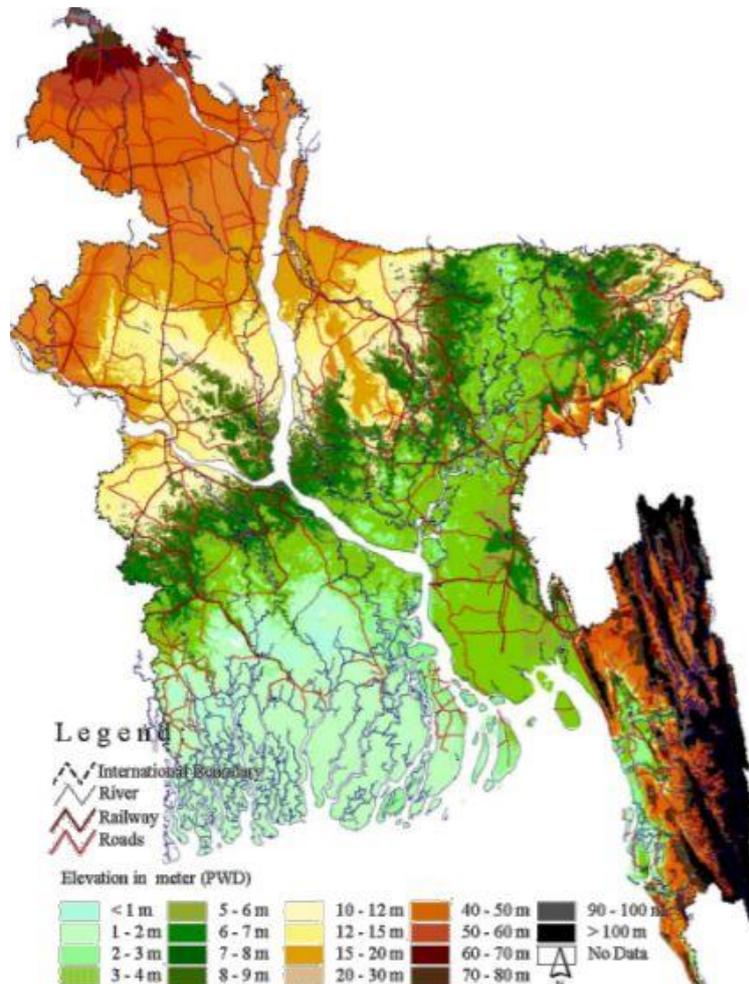




## ADRC Visiting Researcher Programme FY2021



# Country Report: Bangladesh

By

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## Chapter-1: General Information

### 1.1. Overview

Bangladesh officially the People's Republic of Bangladesh, is a country in South Asia. It is the eighth-most populous country in the world, with a population exceeding 164 million people (Bangladesh Population, 2020). In terms of landmass, Bangladesh ranks 92nd, spanning 148,460 square kilometres (57,320 sq mi), making it one of the most densely populated countries in the world. Bangladesh shares land borders with India to the west, north, and east, Myanmar to the southeast, and the Bay of Bengal to the south. It is narrowly separated from Nepal and Bhutan by the Siliguri Corridor, and from China by Sikkim, in the north, respectively. Dhaka, the capital and largest city, is the nation's economic, political and cultural hub. Chittagong, the largest seaport, is the second-largest city (Wikipedia, 2021). Bangladesh is one of the emerging and growth-leading economies of the world, and is also one of the Next Eleven countries, with one of the fastest real GDP growth rates. The Bangladeshi economy is the 39th-largest in the world by nominal GDP, and the 29th-largest by Purchasing Power Parity (PPP) (Wikipedia, 2021). The basic information regarding Bangladesh given below :

<p style="text-align: center;"><b>People's Republic of Bangladesh</b> গণপ্রজাতন্ত্রী বাংলাদেশ</p>
<p style="text-align: center;"></p> <p style="text-align: center;"><b>Flag</b></p> <p style="text-align: center;"></p> <p style="text-align: center;"><b>Emblem</b></p>
<p style="text-align: center;"><b>Anthem: "<u>Amar Sonar Bangla</u>" (Bengali)</b> "My Golden Bengal"</p>

<p><b>Official Seal</b></p>	
Capital and largest city	<b><u>Dhaka</u></b> 23°45'50"N 90°23'20"E
Official language and national language	<b><u>Bengali</u></b>
Religion (2011)	90.4% <b><u>Islam (official)</u></b> 8.5% <b><u>Hinduism</u></b> 0.6% <b><u>Buddhism</u></b> 0.4% <b><u>Christianity</u></b> 0.1% <b><u>Others</u></b>
<b><u>Demonym(s)</u></b>	<b><u>Bangladeshi</u></b>
Legislature	<b><u>Jatiya Sangsad</u></b>
<b><u>Independence</u></b>	
<b><u>Declared</u></b>	26 March 1971
<b><u>V-Day</u></b>	16 December 1971
<b><u>Current constitution</u></b>	16 December 1972
<b><u>Area</u></b>	
Total	148,460-km <sup>2</sup> (57,320 sq mi)
Water (%)	6.4



<b>Land area</b>	<b>130,170 sq Km</b>
<b>Water area</b>	<b>18,290 sq km</b>
<b><u>Population</u></b>	
<b>2018 estimate</b>	<b>161,376,70</b>
<b>2011 census</b>	<b>149,772,364- (8th)</b>
<b>Density</b>	<b>1,106/km<sup>2</sup> (2,864.5/sq mi) (7th)</b>
<b>Currency</b>	<b><u>Taka</u> (₳) (<b>BDT</b>)</b>
<b>Time zone</b>	<b><u>UTC+6</u> (<b>BST</b>)</b>
<b>Date format</b>	<b>dd-mm-yyyy (<b>CE</b>)</b>
<b><u>Mains electricity</u></b>	<b><u>220 V–50 Hz</u></b>
<b><u>Driving side</u></b>	<b>left</b>
<b><u>Calling code</u></b>	<b><u>+880</u></b>
<b><u>ISO 3166 code</u></b>	<b><u>BD</u></b>
<b><u>Internet TLD</u></b>	<b><u>.bd</u></b> <u>□□□□</u>

## 1.2. Geographical Information

Bangladesh is a low-lying, riverine country with a largely marshy jungle coastline of 710 km (441 mi) on the northern littoral of the Bay of Bengal. Formed by a delta plain at the confluence of the Ganges (Padma), Brahmaputra (Jamuna) and Meghna River and their distributaries and tributaries, Bangladesh's alluvial soil is highly fertile, but vulnerable to flood and drought. The geographical position of Bangladesh showing in figure -1 and information given in Table-1.



Table 1: Geographical Information

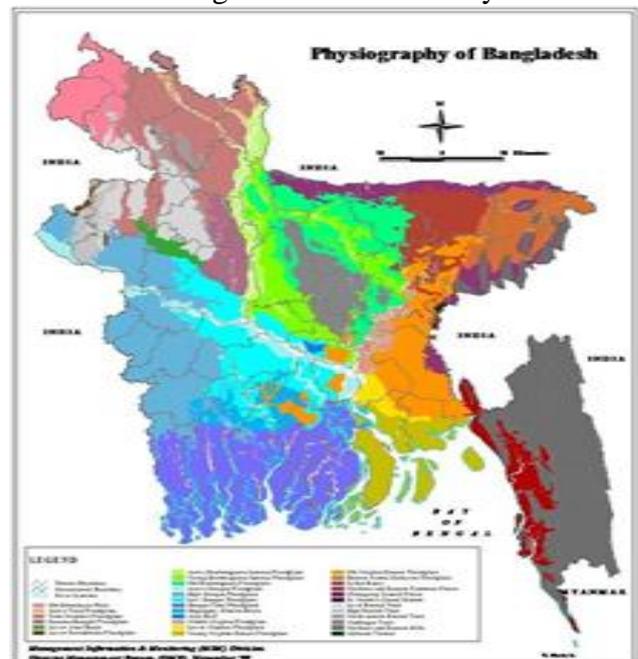
<b>Name</b>	<b>Description</b>
<b>Geographical Coordinates</b>	20°34' to 26°38' north latitude and 88°01' to 92°42' east longitude
<b>Area</b>	Total: 147,570 km <sup>2</sup> Country comparison to the world: 94 Land: 133,910 km <sup>2</sup> Water: 10,090 km <sup>2</sup>
<b>Land boundaries</b>	Total: 4,246 km Border countries: Myanmar 193 km, India 4,053 km
<b>Maritime claims</b>	Contiguous zone: 18 nmi (33.3 km; 20.7 mi) Continental shelf: up to the outer limits of the continental margin Exclusive economic zone: 200 nmi (370.4 km; 230.2 mi) Territorial sea: 12 nmi (22.2 km; 13.8 mi)
<b>Coastline</b>	580 km with 273 km unbroken longest sea beach in the world
<b>Elevation extremes</b>	Lowest point: Indian Ocean 0 m Highest point: In the Mowdok range at 1052 m (at N 21°47'12" E 92°36'36")

Hills rise above the plain only in the Chittagong Hill Tracts in the far southeast and the Sylhet division in the northeast. The whole country consists of mainly low and flat land, except for the hilly regions in the northeast and southeast. A network of rivers, with their tributaries and distributaries crisscross the country. Physiographically, the country can be divided into hills, uplifted land blocks, and the majority alluvial plains with very low mean elevation above sea level. In terms of geographical location, Bangladesh is in the context of the Ganges-Brahmaputra-Meghna (GBM) river system. Geologically, Bangladesh is a part of the Bengal Basin, one of the largest geosynclinals in the world. The Basin is bordered on the north by the steep Tertiary Himalayas; on the northeast and east by the late Tertiary Shillong Plateau, the



Figure 1: Global Map

Tripura hills of lesser elevation, and the Naga-Lusai folded belt; and in the west by the moderately high, ancient Chotanagpur plateau. The southern fringe of the basin is not distinct but geophysical evidence indicates it is open towards the Bay of Bengal for a considerable distance. The formation and growth of the Bengal Basin is directly related to the origin and morphology of the Indo-Gangetic trough, which itself is overlaid and filled by sediments thousands of meters thick. The broad geological features of the Bengal Basin and its prominent tectonic elements are Indian platform, Bengal foredeep, Arakan Yoma folded system, and the Sub-Himalayan Foredeep. Other features are Rangpur Saddle, Dinajpur slope, Bogra slope, Hinge Zone, Barisal High, and Troughs of Sylhet, Faridpur and Hatiya, etc.



### 1.3. Climate

Bangladesh has a subtropical monsoon climate marked by broad seasonal fluctuations in rainfall, mild temperatures and high humidity. Regional climatic variations are small in this flat region. Three seasons are commonly known: the mild, humid summer from March to June; the cold, rainy monsoon season from June to October; and the cool, dry winter from October to March. In general, the mean summer temperatures are between 32°C and 38°C. In most parts of the world, April is the warmest month. January is the coldest month in which the average temperature for much of the world is 10°C.

The winds are mainly from the north and northwest in the winter, moving softly at one to three kilometres per hour in the northern and central regions and three to six kilometres per hour along the coast. From March to May, intense thunderstorms, named to the northwest by local English speakers, emit winds of up to 60 kilometres per hour. During the extreme storms of the early summer and late monsoon season, southerly winds of more than 160 kilometres per hour trigger waves to crest as large as 6 metres in the Bay of Bengal, creating catastrophic floods in coastal areas.

Heavy rainfall is traditional of Bangladesh. With the exception of the comparatively dry western area of Rajshahi, where annual rainfall is approximately 160 cm, most areas of the world receive at least 200 cm of rainfall each year. Due to its position just south of the foothills of the Himalayas, where monsoon winds transform west and northwest, the district of Sylhet in northeast Bangladesh has the highest annual rainfall.

About 80 percent of Bangladesh's rainfall comes during the monsoon season. Monsoons are the product of contrasts between low and high air pressure areas arising from unequal heating of soil and water. During the hot months of April and May, hot air rises across the Indian subcontinent, producing low-pressure areas in which colder, and moist-bearing winds from the Indian Ocean surge. This is the southwestern monsoon, which starts in June and typically continues until September. Divided towards the Indian landmass, the monsoon flows into two branches, one of which hits western India. The other passes up the Bay of Bengal and through eastern India and Bangladesh, crossing the plains to the north and northeast, until turning to the west and northwest towards the foothills of the Himalayas.

Natural calamities, such as hurricanes, tropical cyclones, tornadoes, and tidal bores—destructive waves or floods triggered by floods rushing up estuaries—stricken the region,

especially the coastal belt, almost every year. Between 1947 and 1988, thirteen cyclones struck Bangladesh, causing tremendous loss of life and property. In May 1985, for example, a strong cyclone storm, packed with 154 kilometres per hour of wind and waves 4 metres high, swept southeast and south Bangladesh, killed more than 11,000 citizens, destroyed more than 94,000 homes, killed some 135,000 head of livestock, and damaged nearly 400 kilometres of critically-needed embankments (Wikipedia, 2021).

