and Preparedness Activities on Disaster (NIRAPAD) is a non-governmental organization initiative developed to provide rapid information on major and localized disasters in Bangladesh. The Disaster Management Bureau, in cooperation with UNICEF, issues a newsletter on disaster management events.

The Disaster Emergency Response Group (DER) is another forum for sharing information. The DER group, chaired by World Food Program and composed of representatives of the Government, donor agencies, and the NGO community, seeks to provide timely information on major and localized disasters and in undertaking joint field level needs assessments.

The Comprehensive Disaster Management Programme, which is under the management of the Ministry of Food and Disaster Management, is developing a Disaster Management Information Center (DMIC) to respond to the need for a more effective, better coordinated, information management system i.e. collection, analysis, dissemination, and reporting. The DMIC will promote partnerships, enhance coordination, and be a source of information for policy advocacy in mainstreaming disaster risk management into the development planning process.

The Disaster Management Bureau (DMB) has been able to introduce disaster management messages and awareness programs into primary and secondary school curricula up to grade 12. In 1997, the DMB was successful in mandating that

all children from grades 6 to 8 be required to read a chapter on disaster management as part of the school curriculum.

Agencies such as the Flood Forecasting and Warning Centers (FFWC), the Bangladesh Meteorological Department (BMD), Centre for Environmental and Geographic Information Services (CEGIS), Institute of Water Modeling (IWM), and the Space Research and Remote Sensing Organization (SPARRSO) have particular interest in this information for early warning dissemination and collaborative linkages with regional and international organizations.²²

Flood Forecasting and Warning Centre (FFWC) under Bangladesh Water Development Board (BWDB), continuously updates the website to monitor the river levels and displays the regions upstream receiving rain as well as rainfall amount. The network is composed of 60 water level and rainfall stations. Manned stations along the major rivers report river levels five times a day. The BWDB Flood Forecasting and Warning Centre in Dhaka instantly transfer the data to the MIKE II flood watch system database. This provides a water level forecast for the downstream areas. Anyone with internet capabilities can look at real-time data from the FFWC (<http://www.ffwc.gov.bd/>) to see the current status of river levels nationwide and within Dhaka.²³

The Bangladesh Public Administration Training Center (BPATC) is the apex training institution offering skills-based training, including disaster management, to government staff and officials. The National Defense College and all the training institutes belonging to the army, navy, and air services are providing disaster management training for their military personnel. The Disaster Management Bureau (DMB) is the entrusted public institution to provide training courses for members of disaster management committees at the district, sub-district, union, and grass-root levels. The Bureau trains representatives of civil societies i.e. teachers, religious leaders, youth volunteers. BMD and SPARRSO also impart training on disaster management. Non-governmental organizations, academic institutions, and UN/donor agencies have been pro-active in conducting short-term in-country training initiatives for a variety of disaster management risk reduction stakeholders. Regionally, the Asian Disaster Preparedness Center in Thailand and the Asian Disaster Reduction Center has offered training to Bangladesh officials engaged in policy development or program implementation and management. For example, the Asian Disaster Preparedness Center (ADPC) in Bangkok, Thailand played a lead role in the Asian Urban Disaster Mitigation Program in which Bangladesh was a stakeholder. The MFDM is also engaged with the National Society for Earthquake Technology – Nepal (NSET) in the Program for Enhancement of Emergency Response (PEER). Bangladesh was invited to join PEER based on three factors: high seismic vulnerability, need to improve disaster response capacity, and the interest of the government to participate in the program.

World Food Program, ADPC, the Disaster Management Bureau in concert with UNICEF and a variety of national/international non-governmental agencies have also undertaken training activities in disaster risk reduction.

A considerable number of research works has been carried out at the university level and by different research organizations regarding the risks of different hazards, especially earthquake and urban flooding. The findings of these research works are

shared through seminars and conferences, and further distribution by newspapers and electronic media.

6 DISASTER RISK MANAGEMENT VISION²⁴

The vision of national disaster management program in Bangladesh is to reduce the vulnerability to natural, environmental, and human induced hazards through community empowerment and integration of sustainable risk management initiatives in all development programs and projects. This vision would be achieved by a multi-hazard and multi-agency approach to address vulnerability, risk assessment, and mitigation that include prevention, preparedness, response, and recovery. The vision considers a transition from a response and relief focus to vulnerability and risk reduction approach in disaster.

The Ministry of Food and Disaster Management (formerly the Ministry of Disaster Management and Relief) of the Government of Bangladesh has responsibility for coordinating the government disaster management efforts. The core functions for the fulfillment of this task are outlined in the allocation of business of the Ministry under the Government's Rules of Business. Standing Orders have been developed that detail the preparedness, response, and recovery mechanisms of key stakeholder agencies in responding to an immediate crisis.

Dhaka City has no specific disaster management plan different from the national one. Initiatives at universities, research organizations, and NGOs have been taken to reduce the risks of feared disasters and the need for special attention to Dhaka for its complex urban characteristics has been felt very badly.

7 ISSUES

Due to rapid unplanned and unregulated urban expansion, Dhaka City now suffers from problems of drainage and stagnation of rain water, which lead to flooding during the monsoon season. This situation has turned very bad in recent years both in the old city areas and new parts. Unwise closure of natural and old artificial drainage and navigational canals has aggravated the situation. Main streets now go under a meter of water after every heavy monsoon shower.

Most parts of the city are vulnerable to annual flooding during the monsoon months, because of the topographic condition of the Dhaka. At times of abnormal floods nearly 75 percent of Dhaka goes under water. Such situations were experienced in 1954, 1987, 1988, 1998, and 2004, with the latter ones being the most severe. During such periods the settlements of the poor are affected the worst although other areas also were not spared. The floods cause colossal economic loss to the city and also affect the health of the people. The severity of the floods has been intensified partly due to unplanned urban development, but is also a direct result from poor physical planning. Efforts are now being made for the opening up of the closed canals for the purpose of improving drainage.²⁵

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