URBAN DEVELOPMENT DIRECTORATE (UDD)
Ministry of Housing and Public Works
Government of the People's Republic of Bangladesh

PREPARATION OF PAYRA-KUAKATA COMPREHENSIVE PLAN FOCUSING ON ECOTOURISM

Report on

Review of National Policy for Coastal Region Disaster Management of the Project Area

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Institute of Water and Flood Management

Bureau of Research, Testing and Consultation
Bangladesh University of Engineering and Technology

Review of national policies for coastal region disaster management

1. Introduction

1.1 Background

The Government of the People's Republic of Bangladesh has taken up initiative to go for regional development of the coastal Bangladesh. The coast of Bangladesh has three parts – the eastern, central and the western coast. The Payra Kuakata comes under the western coast. The Payra Kuakata region of the coastal Bangladesh embarks high potential of development. It due to the development of Payra Port with huge govt. initiative and the growth of Kuakata as a tourist hub after Cox's Bazar. The regional planning area includes seven upazilas from Patuakhali and Barguna district. They are Galachipa, Kalapara, Rangabali, Barguna Sadar, Patharghata, Amtali, and Taltali. They are all located very close to the Bay of Bengal having all kinds of severe disasters that befall upon the coast (**Figure 1**). The overall goal of the regional plan is to achieve sustainable development of the Payra-Kuakata Coastal Region by integrated planning and implementation through multi-organizational involvement and community participation for optimum utilization of resources and reduction of poverty.

The Bangladesh government realizing the huge economic potential of coastal areas and land availability, exclusive economic zones (EEZ) are being planned, established and implemented in various parts of the coastal belt. The coastal belt, as all over the globe, is very rich with natural, ecological and marine resources, etc. The area of coastal zones provides shelter, sustenance and livelihood for approximately 46 million people, with 2.85 million hectares of cultivable land (Bala and Hossain, 2010) supporting 20% of the rice production of Bangladesh (Begum and Fleming, 1997).

The region is very dynamic due to interactions of land, ocean and atmosphere. The country needs to harness the vast opportunities of the coastal marine resources. So, EEZs are spread over many areas of coastal zone. Though they might come under the many threats of disasters and vulnerabilities. The Government of Bangladesh has already identified the zone as "vulnerable to adverse ecological processes" (ERD, 2003).