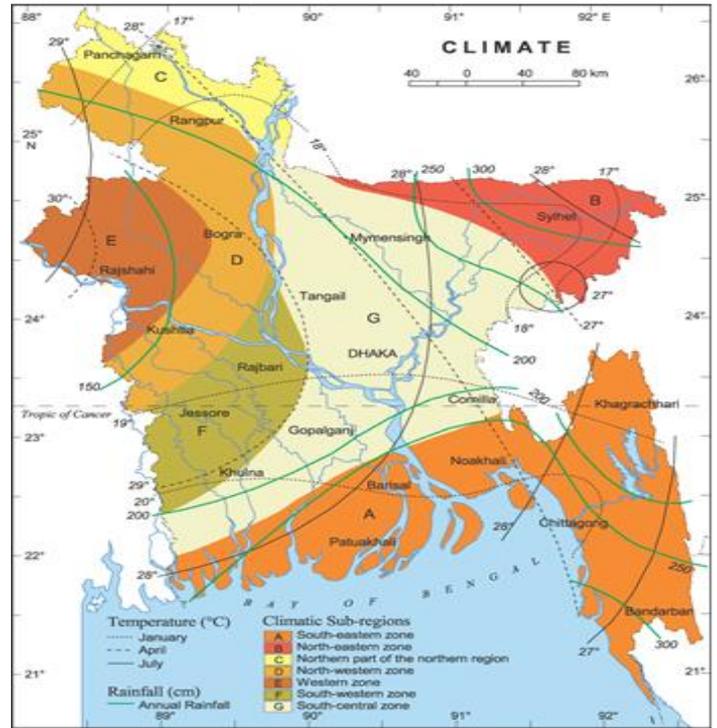


Figure 3: Climate of Bangladesh

Annual monsoon rains result in loss of human life, disruption to property and communication networks and a lack of drinking water contributing to the spread of disease. For example, two-thirds of Bangladesh's sixty-four districts sustained severe flood damage in 1988 as a consequence of the exceptionally heavy rains that overwhelmed the river systems. Millions were left homeless and lacking clean water. About 2 million tonnes of crops have been confirmed lost and rescue work has been rendered much more complicated than normal because the flood has made transport of some sort incredibly difficult. There are no safeguards against cyclones and tidal bores except for issuing early notice and having secure public buildings where citizens can take refuge (Khatun, Rashid, & Hygen, 2016).

## 1.4. Administrative Divisions

Bangladesh is divided into eight administrative divisions, each named after their respective divisional headquarters: Barisal (officially *Barishal*), Chittagong (officially *Chattogram*), Dhaka, Khulna, Mymensing, Rajshahi, Rangpur, and Sylhet.

Divisions are subdivided into districts (*zila*). There are 64 districts in Bangladesh, each further subdivided into *upazila* (subdistricts) or *thana*. The area within each police station, except for those in metropolitan areas, is divided into several *unions*, with each union consisting of multiple villages. In the metropolitan areas, police stations are divided into wards, which are further divided into *mahallas*. There are no elected officials at the divisional or district levels, and the administration is composed only of government officials. Direct elections are held in each union (or ward) for a chairperson and a number of members.

In 1997, a parliamentary act was passed to reserve three seats (out of 12) in every **union for** female candidates (Wikipedia, 2021). There are 08 large city corporations in Bangladesh. Dhaka is the capital and largest city of Bangladesh.



Figure 4: Administrative Divisions



## 1.5. Population

Estimates of the Bangladeshi population vary, but UN data suggests 161,376,708 (162.9 million) in 2017. Bangladesh is the world's eighth-most-populous nation and the most densely-populated large country in the world, ranking 7th in population density even when small countries and city-states are included. The country's population-growth rate was among the highest in the world in the 1960s and 1970s, when its population grew from 65 to 110 million. With the promotion of birth control in the 1980s, Bangladesh's growth rate began to slow. Its total fertility rate is now 2.05, lower than India's (2.58) and Pakistan's (3.07). The population is relatively young, with 34 percent aged 15 or younger and five percent 65 or older. Life expectancy at birth was estimated at 72.49 years in 2016. Bengalis are 98 percent of the population. Of Bengalis, Muslims are the majority, followed by Hindus, Christians and Buddhists. The ethnic minority population includes the Chakma, Marma, Tripuri, Kuki, Khamti, Khumi, Murang, Mru, Chak, Lushei, Bawm, Bishnupriya Manipuri, Khasi, Jaintia, Garo, Santal, Munda and Oraon tribes. The forcefully displaced Myanmar citizen at around 1 million, making Bangladesh one of the countries with the largest refugee populations in the world (<https://en.wikipedia.org/wiki/Bangladesh>, 2021).



## 1.6. Education

Bangladesh has a literacy rate of 72.9 percent as of 2018: 75.7% for males and 70.09% for females. The country's educational system is three-tiered and heavily subsidised, with the government operating many schools at the primary, secondary and higher secondary levels and subsidizing many private schools. In the tertiary education sector, the Bangladeshi government funds over 45 state universities through the University Grants Commission. The education system is divided into five levels: primary (first to fifth grade), junior secondary (sixth to eighth grade), secondary (ninth and tenth grade), higher secondary (11th and 12th grade), and tertiary. Five years of secondary education (including junior secondary) ends with a Secondary School Certificate (SSC) examination. Since 2009, the Primary Education Closing (PEC) examination has also been introduced. Students who pass the PEC examination proceed to secondary or matriculation training, culminating in the SSC examination. Students who pass the PEC examination proceed to three years of junior secondary education, culminating in the Junior School Certificate (JSC) examination. Students who pass this examination proceed to two years of higher secondary education, culminating in the Higher Secondary School Certificate (HSC) examination. Education is primarily in Bengali, but English is commonly taught and used. Many Muslim families send their children to part-time courses or full-time religious education in Bengali and Arabic in madrasas. Article 17 of the Bangladesh Constitution (The Constitution of the People's Republic of Bangladesh) provides that all children between the ages of six and ten years receive a basic education free of charge (Bangladesh, 2021). Universities in Bangladesh are of three general types: public (government-owned and subsidised), private (privately owned universities) and international (operated and funded by international organisations). They are accredited by and affiliated with the University Grants Commission (UGC), created by Presidential Order 10 in 1973. The country has 47 public, 105 private and two international universities. (Wikipedia, 2021).

## 1.7.Economy

Bangladesh has the world's 39th largest economy in terms of market exchange rates and 29th largest in terms of purchasing power parity, which ranks second in South Asia after India. Bangladesh is also one of the world's fastest-growing economies and one of the fastest growing middle-income countries. The country has a market-based mixed economy. A developing nation, Bangladesh is one of the Next Eleven emerging markets. Economic growth slowed to 5.24 percent in FY2019-20, according to the provisional estimates of BBS, which is the lowest since FY2008-09. As per final estimate GDP growth was 8.15 percent in FY2018-19. According to the provisional estimate of BBS, the growth of agriculture sector has slowed to 3.11 percent in FY2019-20, from 3.92 percent in FY2018-19. During the same period, industry sector grew by 6.48 percent, which was 12.67 percent in the previous fiscal year. The service sector grew by 5.32 percent in FY2019-20 compared to 6.78 percent in the previous fiscal year. The contribution of agricultural, industry and service sectors reached at 13.35 percent, 35.36 percent and 51.30 present respectively in FY2019-20 against 13.65 percent, 35.00 percent and 51.35 percent respectively in the previous fiscal year. The basic economy of Bangladesh given below :

<b>Economy of Bangladesh</b>	
<b>Currency</b>	Bangladeshi taka (BDT, ট)
<b>Fiscal year</b>	1 July – 30 June
<b>Trade organizations</b>	SAFTA, SAARC, BIMSTEC, WTO, AIIB, IMF, Commonwealth of Nations, World Bank, ADB, Developing-8
<b>Country group</b>	Developing/Emerging Lower-middle income economy
<b>Statistics</b>	
<b>Population</b>	162,650,853 (2020 est.)
<b>GDP</b>	\$416 billion (nominal; 2021) \$1.07 trillion (PPP; 2021)
<b>GDP rank</b>	37th (nominal, 2021) 31st (PPP, 2021)



<b>GDP growth</b>	7.9% (17/18) 8.2% (18/19e) 5.2% (19/20f) 6.8% (20/21f)
<b>GDP per capita</b>	\$2,591 (nominal, 2021) \$6,380 (PPP, 2021 est.)
<b>GDP per capita rank</b>	149th (nominal, 2021) 130th (PPP, 2021)
<b>GDP by sector</b>	agriculture: 14.23% industry: 35.66% services: 50.11% (FY18)
<b>Inflation (CPI)</b>	5.5% (2020 est.)
<b>Population below poverty line</b>	20.5% in poverty (2019) 28.3% on less than \$3.20/day (2020f) 6% living in extreme poverty (2020)
<b>Gini coefficient</b>	32.4 medium (2016, World Bank)
<b>Human Development Index</b>	0.632 medium (2019) <sup>[16]</sup> (133th) 0.478 Low IHDI (2019)
<b>Labor force</b>	69,706,733 (2019) 55.8% employment rate (2017)
<b>Labor force by occupation</b>	agriculture: 40.6% industry: 20.4% services: 39.6% (2017 est.)
<b>Unemployment</b>	Overall 4.2% Male 3.1% Female 6.7% (2017 est.)
<b>Main industries</b>	Textiles pharmaceutical products electronics shipbuilding automotive bicycle

	<p>leather</p> <p>jute</p> <p>glass</p> <p>paper</p> <p>plastic</p> <p>food and beverages</p> <p>cement</p> <p>tea</p> <p>rice</p> <p>natural gas and crude petroleum</p> <p>iron and steel</p>
<b>External</b>	
<b>Exports</b>	<p>\$24.70 billion (July 2021 - December 2021)</p> <p>\$37.88 billion (2020-21)<sup>1</sup></p>
<b>Main export partners</b>	<p> European Union(+) 58.2%</p> <p> United States(+) 16.3%</p> <p> Japan(+) 3.1%</p> <p> Canada(+) 3.0%</p> <p> India(+) 2.4%</p> <p> Australia(+) 1.9%</p> <p> China(+) 1.9%</p> <p> Southeast Asia(+) 1.6%</p> <p>Others 11.6%</p>
<b>Imports</b>	<p>▲ \$60.68 billion (2020-2021)<sup>[26]</sup></p>
<b>Import goods</b>	<p>Textiles and Textile Articles, Machinery and Mechanical Appliances, Electrical Equipment, Mineral Products, Vegetable Products, Metal &amp; metal products, Chemicals &amp; Allied Products, Vehicles &amp; Aircraft</p>
<b>Main import partners</b>	<p> China(+) 21.5%</p> <p> India(+) 12.2%</p> <p> Singapore(+) 9.2%</p> <p> European Union(+) 6.2%</p> <p> Hong Kong(+) 5.5%</p> <p>Other 45.3%<sup>[27]</sup></p>
<b>FDI stock</b>	<p>\$16.85 billion (March 2020 est.)</p>

	<b>Abroad: \$309.6 million (31 December 2017 est.)</b>
<b>Current account</b>	<b>−\$3.808 billion US\$(2020-21)<sup>[26]}</sup></b>
<b>Gross external debt</b>	<b>\$72.1 billion (March 2021 est.)</b>
<b>Public finances</b>	
<b>Public debt</b>	<b>40.7% of GDP (November 2021 )</b>
<b>Budget balance</b>	<b>−3.2% (of GDP) (2017 est.)</b>
<b>Revenues</b>	<b>₳3.925 trillion (US\$46 billion) (2021)</b>
<b>Expenses</b>	<b>₳6.037 trillion (US\$71 billion) (2021)</b>
<b>Foreign reserves</b>	<b>\$48 billion (August 2021)<sup>[37]</sup> (41st)</b>

The economy is driven by strong domestic demand. The private sector of Bangladesh has rapidly expanded, with a number of conglomerate driving the economy. Major industries include textiles, pharmaceuticals, shipbuilding, steel, electronics, energy, construction materials, chemicals, ceramics, food processing, and leather goods. Export-oriented industrialization has increased with fiscal year 2018–19 exports increasing by 10.1% over the previous year to \$40 billion. Most export earnings are from the garment-manufacturing industry. Bangabandhu Bridge, commonly called the Jamuna Multi-purpose Bridge, was the 11th longest bridge in the world and the 6th longest bridge in South Asia when constructed in 1998. Agriculture is the largest sector of the economy, making up 14.2 percent of Bangladesh's GDP in 2017 and employing about 42.7 percent of the work force. The agricultural sector impacts employment generation, poverty alleviation, human resources development and food security. More Bangladeshis earn their living from agriculture than from any other sector. The country is among the top producers of rice (fourth), potatoes (seventh), tropical fruits (sixth), jute (second), and farmed fish (fifth). Bangladesh is the seventh-largest natural gas producer in Asia, ahead of neighbouring Myanmar, and 56 percent of the country's electricity is generated

by natural gas. The country has three UNESCO World Heritage Sites (the Mosque City, the Buddhist Vihara and the Sundarbans) and five tentative-list sites (MoF, 2020).

## 1.8. Art and Culture

Bangladesh is a melting pot of races. She, therefore, has a mixed culture. Her deep rooted heritage is amply reflected in her architecture, literature, dance, drama, music and painting. Bangladeshi culture is influenced by three great religions- Hinduism, Buddhism and Islam in successive order, with Islam having the most pervading and lasting impact. Like a colorful montage, the cultural tradition of the country is a happy blending of many variants, unique in diversity but in essence greatly symmetrical.



*Figure 5: Ahsan Manzil*



*Figure 6: Bengali Traditional Handcraft Nokshi Katha*

## Chapter-2: Disaster management overview

### 2.1. Country risk profile

Bangladesh is considered as a developing economy. Bangladesh has achieved rapid and spectacular improvements in many social development indicators during the last two decades or so. Within South Asia, Bangladesh has improved its position in the region as a whole in a number of human development indicators. (Asadullah, Mahmud, & Savoia, 2012). This has all been achieved against the backdrop of being exposed to over population, natural and human-induced hazards. It is estimated that 14% of Bangladesh's GDP is exposed to disasters on an annual basis. This is a testament to the innate resilience of the Bangladeshi people who continue to make developmental progress while living with disasters and climate risk (MoEF, 2013). Every year the country faces many natural disasters like floods, cyclone, tidal surges, tornado, thunderstorm, river and coastal erosion, landslides, salinity intrusion, hailstorm, extreme weather events etc (Agrawala, 2003). With the country's geographical location, its topography and high population density, the frequent occurrence of natural hazard events often offsets in high loss of life and economic damage. Simultaneously, the country is at risk from adverse impacts of climate change and variability. It is therefore likely that both acute hazards (such as flooding or cyclonic events) and chronic hazards (drought, sea level rise and saline intrusion, for example) will be more damaging to human lives and properties in the contexts of flourishing economic conditions where more investments will create more economic activities, e.g. infrastructure and human engagements in areas susceptible to different hazards. The disasters that Bangladesh experiences are primarily originated from three factors such as :

(i) physical conditions (like low lying topography, fluvial systems) and relative location of the country in the region causing hydro-meteorological hazards like floods, cyclone, river bank erosion etc.

(ii) man-made conditions that trigger various types of disasters such as road accidents, building collapse, fire hazards etc. and

(iii) climate change impacts which bring in subtle alterations in the physical, hydrological, biological processes and cause different kinds of slow but progressive changes leading to different hazards like droughts, water logging, salinity intrusion etc.

These differences in the origin of disasters uniquely characterize the disaster events and create varied impact conditions in different parts of Bangladesh which suggest that different approaches are required by state agencies to reduce disasters impacts where possible and to

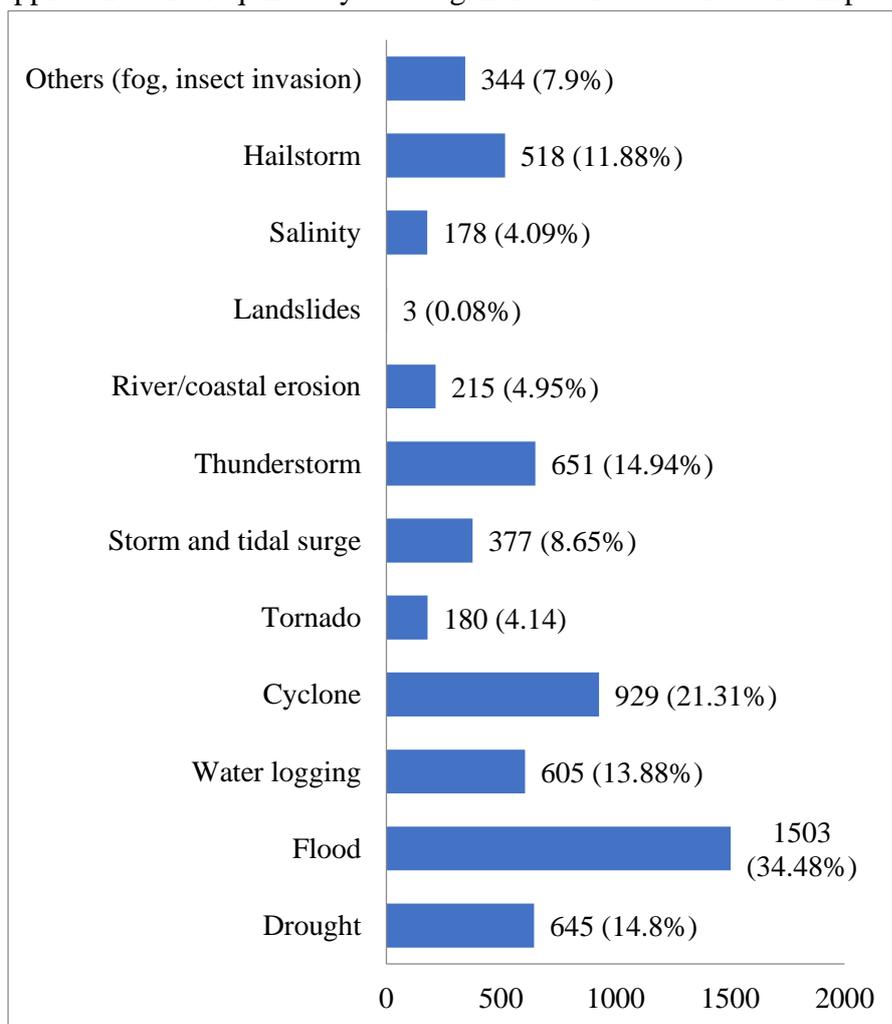


Figure 7: Affected Households

better manage where mitigation is not possible. The approaches accommodate tools and strategies sensitive to different disaster contexts for handling disaster impacts effectively and efficiently. In this regard, disasters occurring in Bangladesh are broadly categorized into two groups considering institutional level impact management

aspects. These are strong and rapid disaster onslaughts covering common natural hazards like floods, cyclones, earthquakes and man induced disasters like fire hazards, building collapse etc. The second category is slow and progressive disasters induced by change in the climatic conditions such as water logging, salinity intrusion, sea level rise etc. Table 2 highlight the

major types of disasters with major attributes and Figure 7 depicts the number of affected households from 2009 to 2015. Table 2: Major Types of Disaster

Disaster	Scenario	Socio-economic vulnerability and risk exposure
		→
<b>Flood</b>	Floods occur annually, reaching their most severe in months of July and August. The floods of 1988, 1998, and 2004 were catastrophic resulting in large scale destruction and loss of lives.	<ul style="list-style-type: none"> <li>→ The 1988 flood affected 2/3<sup>rd</sup> area of the country.</li> <li>→ The 1998 flood affected 67% area of the country and caused 1,100 deaths, rendered 30 million people homeless, damaged 500,000 homes and caused heavy loss to infrastructure.</li> <li>→ The 2004 flood inundated about 38% of the country (WARPO, 2005). About 747 people lost their lives, 2500 kilometers of embankment were damaged, and 74 primary school buildings were washed away. This flood caused economic loss of about US\$ 2200 Million.</li> </ul>
<b>Cyclone and Storm surges</b>	Tropical cyclones accompanied by storm surges are annual disaster phenomena in Bangladesh. In an average year, the country's coast is hit by 1.3 cyclones, the more severe (1970, 1991, 2007 & 2009) of which caused devastation and huge loss of lives.	<ul style="list-style-type: none"> <li>→ Super cyclone Sidr hit the Bangladesh coast in November 2007, killing around 3,406 people and costing the economy approximately US\$2.3 billion.</li> <li>→ AILA caused 190 deaths of people in 2009.</li> <li>→ The 1991 cyclone killed 138,882 people and living as many as 10 million homeless causing 1.5 billion USD in damage.</li> <li>→ The 1970 cyclone was deadliest in killing 300,000 people and the estimated damage was 86.4 million USD.</li> </ul>
<b>Nor'westers and Tornadoes</b>	Occurring most commonly during the pre- and post-monsoon (March to May, and October to November), Nor' westers bring the much-needed pre-monsoon rain, but also cause devastation and destruction. The frequencies of devastating nor 'westers usually reach maximum in April and minimum in March.	<ul style="list-style-type: none"> <li>→ Wind-speeds in nor 'westers do not exceed 113-130 km/hr (70-80 miles/hr), though often their speeds exceed 162 km/hr (100 miles/hr). When the winds become whirling with funnel shaped clouds having a speed of several hundred kilometers or miles per hour, they are called tornados.</li> <li>→ Tornados are suddenly formed and are extremely localized in nature and of brief duration.</li> </ul>
<b>Earthquake</b>	Bangladesh is in a seismically active region. It has experienced numerous moderate to large-scale events in the last 100 years. None of these, however, has had a catastrophic impact	<ul style="list-style-type: none"> <li>→ The record of approximately 150 years shows that Bangladesh and the surrounding regions experienced seven major earthquakes</li> </ul>
<b>River Bank Erosion</b>	It is estimated that 5% of total floodplain of Bangladesh is directly affected by river bank erosion. During monsoon, extensive overbank spills, bank erosion and bank line shifts have become typical and the unpredictable shifting behavior of rivers and their encroachments not only affect rural floodplains but also hinder urban growth centers and infrastructures.	<ul style="list-style-type: none"> <li>→ Approximately 8,700 hectares of land are lost and around 180-200,000 people displaced annually due to river erosion in Bangladesh.</li> <li>→ Kurigram, Gaibandha, Jamalpur, Bogra, Sirajganj, Tangail, Pabna and Manikganj districts along Jamuna River, and Rajbari, Faridpur, Manikganj, Dhaka, Munshiganj, Shariatpur and Chandpur districts are along Padma River, are the country's most erosion prone zones</li> </ul>
<b>Landslide</b>	Common in hilly areas of southeastern Bangladesh especially in Bandarban, Rangamati, Khagrachhari and Cox's bazar. The events of June 2007 in Chittagong, in which more than 120 people died, clearly demonstrate that.	<ul style="list-style-type: none"> <li>→ Causes of landslides include: earthquakes, sustained rainfall, unregulated anthropogenic developments, mining, and, as is most common in Bangladesh, heavy rainfall. Deforestation, hill cutting, and unregulated development work can also contribute to the likelihood of landslides.</li> <li>→ The effects of jhum cultivation and other forms of cultivation in the steep slopes also play significant role in occurrence of landslides.</li> <li>→ Landslides often affect most severely the poorer sections of the population, because poverty and landlessness force poor people to live on the slide-prone hill slopes.</li> </ul>
<b>Fire</b>	Fires in urban settings are common in Bangladesh, causing huge loss of life and damage to properties every year. Fire incidents in the country are increasing at an alarming rate. In 2004 alone, a total of 7,140 fire incidents occurred	<ul style="list-style-type: none"> <li>→ Factory fires are more frequent in Bangladesh as fire incidents in the country are increasing at an alarming rate. In 2004 alone, a total of 7,140 fire incident occurred which caused damage to property worth more than Tk. 200 crore.</li> </ul>
<b>Infrastructure collapse</b>	Incidents of infrastructure collapse are on the rise, and Bangladesh has witnessed the collapse of a number of industrial buildings in recent years.	<ul style="list-style-type: none"> <li>→ Vulnerability increased due to inaccessibility of site to the equipment even though all the required equipment is mobilized, unfamiliarity with understanding and practical collapse condition and lack of awareness of mass people on stages of rescue operation.</li> </ul>
<b>Traffic accidents</b>	Fatalities and injuries from road accidents are a growing concern..	<ul style="list-style-type: none"> <li>→ According to the Bangladesh Bureau of Statistics, 3,193 people were killed and 2,409 injured in traffic accidents during 2006</li> </ul>

### 2.1.1 Earthquake Risk

Earthquake hazard poses huge threats to the lives of people, damage of property and economy in Bangladesh because of its location in the tectonically active Himalayan



orogenic belt. The major earthquakes happened in Bangladesh include 1548 earthquake hit in Chittagong and Sylhet regions, earthquake stricken in 1642 in Sylhet district, earthquake took place in 1918 in Sylhet district, 1762 earthquake that shaken most parts of Bangladesh, great Indian earthquake happened in 1897 (8.7 magnitude on Richter Scale) caused huge damage in Dhaka, Sylhet and Mymensingh districts. In recent memories, 1997, 1999 and 2003 earthquake in greater Chittagong regions caused local level damages. Study suggests that around 250,000 buildings in the three major cities of Bangladesh like Dhaka, Chittagong and Sylhet are extremely vulnerable to earthquakes (CDMP 2009). Some 142,000 among 180,000 (79%) buildings in Chittagong; 24,000 out of 52,000 in Sylhet (46%); and 78,000 out of 326,000 buildings (24%) in Dhaka were detected as risky to earthquake hazards. MoDMR has carried out several studies to assess earthquake risks especially for urban conditions. For example, risk assessments were carried out for Dhaka, Chittagong and Sylhet (CDMP) and also for cities like Bogra, Dinajpur, Mymensingh, Rajshahi, Rangpur, and Tangail (CDMP, 2009) . Ministry of Disaster Management (MoDRM) in 2015 study identified major earthquake risks which are mentioned as follows:

- In general, at short return period, i.e. 43 years, the observed seismicity in and around Bangladesh controls the hazard for most considered structural periods.
- Ground motion across Bangladesh represented by PGA is in the range of 0.1-0.6g, corresponding to the 475-year return period and in the range of 0.1-1.0 g, corresponding to the 2,475-year return period.
- The effect of high-slip-rate of Duaki fault could be observed as the largest seismic hazard in Bangladesh.