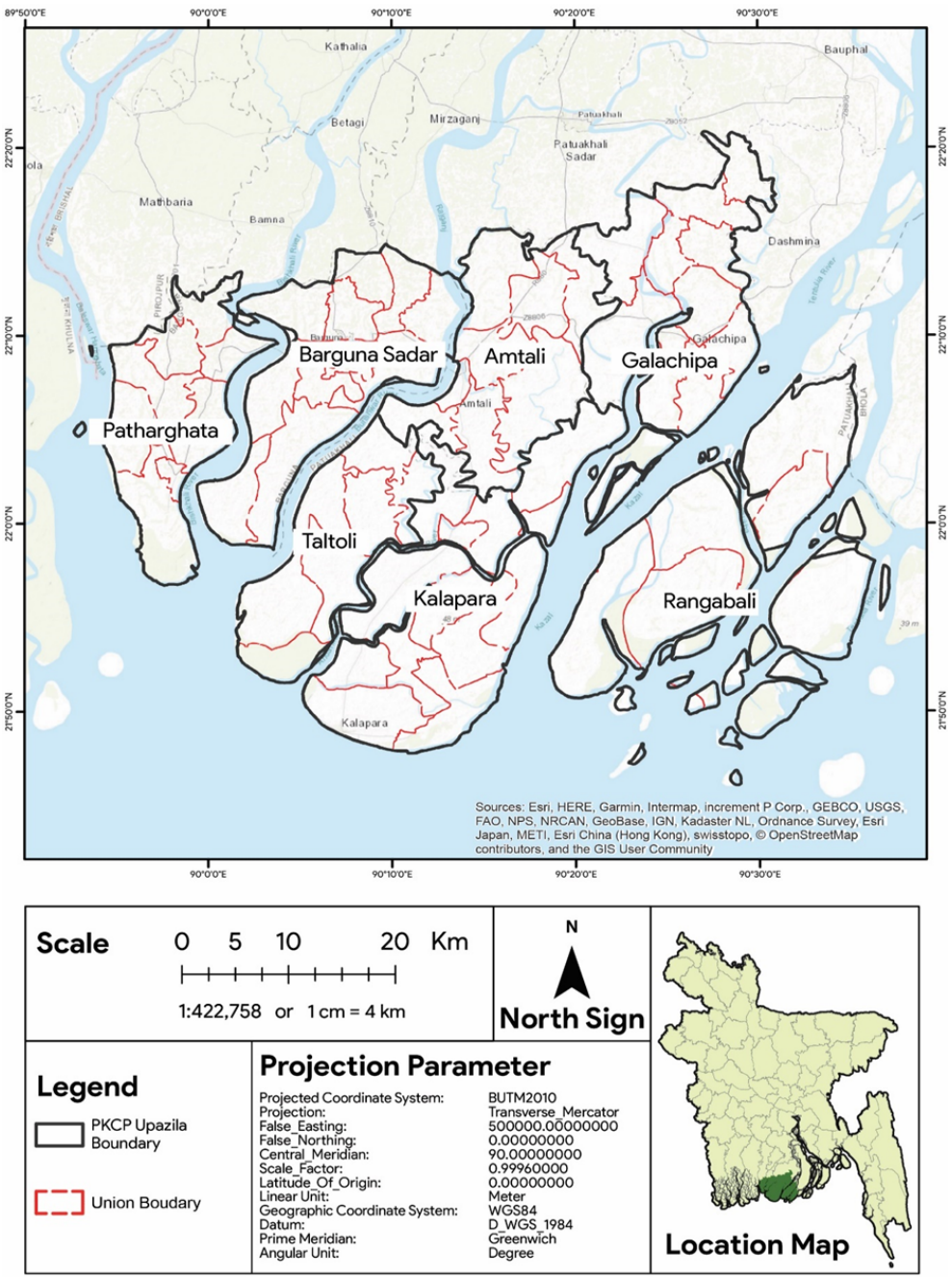

Figure **Error! No text of specified style in document.:** Payra-Kuakata Coastal Region

Bangladesh is a delta and has emerged from the oceanic turbulence of the Bay of Bengal. So, Bangladesh, as a whole, from her birth, has embarked turbulence of natural disturbances. It will remain so for the unknown time to come. The coast of Bangladesh was, is and will remain as the hottest spot of disasters for the country. The only option is to manage the disasters up to the extreme possible.

Cyclones, storm surges, erosions and accretions, floods, sea level rise, safe drinking water, salinization, morphological changes, massive sedimentations, heat waves, droughts, slides, water related diseases, windstorms, etc. make the coastal belt disaster prone and highly vulnerable.

2. Major Types of Disasters in Bangladesh: A Short Review

With over 150 million people living within 147,570 sq. km (Bangladesh Bureau of Statistics, 2011) or over 1,016 people per sq. km, Bangladesh remains the most densely populated country in the world, barring a few city states. With the Bay of Bengal to the south and the Himalayas to the north, Bangladesh is situated in between two contrasting environments. It is divided into three zones, namely, hills, terraces and flood plain based on geomorphology and physiographic. However, most of Bangladesh is floodplain. It is a lower riparian country of the three of the greatest rivers of the world—the Ganges, the Brahmaputra and the Meghna. The total catchment area of the Ganges–Brahmaputra–Meghna (GBM) river system stands at 1.74 million sq. km covering areas of China, India, Nepal, Bhutan and Bangladesh of which only 8 per cent lies within Bangladesh. The floodplain of the GBM river system covers about four-fifths of Bangladesh. Roughly 80 per cent of the landmass of Bangladesh is alluvial deltaic plain with an average elevation above sea level of only 10 meters that is formed by more than 210 rivers, and their numerous tributaries and distributaries. These rivers include no less than 57 international/trans-boundary rivers of which 54 flow into the country through/from India. These rivers carry an enormous discharge of water from the Himalayas heavily laden with sediments. The combined flow of these rivers discharges under the name of Meghna into the north-eastern corner of the Bay of Bengal. Being in the combined catchment area of the GBM river basin, it drains 92 per cent of the flow out into the Bay of Bengal, which is the major cause of flooding (International Federation of Red Cross and Red Crescent Societies, 2010). As a result of flat topography of the floodplain, between 30–70 per cent of the country is normally flooded each year (Agrawala et al. 2003) by overflowing rivers during monsoon when the rainfall within the country is also very high. This annual phenomenon of river flooding plays a vital role in the floodplain ecosystem. North-eastern corner of the Bay of Bengal is quite shallow and periodically witnesses strong tidal and wind action. Due to the funnel-shaped coast, Bangladesh often becomes the landing ground and breeding place of catastrophic cyclones formed in the Bay of Bengal (International Federation of Red Cross and Red Crescent Societies 2010). Thus, in addition to flood, Bangladesh remains constantly

vulnerable to cyclones, tidal bores, storm surges and the likes originated in the Bay of Bengal. Thus, historically, Bangladesh remains a disaster-prone country. It is exposed to a wide variety of natural disasters, such as, tropical cyclones and storm surges, floods, tornadoes, river/coastal erosion, earthquake, droughts, torrential rains, epidemics, arsenic contamination, salinity intrusion and various forms of natural and human-induced hazards, from time to time, causing large-scale loss of lives and properties, and jeopardising the developmental activities and livelihood of a large number of people. In a country like Bangladesh, virtually no natural hazard goes without adversely affecting a large number of people. However, not all the natural disasters affect people's life, their economic well-being and livelihood, environment and so on with equal ferocity (Datta and Banik 1999). Hence, some of the natural calamities could be singled out as being the major types of disasters. What follows is an attempt to review a number of such major types of disasters that strike Bangladesh periodically.