Management of earthquake risks needs mitigation, preparedness, emergency response and recovery plans. MoDMR prepared contingency plans for emergency response and recovery stages of earthquake disaster management for different levels. The contingency plans also may help to design appropriate mitigation and preparedness plans. However, scenario based contingency plan has been prepared for national level. In addition, contingency plans developed for city level, e.g. for the city corporations in Dhaka, Chittagong and Sylhet. Agency level contingency plans include Department of Disaster Management (DDM), Armed Forces Division (AFD), Directorate General of Health Services (DGHS), Fire Service and Civil Defense (FSCD), Titas Gas Transmission and Distribution Company Limited (TGTDC), Bangladesh Telecommunication Company Limited (BTCL), Dhaka Power Distribution Company Limited (DPDC) and Dhaka Water Supply and Sewerage Authority (DWASA).

Scenario based contingency plans have also been prepared at city level for the cities of Bogra, Dinajpur, Mymensingh, Rajshahi, Rangpur and Tangail, and at Ward Level for Dhaka North City Corporation (13 Wards), Dhaka South City Corporation (12 Wards), Chittagong City Corporation (15 Wards) and Sylhet City Corporation (10 Wards ). The plans have identified evacuation routes, emergency shelter locations and identified gaps in the resource and needs by the responding agencies.

Table 3: Status of buildings-at-risk in different cities of Bangladesh to earthquake hazards

Cities	Total number of buildings	Generation of debris		Concrete Structure			Masonry Structure			Informal Structures		
		(Metric Ton)	% of steel followed by brick/wood	Total buildings	Moderate Damage (%)	Complete Damage (%)	Total buildings	Moderate Damage (%)	Complete Damage (%)	Total buildings	Moderate Damage (%)	Complete Damage (%)
Bogra Municipality	92830	3.850	73, 27	9829	22.86	8.37	61288	19.79	32.19	20227	18.54	0.1
Dinajpur Municipality	41955	1.390	75, 25	3929	22.74	1.78	23318	25.78	16.16	8057	14.48	0
Mymensingh Municipality	45033	4.55	70, 30	7703	0.58	97.77	26789	0.57	91.77	10541	38.36	1.57
Rajshahi City Corporation	93885	1.610	68, 32	7982	23.85	8.62	80618	29.73	18.84	5142	18.07	0.14
Rangpur City Corporation (old municipal area)	76444	2.81	73, 27	6294	31.33	29.32	37436	13.84	42.18	32694	10.66	0.15
Tangail Municipality	68348	0.35	72, 28	4864	20.54	10.57	13076	40.04	5.93	44417	12.07	0

Source: (MoDMR, Earthquake Risk, 2015)

The relative location of the country, low-lying land topography, tropical climatic pattern, strongly active hydrological processes all in combined fashion makes the country sensitive and vulnerable to different type of hazards. A brief review of the physical characteristics might give an understanding about the susceptibility of the country to hazards which sometimes lead to disasters conditions.

### 2.1.2 Thunderstorm: A new disaster frontier in Bangladesh

The pre-monsoon hot summer season from the month of March to May brings with it heat, rainfall and thunderstorm every year. With the shifting from winter anti-cyclonic pressure regime to summer, this season has a hallmark characteristic of high temperature and cyclonic storms brewing in the Bay of Bengal. Lightning-strike normally peaks in this season. Lightning has suddenly drawn attention of the citizens of Bangladesh with its sudden onslaught as something more than a hazard, rather a disaster. Particularly, death of a large number of people due to lightning this year (in the month of April, May and June) i.e. 2016 caused and spread panic across the country. The State Minister, Disaster Management and Relief, Bangladesh informed the Members of the Parliaments on 5th of June 2016 that 142 people have been died of thunderstorms this year<sup>2</sup> with the highest 15 people in Habigonj district. This death toll and damage of assets made Government of Bangladesh to include Thunderstorm hazards (and associated lightening) as a national disaster.

Climate scientist suggest (Diffenbaugh N.S., 2013) that in future the energy available for convection( called convective available potential energy or CAPE) will increase in climate change induced greenhouse gas forcing conditions. As high value of CAPE is conducive for severe thunderstorms, we can expect to have more thunderstorms and lightning hazards in future in Bangladesh. With global warming expected to continue in future, thunderstorms will occur more frequently given conducive context for it to form (Samenow, 2013).

## 2.2. Natural hazards likely to affect

Historical statistics would suggest that Bangladesh is one of the most disaster prone countries in the world with great negative consequences being associated with various natural and human induced hazards. The geophysical location, land characteristics, multiplicity of rivers and the monsoon climate render Bangladesh highly vulnerable to natural hazards. The coastal morphology of Bangladesh influences the impact of natural hazards on the area. Especially in the south eastern area, natural hazards increase the vulnerability

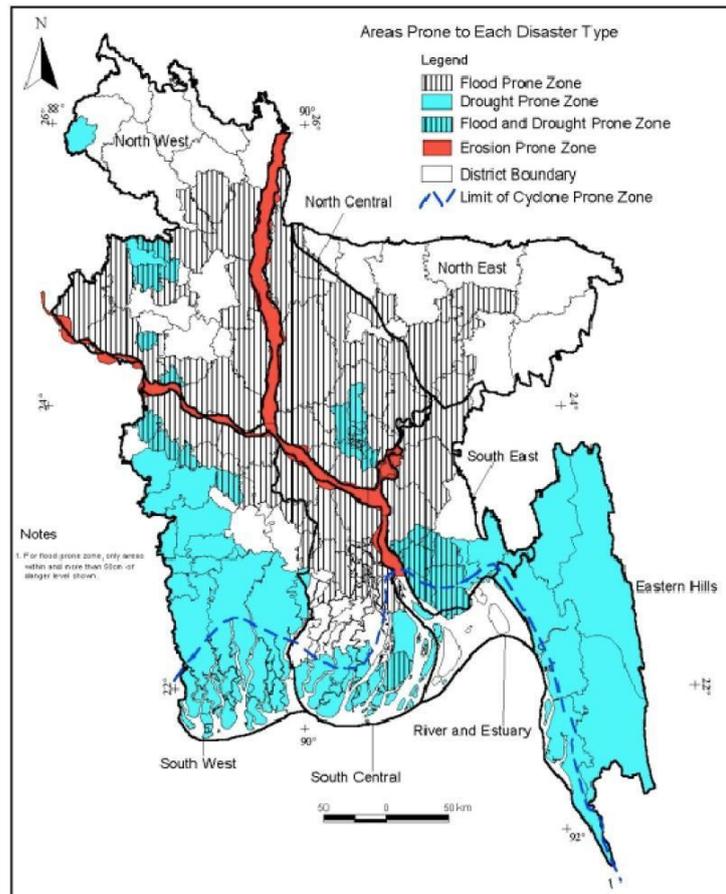


Figure 8: Areas Prone to Disaster Type

of the coastal dwellers. Following disaster occurred frequently in Bangladesh:

- Flood
- Tropical Cyclone
- Storm Surge
- Tornado
- River Bank Erosion
- Drought
- Earthquake

And the Key factors of vulnerability are Geographical location, Dominance of flood plains, Low elevation from the sea, warming & climate change, High population density, High level of poverty.

## 2.2.1 Flood

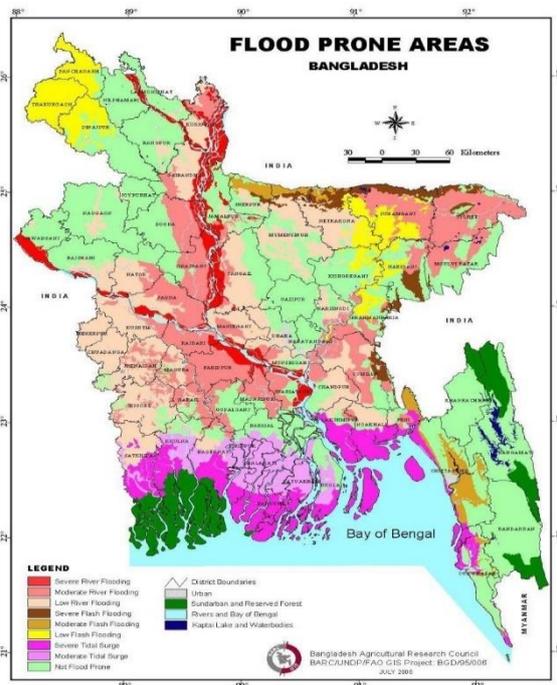
Floods are annual phenomena, with the most severe occurring during the months of July and August. Regular river floods affect 20% of the country, increasing up to 68% in extreme years. The floods of 1988, 1998, 2004 and 2007 were particularly catastrophic, resulting in large-scale destruction and loss of lives.

Flash floods caused by overflowing of hilly rivers in eastern and northern Bangladesh (in April-May and September-November).

Rain floods caused by drainage congestion and heavy rains.

Monsoon floods caused by major rivers usually in the monsoon (during June-September).

Coastal floods caused by storm surges.



The 1998 flood lasted for 65 days from July 12 to September 14 and affected about 67% of area of the country. In the year 2000, Bangladesh faced an unusual flood over its usually flood-free south western plain, which also caused loss of life and massive damage to property. In 2004, floods inundated about 38% of the country. About 747 people lost their lives. About 2,500 kilometers of embankment were damaged and about 74 primary school buildings were washed away. This flood caused economic losses of about US\$2,200 Million. Floods continue to be major hazards in Bangladesh.

Figure 9: Flood Prone Areas

To mitigate the impacts of floods, the government has been developing and implementing various measures to better equip the country to deal with floods. The Ministry of Water Resources (MoWR) is leading the country on flood mitigation initiatives. Important initiatives include Flood Action Plan, Flood Hydrology Study, Flood Management Model Study, National Water Management Plan, National Water Policy, Flood Early Warning System Study, etc.

## 2.2.2. Tropical cyclone

Tropical cyclones from the Bay of Bengal accompanied by storm surges are one of the major disasters in Bangladesh. The country is one of the worst sufferers of all cyclonic casualties in the world.

Number of casualties is due to the fact that cyclones are always associated with storm surges. Storm surge height in excess of 9m is not uncommon in this region. For example, the 1876 cyclone had a surge height of 13.6 m and in 1970 the height was 9.11 m. In fact, the 1970 cyclone is the deadliest cyclone that has hit Bangladesh coastline. With a wind-speed of about 224 km per hour and associated storm surge of 6.1 to

9.11m, it was responsible for deaths of about 300,000 people.

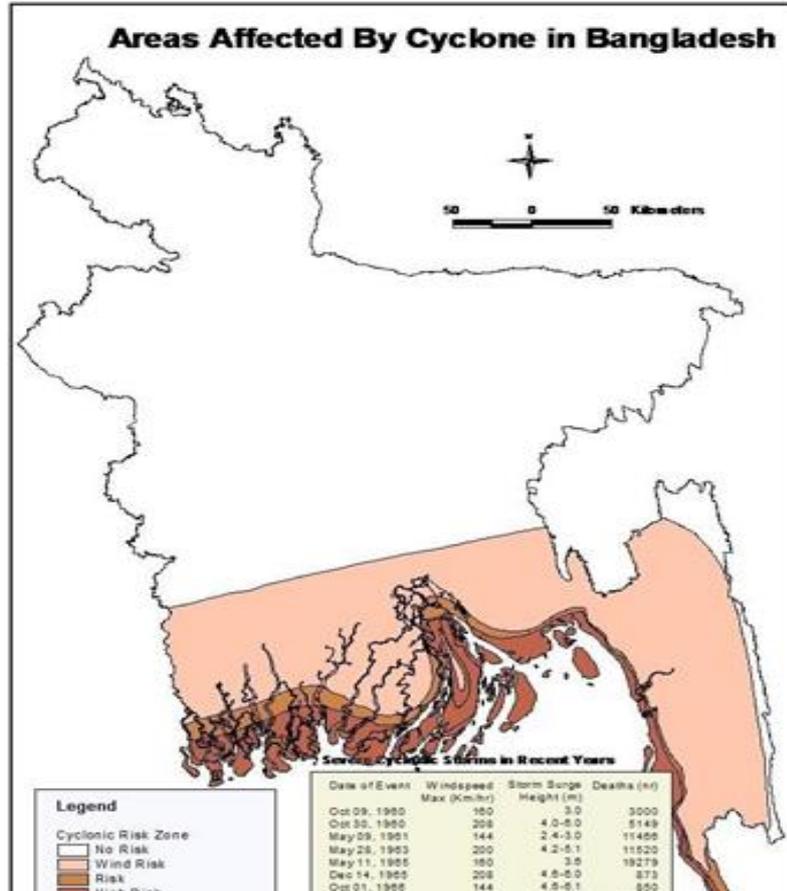


Figure 10: Areas Affected to Cyclone

Table 4: Major cyclones that hit the Bangladesh

Date		Maximum Wind speed (km/ hr)	Storm Surge Height (metres)	Death Toll
11 May	1965	161	3.7 - 7.6	19,279
15 December	1965	217	2.4 - 3.6	873
01 October	1966	139	6.0 - 6.7	850
12 November	1970	224	6.0 - 10.0	300,000
25 May	1985	154	3.0 - 4.6	11,069
29 April	1991	225	6.0 - 7.6	138,882
19 May	1997	232	3.1 - 4.6	155
15 November (SIDR)	2007	223	4.2 - 4.6	3363
25 May (AILA)	2009	92	--	190
16 May (Mahasen)	2012	130	--	16

Source: (BMD, 2020)

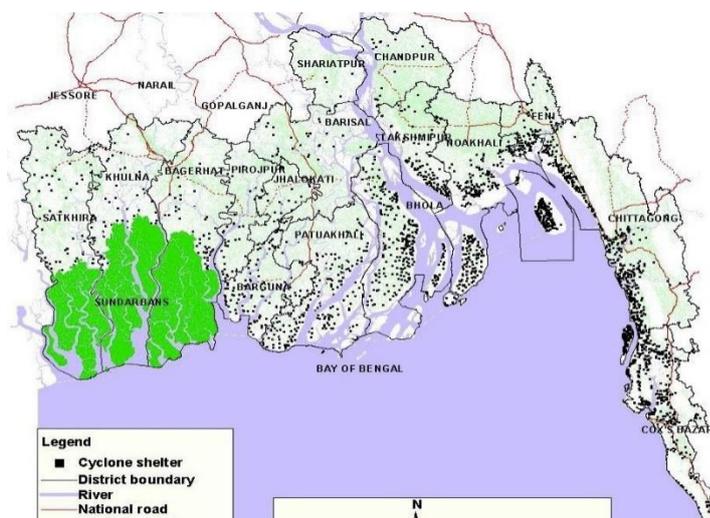


Figure 11: Cyclone Shelter Location Map



### 2.2.3. Tornado

The two transitional periods between southwest and northeast monsoons over the Indian sub-continent are characterized by local severe storms. The transitional periods are usually referred to as pre-monsoon (March-May), and post-monsoon (October- November). It is the pre-monsoon period when most of the abnormal rainfall or drought conditions frequently occur in different parts of Bangladesh. Also there are severe local seasonal storms, popularly known as nor'westers (kalbaishakhi). Severe nor'westers are generally associated with tornadoes. Tornadoes are embedded within a mother thundercloud, and moves along the direction of the squall of the mother storm. The frequency of devastating nor'westers usually reaches the maximum in April, while a few occur in May, and the minimum in March. Nor'westers and tornadoes are more frequent in the afternoon. Nor'westers may occur in late February due to early withdrawal of winter from Bangladesh, Bihar, West Bengal, Assam, and adjoining areas. The occasional occurrence of nor'westers in early June is due to the delay in the onset of the southwest monsoon over the region. Wind speeds in nor'westers usually do not exceed 113-130 km/hr (70-80 miles/hr), though often their speeds exceed 162 km/hr (100 miles/hr). When the winds become whirling with funnel shaped clouds having a speed of several hundred kilometers or miles per hour, they are called tornados.



Nor'westers bring the much-needed pre-monsoon rain. They can also cause a lot of havoc and destruction. Tornadoes are suddenly formed and are extremely localized in nature and of brief duration. Thus, it is very difficult to locate them or forecast their occurrence with the techniques available at present. However, high-resolution satellite pictures, suitable radar, and a network of densely spaced meteorological observatories could be useful for the prediction or for issuing warnings of nor'westers and tornadoes.

14 April 1969	Demra (Dhaka)
17 April 1973	Manikganj (Dhaka)
10 April 1974	Faridpur
11 April 1974	Bogra
09 May 1976	Narayanganj
01 April 1977	Faridpur
26 April 1989	Saturia (Manikganj)
14 May 1993	Southern Bangladesh
13 May 1996	Tangail
04 May 2003	Brahmanbaria
21 March 2005	Gaibandha
22 March 2013	Brahmanbaria

Table 5: The Table 6 The devastating northwesterners and tornadoes that hit Bangladesh.

## 2.2.4. Riverbank erosion

River erosion in Bangladesh is no less dangerous than other sudden and devastating calamities. Losses due to river erosion occur slowly and gradually. Though losses are slow and gradual, they are more destructive and far-reaching than other sudden and devastating calamities. The effects of river erosion are long-term. It takes a few decades to make up the losses, which a



Figure 12: River Erosion

family has incurred by river erosion. There has been little progress, however, for improving the lives of erosion-affected people due to resource constraint. This is an ongoing disaster and there is no specific indicator to measure the extent of damage. So the extent of damage caused by river erosion in most cases is based on various reports/information.

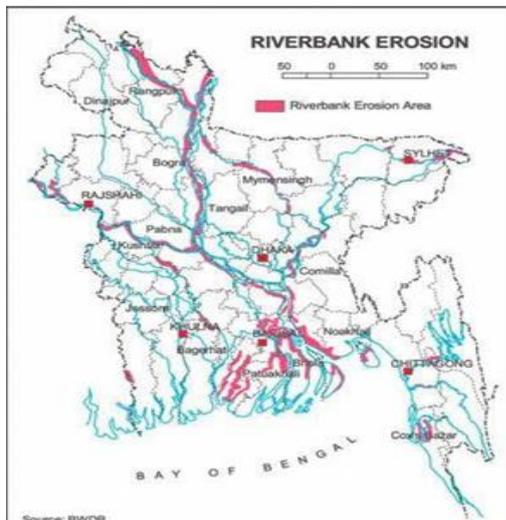


Figure 13: Riverbank Erosion Map

Needless to say whatever the difference in ascertaining the extent of damage river erosion causes huge loss of property throughout the year. According to “World Disaster Report 2001” published by IFRC every year about 10,00,000 people are affected by river erosion and 9,000 hectare cultivable lands are banished in river. Among these only a few affected people are able to find new shelters while others become

homeless for uncertain period. A recent study of CEGIS (2005) shows that bank erosion along Padma River during 1973 – 2004 was 29,390 hectares and along Jamuna River during 1973 – 2004, it was 87,790 hectares.

### 2.2.5. Drought

Drought conditions due to deficiency in rainfall affect different parts of Bangladesh mostly during the pre-monsoon and post-monsoon periods. Between 1949 and 1991, droughts occurred in Bangladesh 24 times. Very severe droughts hit the country in 1951, 1957, 1958, 1961, 1972, 1975, 1979, 1981, 1982, 1984 and 1989. Past droughts have typically affected about 47% area of the country and 53% of the population (WARPO, 2005). Bangladesh faces



Figure 14: Drought

unpredictable drought hazard in the dry monsoon due to inadequate and uneven rainfall. It varies from place to place, however, and the northwestern regions suffers most from the drought. As much as 17% of the Aman crops, the main paddy crops in the wet season may be lost in a typical year due to drought.

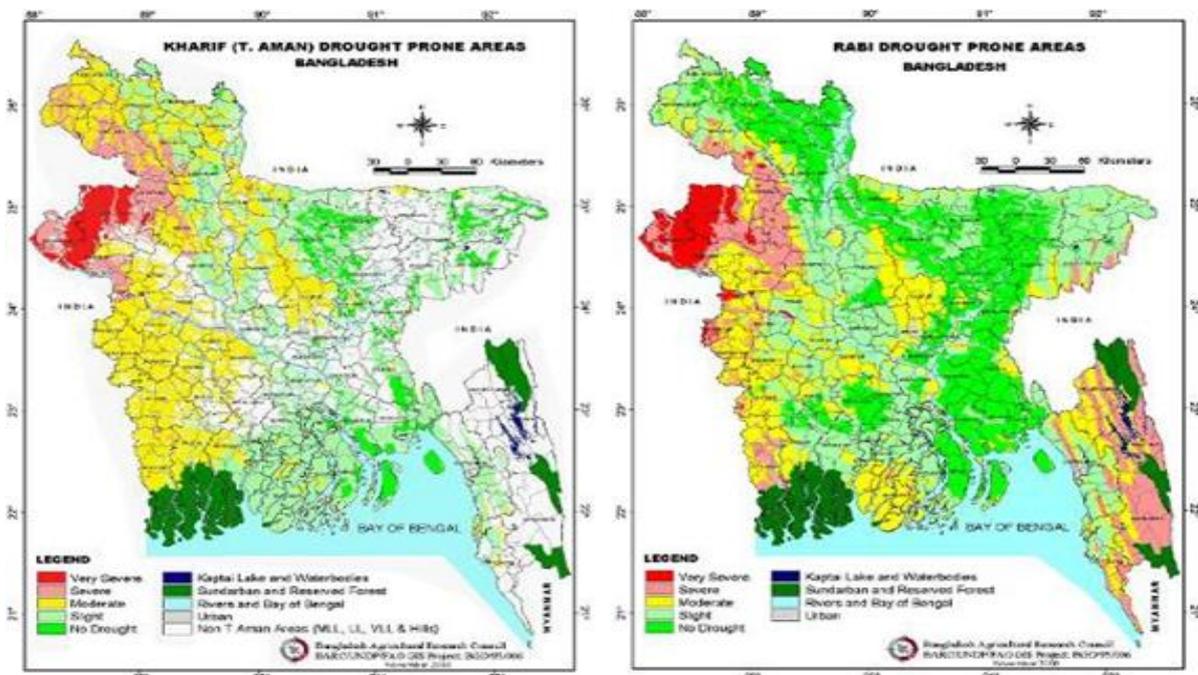


Figure 15: Drought Map

## 2.2.6. Earthquake

The historical seismic data of Bangladesh and adjoining areas indicate that Bangladesh

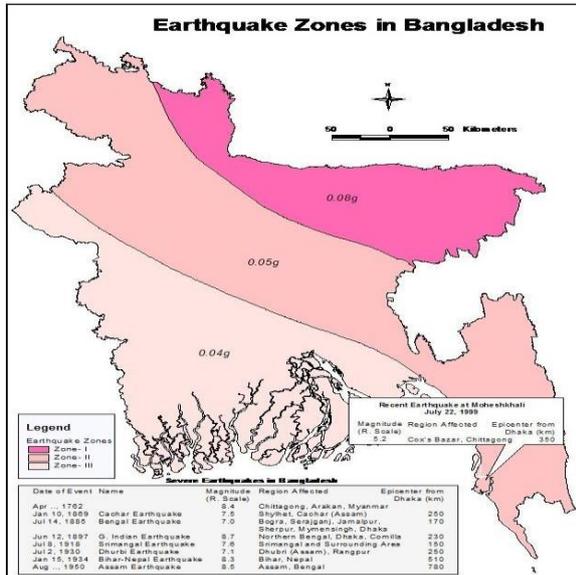


Figure 16: Earthquake Zones in Bangladesh

isvulnerable to earthquake hazard. The record of approximately 150 years shows that Bangladesh and the surrounding regions experienced seven major earthquakes (with  $M_b = 7$ ). In the recent past, a number of tremors of moderate to severe intensity had already taken place in and around Bangladesh. The Sylhet Earthquake ( $M_b = 5.6$ ) of May 8, 1997, the Bandarban Earthquake ( $M_b = 6.0$ ) of November 21, 1997, the Moheshkhali Earthquake ( $M_b = 5.1$ ) of July 22, 1999, the Barkal (Rangamati) Earthquake ( $M_b = 5.5$ ) of

July 27, 2003, the Meghalay Earthquake ( $M_b = 5.2$ ) of March 02, 2013 and many more shakes in the recent years may be cited as examples. Bangladesh and the northeastern Indian states have long been one of the seismically active regions of the world, and have experienced numerous large earthquakes during the past 200 years. Many of seismic-tectonic studies have been undertaken on the area comprising the Indo-Burman ranges and their western extension and in the northern India.

Major active fault zones of the country have been delineated through geological trenching and dating methods. A seismic zoning map of Bangladesh has been proposed in 1979 by Geological Survey of Bangladesh (GSB) dividing the country into three seismic zones which was accompanied by an outline of a code for earthquake resistant design. Later, a new updated seismic zoning map and detailed seismic design provisions have been incorporated in Bangladesh National Building Code (BNBC 1993). A seismicity map of Bangladesh and its adjoining areas has also been prepared by BMD and GSB. Bangladesh has been classified into three seismic zones with zone-3 the most and zone-1 the least vulnerable to seismic risks.

Table 7: Major Earthquake

Date	Name	Magnitude (Richter)	Epicentral Distance from Dhaka (km)	Epicentral Distance from Sylhet City (km)	Epicentral Distance from Chittagong (km)
10 January, 1869	Cachar Earthquake	7.5	250	70	280
14 July, 1885	Bengal Earthquake	7.0	170	220	350
12 June, 1897	Great Indian Earthquake	8.7	230	80	340
8 July, 1918	Shrimongal Earthquake	7.6	150	60	200
2 July, 1930	Dhubri Earthquake	7.1	250	275	415
15 January, 1934	Bihar-Nepal Earthquake	8.3	510	530	580
15 August, 1950	Assam Earthquake	8.5	780	580	540

## 2.3. Recent Major Disasters

### May 2020 - Tropical Cyclone Amphan

On 20 May 2020, Tropical Cyclone Amphan reached Bangladesh. As of 22 May, the official death toll in Bangladesh was 17, with the UN estimating 10 million people and 19 districts were affected. GoB's Early Warning system, the successful massive evacuations to cyclone shelters respective of COVID-19 mitigation measures, and the power of the mangrove forest of the Sundarbans contributed to reduce the impact of the cyclone and to reduce the loss of lives as well as the damages to infrastructures. According to MoDMR 330,667 houses were damaged including 55,667 totally destroyed in nine most impacted districts: Khulna, Satkhira, Barguna, Bhola, Patuakhali, Pirojpur, Noakhali, Bagerhat and Jessore. Damage was mostly due to tidal surge causing embankments to collapse or overflow. Bangladesh Armed Forces provided medical assistance, emergency rescue and relief assistance. BDRCS provided food and emergency relief items in affected districts in addition to funding the immediate repair of 200 tube-wells and for the rapid installation of 100 communal latrines. CSOs and NGOs are using their prepositioned items to contribute to the relief efforts.

### July 2019 – Monsoon Floods

Despite the delayed onset of the monsoon, heavy rainfall occurred during the first half of July 2019 which triggered widespread flooding. Floods damaged and destroyed vital infrastructures including 6,641 kilometers of roads, 1,275 bridges and culverts as well as 1,515 kilometers of embankments. With the support of the Ministry of Disaster Management and Relief (MoDMR), the humanitarian community conducted a Joint Needs Assessment (JNA). Among the 28 districts affected by the floods, the JNA report identified nine most severely affected districts: Jamalpur, Kurigram, Gaibandha, Sylhet, Sirajganj, Tangail, Sunamganj, Bogura, Bandarban. In those districts, 85% of the overall displacement occurred equivalent to 261,499 persons including 57,406 school-age children (29,407 boys and 28,002 girls). Among the displaced population, 239,387 persons were living in makeshift shelters (schools, colleges) or on embankments and some returned as water started to recede in their areas. Associated riverbank erosion permanently displaced more than 8,000 people equivalent to 1,654 households in Kurigram, Bogura and Tangail districts.<sup>131</sup>



### **July 2018 – Floods**

On 25 July 2018, heavy monsoon rains caused landslides and flooding in the southeast, killing five children near Cox's Bazar and Ramu. Approximately 21,000 Rohingya refugees in the camps were relocated because their shelters were threatened by landslides.

### **August 2017 – Floods**

Heavy monsoon rains caused intense flooding across more than one-third of Bangladesh. The Bangladesh Meteorological Department provided heavy rainfall warnings. As per the analysis by the Ministry of Disaster Management and Relief (MoDMR), the floods were the worst in the last four decades. Incessant heavy rainfall brought by the monsoon triggered flooding in five divisions, 31 districts, 176 Upazilas and 1,173 Unions. Findings from the 72-hours Needs Assessment were published on 21 August and they indicated that a total of about 6.9 million people (1.54 million households) were affected by the floods. National authorities confirmed 114 deaths and 197,416 people were temporarily displaced in 703 community shelters. As a result of the extensive floods, 77,272 houses were destroyed, 524,375 were partially damaged. Findings of the 72-hours Needs Assessment also highlighted that in northern Bangladesh, the following were the six worst-affected districts: Gaibhandha, Dinajpur, Kurigram, Jamalpur, Nilphamari, Sirajganj. In these districts, a total of 330,000 people were displaced. Access to the most affected areas in the northwest was a challenge as roads were either severely damaged or submerged under flood water. Approximately 9,000 km of roads, 500 bridges and culverts were damaged. Nearly 100 km of rail lines were severely damaged by the floods. Around 714 km of embankments were also washed away.

### **June 2017 – Landslides**

The June landslides, which started on 13th June with a few episodes, resulted in heavy loss of life (160 persons), injury (187 persons), destruction of houses (6,000 structures), and other key infrastructures despite being localized in impact. It was the worst landslide-related disaster since 2007. It affected approximately 80,000 persons across five districts: Bandarban, Chittagong, Cox's Bazar, Khagrachari and, Rangamati. Among these people, 34,000 were



severely impacted as they lost their houses together with their belongings, basic necessities, livelihoods and food stocks.

### **2016 - Cyclone Roanu**

On 21 May 2016, Cyclone Roanu made landfall in Bangladesh, about one week after it struck Sri Lanka as a tropical storm. The cyclone caused the deaths of at least 27 people in Bangladesh, though many more in Sri Lanka. Thanks to early warning systems, half a million people were evacuated to shelters. Cyclone Roanu affected 1.3 million people, bringing winds over 100 km/hour (62 miles/hour), heavy rain, and storm surges peaking at 2.7 meters (8.9 feet).<sup>127</sup> The Bangladesh Armed Forces were among the responders.

### **Cyclone Aila (May 2009)**

Cyclone Aila hit the Bangladesh on Monday 25 May 2009 and has produced substantial damage across areas of southern Bangladesh. It caused 190 immediate deaths, injuries to 7,103 people and more than 500,000 people to become homeless. The total damage was \$ 1.7 billion.

### **Cyclone Sidr (November 2007)**

Cyclone Sidr hit the coastal areas on 15 November 2007. It affected 87,000 people, killed 3,363 and injured 55,282 and 564,000 homes have been destroyed 8,85,280 houses have been damaged. Total damage and losses were (in USD) 23 billion.

### **Cyclone (April 1991)**

On April 29, 1991, a cyclone struck the country of Bangladesh, causing a massive storm surge and widespread flooding. Approximately 138,000 people perished in this disaster. Although cyclones frequently hit this region of the world, this cyclone was one of the strongest hurricanes in recent history. The 270 km/hr wind speed caused a 6 meter high storm surge that flooded a large area of the country. The total damage was \$ 1.5 billion.



### **Cyclone (November 1970)**

The 1970 Bhola cyclone was a devastating tropical cyclone that struck Bangladesh on November 12, 1970. It remains the deadliest tropical cyclone ever recorded, and one of the deadliest natural disasters in modern times. The 34.8 foot (10.6 meter) storm surge caused the highest tropical cyclone death toll in history, about 300,000 people were killed. Two hundred and fifty miles of coastline on the Bay of Bengal was devastated and homes, crops, cattle and poultry, everything washed away. The total damage was US\$24 billion.

## Chapter-3: Disaster Management System in Bangladesh

### 3.1. Disaster Risk

Proper understanding of disaster risks is the prerequisite to devise necessary strategy, mobilize resources for reducing disaster risks and at the same time to put appropriate systems in place for efficient handling impact events. However, there should be a conceptual construct how to assess potential risks for different sectors (e.g. health, education, settlement, employment and livelihoods etc.) operating at different tiers (e.g. national, regional and local, household levels), at different times for different disasters. Involvement of multiple dimensions of these kinds indicates that understanding disaster risks is not straight forward phenomenon; it rather needs a comprehensive and systematic approach to assess the challenges induced from disasters. Considering the necessity and importance in understanding the risks, different directives promulgated in policy instruments (both local and international), different risk assessment tools and processes were adopted, loss and damage assessment studies conducted, early warning systems and communication modes/processes for disseminating risk information at community levels implemented to better understand disaster risks.

#### 3.1.1. Policy framework for Disaster Risk Reduction

Disaster Management has been considered as GOB's one of the top priorities, which is now focusing on shifting from post-disaster relief distribution to a disaster risk reduction culture. This also gradually focused on mainstreaming efforts adopting inclusive approach including gender mainstreaming in DRR. The National Plan for Disaster Management (2016-2016) and the Disaster Management Act (2012) have become functional. A Disaster Management Policy has also been prepared and is waiting for final approval. In addition to MoDMR, DRR issues have also been taken as one of the key components of several policies and legislations in Bangladesh. Some of the DRR inclusive documents can also be found in the plans and policies of other Ministries, few of them are: the Seventh Five Year Plan (2010-2015, Ministry of Planning), BCCSAP (MoEF-GOB, 2009), National Women's Advancement Policy (Ministry of Women and Children Affairs/MoWCA, 2011), National Child Policy (2011) and Children Act (MOWCA, 2013), National Education Policy (Ministry of Education, 2010), National Agriculture policy (MoA, 1999).



The National Plan for Disaster Management (NPDM, 2010-2015), led by Ministry of Disaster Management and Relief (MoDMR)<sup>4</sup>, is an outcome of the HFA and of the process of regional cooperation in South Asia (i.e., the SAARC Process). The NPDM focuses on disaster management vision of Bangladesh, takes into consideration hazards, climate change, linkages between disasters and development, national and International drivers for change like MDGs, Hyogo Framework of Action (HFA) etc. All the issues involving methods, strategic goals, regulatory framework, plans for disaster management, and implementation of the plan, financing and follow up are planned to be executed in collaboration with stakeholders including the UN agencies, INGOs and NGOs (MoFDM, 2010).

The revised Standing Orders on Disaster (MoFDM, 2010) include various stakeholders such as Ministry of Women and Children Affairs (MOWCA) in risk reduction activities. Such activities involve responses during normal, warning, disaster and rehabilitation stages. Department of Women Affairs (DWA) is assigned to carry out specific activities such as ensuring participation of DWA representatives in different disaster management committees (DMC), ensuring women's participation in the preparedness and disaster management activities, play active role in identifying the gender gap and ensure its implementation in all disaster management activities, provide livelihood support to women and children affected by disasters. The National Policy for Women's Advancement, 2011 has endorsed women in disaster as a separate theme for the first time in Bangladesh.

### 3.1.2 Risk informed sharing platform

Bangladesh has made good progresses in monitoring sub-regional and regional hazard risks. Institutional arrangements exist between FFWC and neighboring state institutions, such as the Indian Central Water Commission, to exchange hydrological and meteorological data on trans-boundary rivers. Arrangements have been put in place to facilitate the sharing of information regarding avian influenza outbreaks near borders between Bangladesh and neighboring states of India. Adoption of the South Asian Association for Regional Cooperation (SAARC) Comprehensive Framework on Disaster Management created an opportunity for the exchange of information and regional cooperation in risk assessments at the regional level. During this reporting period, the SAARC agreement for Rapid Response to Natural Disasters was ratified by Bangladesh to enhance regional cooperation and collaboration on Disaster Risk Management (DRM). United Nations Platform for Space-based Information for Disaster



Management and Emergency Response (UN-SPIDER) has been continuing its efforts since 2011 towards use of space-based information for DRR as follow up of Technical Advisory Mission (TAM) to Bangladesh. International NGOs have facilitated the sharing of information and knowledge on DRR and DM on a regular basis, especially during the hazard and disaster season with neighboring states.

### 3.1.3. Risk inform to the community level

The Government of Bangladesh has strong Early Warning (EW) systems for cyclone and flooding. The Bangladesh Meteorological Department (BMD) and FFWC produce and disseminate disaster warning information through the media and institutions at the local level. A community-based flood EW system has been piloted in three districts by MoDMR through CDMP-II. DDM through DMCs disseminate EW information using local means; in addition community members have access to EW information and daily weather bulletin by dialing 10941 on any mobile phone. DDM is disseminating forecasts of disasters using mobile phones; for example, during cyclone Mahasen updates were sent on the cyclone's movement through IVR and instructions were provided to DMCs through Short Message Service (SMS). Weather forecasts from BMD are provided by the DAE in its Disaster and Climate Risk Management in Agriculture (DCRMA) Project website and field offices. The GSB has established landslide EW systems in parts of Chittagong, Cox's Bazar, and Teknaf cities; this will be extended to include three hill-tract towns. MoDMR has also established local EW systems through 30 community radio stations. Using Space-based information, community based flood EW dissemination system and inundation mapping have been piloted in two flood-prone areas by DDM and FFWC, with support from the JAXA and the ADB. NGOs are working closely with the Local Governments (LGs) to strengthen the EW dissemination system. NGOs have mobilized youth volunteers to disseminate EW messages During Cyclone Mahasen, along with CPP volunteers, children and youth groups supported by NGOs were requested by the LGs to disseminate EW messages to their communities. The GoB and NGOs have built a technical partnership with the Regional Integrated Multi-hazard Early Warning System (RIMES) to get scientific data.

### 3.2. Risk Governance to manage Disaster Risk

Bangladesh has become well known for its disaster management and risk reduction approaches within the South Asian region. Being the most disaster prone country within the region Bangladesh was the first country to establish a separate Disaster Management Bureau (DMB) in early nineties. Bangladesh has drafted a well-designed document- Standing Orders on Disasters (SOD) in 1997 (revised in 2010), which explains specific roles of relevant stakeholders during different phases of a disaster (DMB, 2010). In 2004 the Ministry of Food and Disaster Management (in 2012 the Ministry has been named as Ministry of Disaster Management and Relief/MODMR) launched the Comprehensive Disaster Management Programme (CDMP) to facilitate the reform of the disaster management approach by expanding its focus from reactive emergency response to proactive risk reduction. The past decade has seen the country to initiate a good number of institutional structures and restructuring to achieve technical monitoring, capacity building, preparedness and response in reducing disaster risks. The MODMR, with its line agency Department of Disaster Management, is responsible for coordinating national disaster management efforts across all agencies. A series of inter-related institutions, at both national and sub-national levels have been created for disaster management. As per the Rules of Business of the Government of Bangladesh, the Ministry of Disaster Management and Relief (MoDMR) is mandated to formulate policies, prepare plans, and monitor and coordinate all



Figure 17: Disaster Management Institutions

aspects of disaster activities. The field level activities of MoDMR are carried out by two subordinate offices e.g. the Department of Disaster Management and Cyclone Preparedness Centre (CPP), While DDM is responsible for dissemination of all information on natural disasters, including flood information at community level, flood preparedness, awareness raising and capacity building activities, and also is responsible for conducting relief and rehabilitating operations with the help of district and upazila administrations. The Ministry issued the Standing Orders on Disaster (SOD) in January 1997 to guide and monitor disaster management activities in Bangladesh. The SOD has been prepared for concerned persons to understand their duties and responsibilities regarding disaster management. All Ministries, Divisions/Departments and Agencies shall prepare their own Action Plans in respect of their responsibilities under the Standing Orders for efficient implementation. The National Disaster Management Council (NDMC) and Inter-Ministerial Disaster Management Coordination Committee (IMDMCC) will ensure coordination of disaster related activities at the National level. Coordination at District, Thana and Union levels will be done by the respective District, Thana and Union Disaster Management Committees. The Disaster Management Bureau will render all assistance to them by facilitating the process. A series of inter-related institutions, at both national and sub-national levels have been created to ensure effective planning and coordination of disaster risk reduction and emergency response management.

### 3.3 Regulative Framework

A number of policy and regulatory frameworks have been adopted and promulgated by appropriate agencies in Bangladesh to reduce disaster risks. The major policies are mentioned in the following sections. The *Standing Orders on Disaster* (MoDMR, 2019) provides a detailed institutional framework for disaster risk reduction and emergency management. It outlines detailed roles and the responsibilities of ministries, divisions, departments, various committees at different levels, and other organizations' involved in disaster risk reduction and emergency management. It also describes the detailed roles and responsibilities of Committees, Ministries, Divisions, Departments and other organizations involved in disaster risk reduction and emergency response management, and establishes the necessary actions required in implementing Bangladesh's Disaster Management Model, e.g., defining the risk environment, managing the risk environment, and responding to the threat environment.

*Disaster Management Act* (MoDMR, 2012) was adopted after collective efforts given by the GoB and development and civil society actors to create a legislative tool under which disaster and emergency

management will be undertaken. It has placed mandatory obligations and responsibilities on ministries and committees, and ensures transparency and accountability in the overall disaster management system. Nine rules are proposed to develop in order to strengthen disaster management activities.

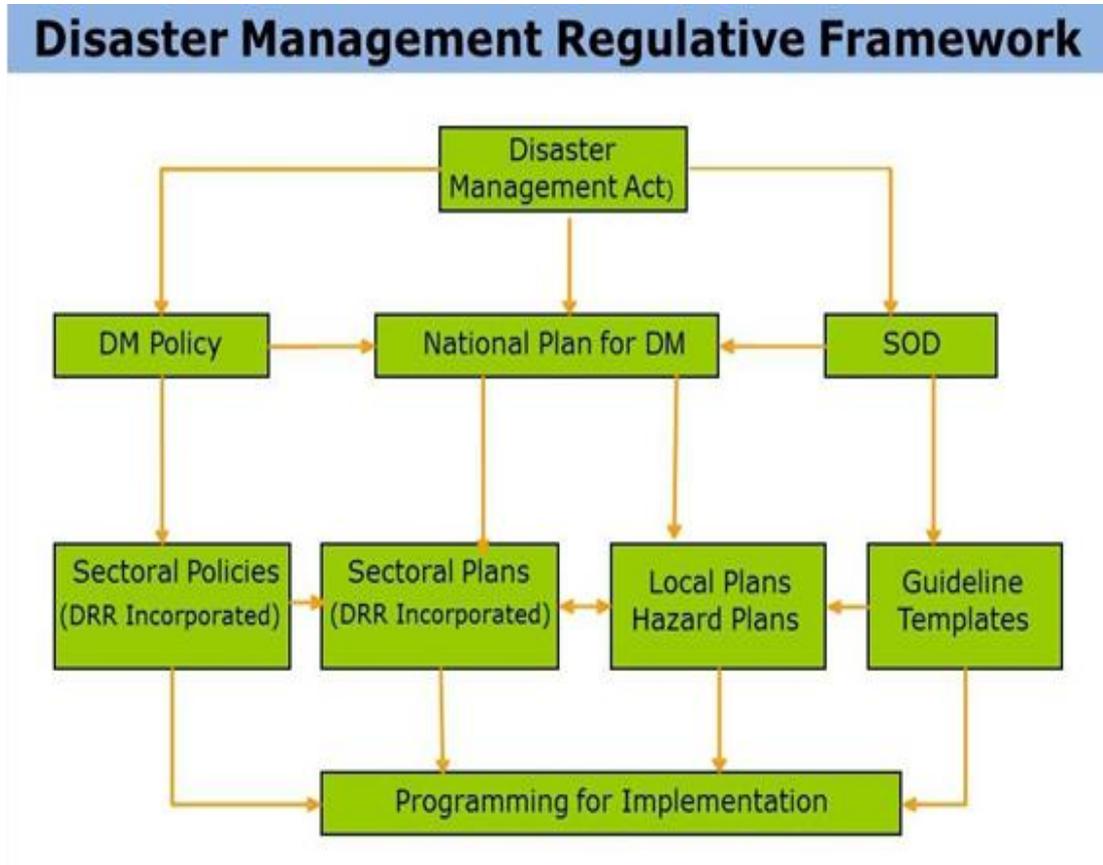


Figure 18: Disaster Management Framework

The objectives of the DM Act (2012) are to substantial reduction of the overall risks of disasters to an acceptable level with appropriate risk reduction interventions, effective implementation of post disaster emergency response, rehabilitation and recovery measures, provision of emergency humanitarian assistance to the most vulnerable community people, strengthening of institutional capacity for effective coordination of disaster management involving government and non-government organizations and establishing a disaster management system capable of dealing with all hazards for the country. The DM Act promotes a comprehensive disaster management program upholding the all hazard, all risk and all sector approach where risk reduction as a core element of disaster management has equal emphasis with emergency response management with greater focus on equitable and sustainable development.

According to the *National Plan for Disaster Management 2021-2025* (MoDMR, 2020) the vision is to reduce the risk of people, especially the poor and the disadvantaged, from the effects of natural, environmental and human induced hazards, to a manageable and acceptable humanitarian level, and to



have in place an efficient emergency response system capable of handling large scale disasters. The Plan envisages a group of broad- strategies which are given below.

- Maintaining the overall goal of building a resilient Bangladesh, the major objectives of the plan are to:
- Identify the priority actions to guide the implementation of DM acts, policies and programs in terms of action plans;
- Provide a roadmap for progress and implementation of at least 25 core investments;
- Incorporate DM aspects in the plan and programs of the sectoral ministries and agencies to ensure risk informed development plans;
- Explore the investment areas both in public and private sectors and also in hazard-prone regions, communities;
- Ensure inclusion of disability, class, ethnicity, religious minority and address gender in all plans and programs;
- Include emerging disaster risks (earthquake), emphasize urban disaster risk (fire, building collapse) and align those in the plan;
- Promote risk governance in the DM programs, compliance including oversight and accountability; and
- Illustrate to other ministries, NGOs, civil society and the private sector how their work can contribute to the achievements of the strategic goals and government vision for DM.

In addition to these legislative frameworks on disaster management there are some sectoral policies which indirectly support disaster risk management activities in different ways in Bangladesh. These are National Debris Management Guideline 2015, Policy Guideline of Management of Dead after Disasters 2016, Bangladesh Climate Change Strategy and Action Plan, National Food and Agriculture Policy, National Education Policy, National Child Policy and Children Act, National Women Advancement Policy, National Water Policy 1999.



### 3.4 National Disaster Context

- Frequently hit by various natural disasters like Cyclones, Storm surges, Floods, Tornadoes, Droughts and other calamities.
- Monsoon flooding is an annual occurrence shaping lives and livelihoods.
- Climate change is likely to cause significant impact in the form of severe floods, cyclones, droughts, sea level rise and salinity affecting agriculture, livelihoods, natural orders, water supply, health etc.
- The disaster vulnerable people demonstrate strong coping capacity to face the disaster challenges.

#### 3.4.1 GOB Vision on Disaster Management

To reduce the vulnerability of people, especially the poor, to the effects of natural, environmental and human induced hazards to a manageable and acceptable humanitarian level

#### 3.4.2 Mission of the MODMR

To bring a paradigm shift in disaster management from conventional response and relief to a more comprehensive risk reduction culture.

#### 3.4.3. Overall Objective

To strengthen the capacity of the Bangladesh Disaster Management System.

#### 3.4.4 National Committees under SOD

The significant change in emergency and disaster management approaches demand institutional restructuring in the governance portfolios. Consequently, the government of Bangladesh, led by the Ministry of Disaster Management and Relief, has undertaken various steps in the form of policy, strategy and programs considering the concept of disaster management through mitigation,

preparedness, recovery and rehabilitation. The government established the Disaster Management Bureau (DMB) under the Ministry of Disaster Management in 1993 to promote disaster prevention, mitigation and preparedness, provide guidelines and to organize training and awareness for the concerned people and stakeholders to mitigate the impacts of disasters. Currently, the DDM has focused on risk reduction through community mobilization, capacity-building and linking risk reduction with the socio-economic development of the poor and vulnerable groups and with developing the DDM's partnership with other government agencies, NGOs and international organizations.

Table 8: Summary of institutional Mechanisms and Committees for Disaster Risk Reduction

<i>Level</i>	<i>Summary</i>
<b>National Level Bodies</b>	<p><b>National Disaster Management Council (NDMC)</b> headed by the Prime Minister for formulates and review the disaster management policies and issue directives.</p> <p><b>Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC)</b> headed by the Minister in charge of the Disaster Management and Relief Division (DM&amp;RD) to implement disaster management policies and decisions of NDMC / Government.</p> <p><b>National Disaster Management Advisory Committee (NDMAC)</b> headed by an experienced person having been nominated by the Prime Minister</p> <p><b>National Platform for Disaster Risk Reduction (NPDRR)</b> headed by Secretary, DM&amp;RD and DG, DMB functions as the member secretary. This platform shall coordinate and provide necessary facilitation to the relevant stakeholders</p> <p><b>Earthquake Preparedness and Awareness Committee (EPAC)</b> headed by minister for MoFDM and DG, DMB act as member secretary</p> <p><b>Cyclone Preparedness Program Implementation Board (CPPIB)</b> headed by the Secretary, Disaster Management and Relief Division to review the preparedness activities in the face of initial stage of an impending cyclone</p> <p><b>Cyclone Preparedness Programme (CPP) Policy Committee</b> headed by the Minister, MoFDM and Secretary, DM&amp;RD act as member secretary</p> <p><b>Disaster Management Training and Public Awareness Building Task Force (DMTATF)</b> 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.</p> <p><b>Focal Point Operation Coordination Group of Disaster Management (FPOCG)</b> headed by the Director General of DMB to review and coordinate the activities of various National Plan for Disaster Management 42 departments/agencies related to disaster management and also to review the Contingency Plan prepared by concerned departments</p> <p><b>NGO Coordination Committee on Disaster Management (NGOCC)</b> headed by the Director General of DMB to review and coordinate the activities of concerned NGOs in the country</p> <p><b>Committee for Speedy Dissemination of Disaster Related Warning/ Signals (CSDDWS)</b> headed by the Director General of DMB to examine, ensure and find out the ways and means for the speedy dissemination of warning/ signals among the people</p>
<b>Sub-national Level Bodies</b>	<p><b>District Disaster Management Committee (DDMC)</b> headed by the Deputy Commissioner (DC) to coordinate and review the disaster management activities at the District level.</p> <p><b>Upazilla Disaster Management Committee (UZDMC)</b> headed by the UpazillaNirbahi Officer (UNO) to coordinate and review the disaster management activities at the Upazilla level</p> <p><b>Union Disaster Management Committee (UDMC)</b> headed by the Chairman of the Union Parishad to coordinate, review and implement the disaster management activities of the concerned Union</p> <p><b>Pourashava Disaster Management Committee (PDMC)</b> headed by Chairman of Pourashava (municipality) to coordinate, review and implement the disaster management activities within its area of jurisdiction</p>



	<p><b>City Corporation Disaster Management Committee (CCDMC)</b> headed by the Mayor of City Corporations to coordinate, review and implement the disaster management activities within its area of jurisdiction.</p>
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## 3.5 National Institutions for Disaster Management

### 3.5.1 Department of Disaster Management (DDM)

DDM is designed as a small dynamic professionals unit at national level to perform specialised functions in the field of disaster preparedness, local disaster action planning, contingency planning, raising public awareness, training and facilitating improved disaster information flows. DDM works under MODMR and overviews and coordinates all activities related to disaster management from the national level down to the grass-roots level. DDM is committed to enhancing regular dialogues and fostering co-operation in practical disaster preparedness matters ‘before, during and after’ a disaster between all levels of government, donors, non-government organisations, community groups and others. DDM’s main strength is the mandate and authority for dissemination of early warning of different disasters. DDM has a total of 48 technical professionals stationed at their head office in Dhaka. It has a vast network under its authority through a standing order.

Currently, DDM is working on cyclone and flood information warning dissemination, but it has plans to extend its dissemination activities to other disasters. A process of hazard mapping is also under consideration. A website (<http://www.ddm.gov.bd>) is currently available with only static historic information, but it could be made dynamic for updating with early warnings like the FFWC website.

### 3.5.2 Cyclone Preparedness Program (CPP)

After the severe cyclone in 1970, by the request of the United Nations, Cyclone Preparedness Programme (CPP) was established in 1972 with the help of the then league of Red Cross. After One Year the league of Red Cross decided to withdraw the program from the field with effects from 1st July 1973. Considering the importance of the programme, for the interest of the coastal belt people, government came forward and took the responsibility of the programme by deciding to continue the programme with effect from July, 1973. It has been working in the field of disaster management in Bangladesh especially in early warning system, search and



rescue, evacuation, sheltering, First aid, relief distribution and rehabilitation activities It has Obtained a great name and fame all over the world for its well managed and motivated disaster management activities with a dedicated humanitarian spirit. Bangladesh has already proved its skillness and effectiveness to disaster response especially in case of Cyclonic disaster which has been appreciated by many others countries in the world.. Now CPP is considered as a model programme in the disaster management field in the world. In policy concern, CPP is run by a Policy Committee headed by Honorable Minister, Ministry of Disaster Management & Relief(MoDMR) and in administrative concern, it is operated by an Implementation Board headed by the Secretary,Minister of Disaster Management and Relief (MoDMR.)

The CPP has 103 officers /staffs and 55,515 Volunteers among which 18,505 Female volunteers. 3,701 unit, 355 union , 41 upazila of 13 coastal districts are the command area of CPP (CPP, 2021).

### 3.5.3. Space Research and Remote Sensing Organization (SPARRSO)

SPARRSO acts as the centre of excellence and national focal point for the peaceful applications of space science, remote sensing and geographic information system (GIS) in Bangladesh. SPARRSO also advises the government in all matters relating to space technology applications and policies. SPARRSO maintains close collaboration with national, regional and international organizations, institutions and agencies and disseminates research results, satellite data and information to the relevant public, autonomous and private agencies for their development and policy-making activities. SPARRSO's mandate includes monitoring and research on environmental issues. For this purpose they receive images daily to observe weather patterns and floods and prepare flood reports including flood maps showing flood-affected areas.

### 3.5.4. Bangladesh Meteorological Department (BMD)

BMD is the government organization authorized for all meteorological activities in the country. It maintains a network of surface and upper air observation stations, radar and satellite stations, agro-meteorological observation stations, geomagnetic and seismological

observation stations and meteorological telecommunication system. BMD contributes to flood forecasting and warnings by preparing short/medium and long term weather forecasts, 3-hourly surface charts, 6 and 12-hourly upper air charts, heavy rainfall warnings, and special weather bulletins with storm surge information. BMD is the only government authorized organization mandated to issue all sorts of weather forecast and record meteorological observations (surface and upper air) in Bangladesh. BMD has been affiliated to the World Meteorological Organization (WMO) since 1972.

FFWC is a division of the Directorate of Processing and Forecasting, under the Chief Engineer, Hydrology. Together FFWC, Surface Water Hydrology (SWH) and Construction and Instrumentation (C&I) undertake the transmission and processing of data for flood forecasting and warning services. It maintains a strong institutional network for disseminating flood forecasts at national level.

## 3.6. Other Institutions for Disaster Management

### 3.6.1. Center for Environmental and Geographic Information Services (CEGIS)

CEGIS is a Public Trust organization under the Ministry of Water Resources and functions under a Board of Trustees chaired by the Secretary of the Ministry of Water Resources on behalf of the government. CEGIS works in the fields of initial environment examination, environmental impact assessment, disaster management modelling, natural resource and risk management, GIS/RS mapping, and survey. CEGIS serves government and non-government organizations. CEGIS has developed several disaster and warning related tools including a Community Based Flood Information System (CFIS); an Environmental Monitoring Information Network (EMIN); and a Climate Forecast Application Network (CFAN). Currently, CEGIS is in the process of development/acquiring technology for a regional basin flood forecast modeling for use in Bangladesh. Also, CEGIS has started to acquire knowledge on urban and flash flood forecasting.

An operational pilot system was developed to produce daily flood monitoring and forecast maps for use at the community level under Community Flood Information System (CFIS). CFIS project was designed as a pilot operational system to produce accurate and timely information on current and forecasted flood conditions for a floodplain community by using



easy understandable mobile SMS. This created an important opportunity for low-cost, reliable, and deeply penetrating dissemination of flood forecasts for vulnerable communities.

CEGIS has developed a methodology for predicting the morphology process and bank erosion along the Jamuna, Ganges and Padma Rivers based on space-based technology. The methodology makes it possible to predict morphological development and bank erosion one to two years ahead.

### 3.6.2 The Institute of Water and Flood Management (IWFM)

IWFM is a research institute of the Bangladesh University of Engineering and Technology (BUET). Its mandate includes conducting research on floods focusing on integrated water management, organizing seminars and workshops related to floods, and offering a post graduate diploma in Water Resources Development.

### 3.6.3 Institute of Water Modelling (IWM)

IWM is an institute of learning and research in the fields of water modelling, computational hydraulics and allied sciences established as a Public Trust under the ministry of Water Resources. IWM activities in flood forecasting and warning include the collection of real time hydrometric data for running flood forecasting and inundation models; annually updating and validating the forecasting models; providing technical backstopping and training to FFWC; assisting FFWC to expand into new areas; developing dynamic flood inundation models (MIKE FLOOD) and issuing medium (10 days) flood predictions based on climate forecasts produced by the CFAB project.

### 3.7 Priorities for Sendai Framework Implementation

Achieving the SFDRR outcome, goals and targets are upcoming challenges for Bangladesh to face in coming 2016-2030 period along with sustainable development goal. The necessity to establish priorities for action in local and national level for monitoring and reporting on Sendai Framework progress will ensure to the achievement of global targets and outcome.

Priority	Strategic Goal	Key Target	Expected Outcome	Action Agenda
<b>Understanding Disaster Risk</b>	Enhance understanding of disaster risk management, knowledge and capacity building	Develop and establish standard assessment procedure to identify community and household level risks	Communities have greater understanding of their risks and vulnerabilities to hazard and anticipate disaster risks and strategies for reducing or managing all risks.	<ul style="list-style-type: none"> <li>- Identify and document community and household level risks with special emphasis on risks of diversified group that include women, children, PWDs, the elderly, minorities, following standard procedure.</li> <li>- Revise curricula at different levels of education so that the future citizens are better prepared to serve, having proper knowledge base.</li> <li>- Invest in leadership and management capacity development of civil servants and other stakeholders at all level</li> <li>- Strengthen institutional capacity within planning cells/units, finance/budget cell, and monitoring cell/unit of each ministry and department so that climate change may be integrated in planning, financing and implementation monitoring process of all sectoral development projects and initiatives.</li> </ul>
	Enhance management skills	Create a national training capacity to sustain and progressively expand the training efforts	<p>Training institute is established and well-functioning</p> <p>Disaster Management is taught in all training courses of public training institutes.</p> <p>All training institutes use the updated module for disaster management</p>	<ul style="list-style-type: none"> <li>- Revise all design criteria and management manuals in a bid to incorporate DRR, irrespective of sectors</li> <li>- Incorporate DRR module and administer DRR related courses in Foundation Training for civil servants (to be conducted by Public and Private Sector Training Academies)</li> <li>- Incorporate DRR module and administer DRR courses for the training of office bearers of LGIs (to be conducted primarily by National Institute for Local Government and if needed by other private and</li> </ul>

				public sector training institutions)
<b>Strengthening Disaster Risk Governance to manage Disaster Risk</b>	Coordination across sectors and actors working on DRR	Strengthen and integration of DRR with development efforts	Prioritization of development projects which have proven adaptation co-benefit potential	<ul style="list-style-type: none"> <li>- Invest in up-gradation of current institutional set up to utilize whole of government approach to combat disaster. A consultative process based national consensus will be forged under the NAP formulation process to develop a comprehensive coordination and implementation mechanism across sectors and actors on DRR</li> <li>- Strengthen institutional capacity for greater and effective coordination</li> <li>- Build institutional capacity to integrate DRR in Development programming</li> <li>- Initiate greater investment in the environmental and natural resource management</li> </ul>
	Improved Implementation, Monitoring and Shared Learning	Enhance national monitoring and evaluation system to enable effectiveness of strategies	A common pre-and post-assessment tool is in place to monitor the DM	<ul style="list-style-type: none"> <li>- Develop mechanisms and modalities towards performing participatory reality checks at project locations regarding project adequacy during early design phase</li> <li>- Develop joint monitoring protocols and ensure shared learning with stakeholders.</li> </ul>
	Decentralization and local level mainstreaming of DRR	Promote RRAP (Risk Reduction Action Plan) and contingency planning across agencies and for all unions/cities/wards and monitor its implementation and practice	Contingency planning across agencies are well functioning and properly monitored and reported	<ul style="list-style-type: none"> <li>- Require local authorities to incorporate DRR into district level development plans</li> <li>- Create incentives for design, implementation and maintenance of DRR investments at local level</li> <li>- Encourage the mobilization of informed communities and implement processes for downward accountability to ensure demand for DRR and CCA is met by local authorities</li> </ul>
<b>Investing in Disaster Risk Reduction for Resilience</b>	Prioritization and budgeting of Programs and Projects	Robust financing policies and mechanisms for disaster recovery and reconstruction should be developed.	Elaboration of the role of private finance through capital markets, insurance industry and how the GOB may contribute to the development of effective market mechanisms to support risk hedging	<ul style="list-style-type: none"> <li>- Costing of all disaster risk planning by relevant sectors</li> <li>- Conduct Full scale economic analysis of DRR projects and initiatives, organize national dialogues towards prioritization and participatory decision making before national budget session in the parliament</li> <li>- Projecting the prioritized and costed actions in annual, three years, five year and long term budget framework to</li> </ul>

				demonstrate demands of disaster risk budget
	Enhance DRR financing	Government and donor funding targeting strategies identified within the local level risk reduction plans	Identification of adequate national resources to finance risk reduction and enable appropriate allocation of resources to vulnerability reduction through local level mechanisms.	<ul style="list-style-type: none"> <li>- Increase financial allocations to implement DRR elements in addition to usual development</li> <li>- Consider greater efforts to seek international financial support</li> <li>- Promote structural and non-structural investment like disaster and climate resilient housing, roads, embankments, flood and cyclone shelters and other infrastructure construction and risk reduction programs at community level</li> </ul>
<b>Enhancing Disaster Preparedness for effective response and to ‘Build back better’ in recovery, rehabilitation and reconstruction</b>	Coordination and planning should be enhanced in community and local level	Prepare risk reduction and climate change adaptation action plans for all high risk Unions, Upazillas and Districts and endorsed by the respective DMC	Disaster risk reduction and climate change adaptation action plans for all risks and all sectors are produced and endorsed by the relevant DMCs at all levels.	<ul style="list-style-type: none"> <li>- DDM leadership on humanitarian coordination should be enhanced and a resilience perspective integrated</li> <li>- Resilient recovery will be pursued as a means to sustainable development</li> <li>- Promote RRAP (Risk Reduction Action Plan) and contingency planning across agencies and for all unions/cities/wards and monitor its implementation and practice</li> <li>- Encourage different hazard based contingency planning like chemical and technological hazards, road and water safety, nuclear and radiological risk, biological hazards, landslide etc</li> <li>- Encourage earthquake vulnerable building retrofitting for major cities especially public buildings</li> </ul>
	Gender, vulnerability and inclusivity issues should be considered across all the sectors and ministries in all the phases of disasters	Develop dedicated capacity within MoDMR and DDM to lead and coordinate post disaster recovery and reconstruction	Develop and implement a strategy for the recovery of vulnerable groups  Develop guidelines on multi sectoral coordination for post disaster recovery and development activities  Protect & support the most vulnerable groups during disaster & post recovery stage especially women, children & disable	<ul style="list-style-type: none"> <li>- Gender issues are integrated into all disaster risk management policies, plans and decision-making processes, including risk assessment, early warning, information management and education and training</li> </ul>



			groups and older people.	
	Mainstreaming DRR	Institutionalize the DM Act of 2012 through rules that achieve adequate decentralization and accountability while considering the whole DM cycle of risk reduction, preparedness, response, recovery and reconstruction	DM Act is well functioning due to decentralization and accountability	<ul style="list-style-type: none"> <li>- Reform the SOD and DM Act and its rules, if needed in line with post MDG and Sendai Framework for DRR</li> <li>- Publish the National Plan for Disaster Management 2016-2020 in line with post MDG and Sendai Framework for DRR</li> <li>- Approve and implement the National Disaster Management Policy</li> <li>- Integrate DM in district development plans and provide capacity development training including UDMCs.</li> </ul>
	Develop national emergency response co-ordination mechanism framework & guidelines	Strengthen community and household level capacity to withstand the disastrous situations	<p>Community and households are better prepared to cope with disaster events</p> <p>Local and national development plans are developed on the basis of the updated hazard maps and anticipated climate change induced hazards</p>	<ul style="list-style-type: none"> <li>- Establish the National Emergency Operations Centre (EOC) and fully operationalize it</li> <li>- Finalize, approve, disseminate and create capacity for implementation of critical guidelines and plans on debris management, dead body management etc</li> <li>- Finalize, approve, disseminate and create capacity for implementation of an Incident Management System</li> </ul>



### 3.8. ADRC Counterpart

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