2.1 Tropical Cyclones and Storm Surges

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. The high number of casualties is mostly due to storm surges that sometimes exceed 9 metres in height. Over a period of 100 years, 508 cyclones have affected the Bay of Bengal region, of which 17 per cent made landfall in Bangladesh (Ali 1999). A severe cyclone occurs almost once every three years. Although the frequency of cyclones is not unusual compared to other cyclone hotspot countries, the impact it causes is unparalleled. Over the last four plus centuries, 53 per cent of the cyclones in the world that claimed more than 5,000 lives took place in Bangladesh (Ali, 1999). The cyclones also cause large-scale damage to the material resources and environment. On average, Bangladesh is hit by cyclones of varying severity two to three times a year. A cyclone in 1876 claimed 200,000 lives. Another one in 1970 claimed over 500,000 lives. Again a devastating cyclone that took place in 1991 claimed over 138,000 lives. The devastating cyclones, Sidr, that struck the coast of Bangladesh and moved inland on 15 November 2007, claimed 3,406 lives and caused damage to the material resources worth US$1,675 million.

Records of last 200 years show that at least 70 major cyclones hit the coastal belt of Bangladesh. The Khulna/Sundarban and Barisal-Noakhali coasts received about 30 percent of the cyclones.

Payra-Kuakata region falls in the high risk area (**Figure 2**). In order to minimize fatal consequences of cyclones, construction of cyclone shelters commenced in the 1960s and subsequently increased following the severe cyclone in 1991. The existing shelter capacity can accommodate only about a quarter of the population at risk. In the backdrop of increasing population, 100 additional cyclone shelters are needed annually. An effective disaster warning system is being developed. A comprehensive disaster management program (CDMP), under the auspices of the Disaster Management Bureau (DMB) and the Bangladesh Red Crescent Society, is being implemented.

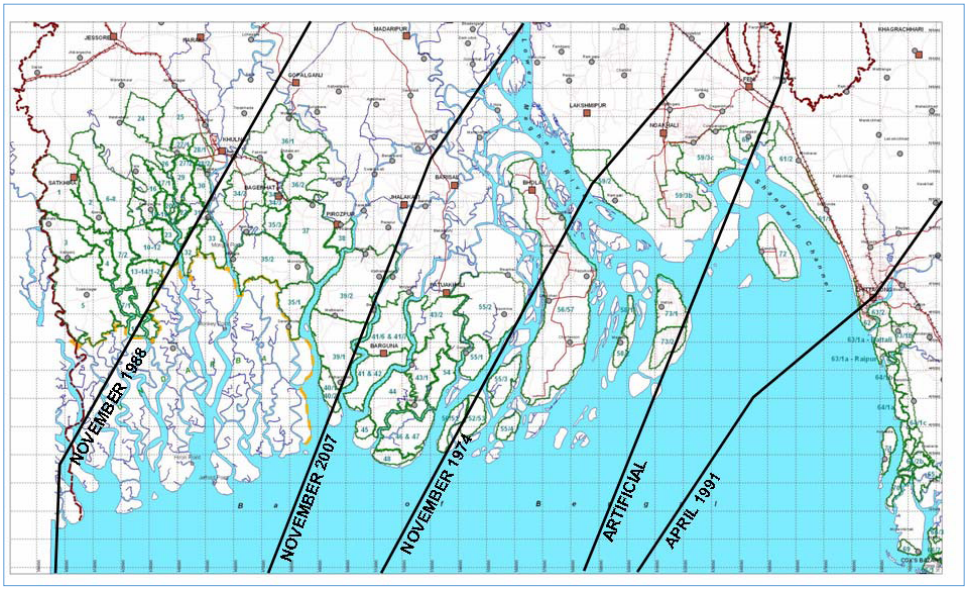

Figure 2: Cyclone tracks considered for demarcation of vulnerable zone due to cyclone and storm surge

2.2 Floods

The particular geo-physical location of Bangladesh makes it susceptible to floods which are annual phenomena with the most severe occurring during the months of July and August. Regular river floods affect 20 per cent of the country, increasing up to 68 per cent in extreme years. The floods of 1988, 1998, 2004, 2007, and 2008 were particularly catastrophic, resulting in large-scale destruction. At present, floods are occurring with historical records like, 2017, 2019, and 2021 floods. While floods in Bangladesh are not so much devastating in terms of the loss of life as cyclones, these are literally catastrophic, resulting in large-scale destruction of crops, houses/buildings, livestock, roads, bridges/culverts, embankments, and so on.

2.3 River Bank Erosion

The Bangladesh delta, being still in its formative stage, is highly unstable. The major rivers and their tributaries in the country are in a constant mode of change with bank erosion. River erosion is, thus, an ongoing disaster resulting in substantial losses of people's farming and homestead lands, livelihoods, destruction of the physical infrastructure like roads and bridges. River bank erosion is an every year's event. Every year about one million people are affected by river erosion and 9,000 hectares of cultivable lands are banished in river. This makes most of the affected people homeless for uncertain period. River erosion is, thus, no less dangerous than other sudden and devastating calamities (Ahmed, 1992).

2.4 Land Erosion

Land erosion is a common natural phenomenon in the coastal zone. Massive changes have occurred in the coastline over the last two centuries due to land erosion, coupled with land accretion. Boundaries of islands undergo major changes due to land erosion and simultaneous accretion. Erosion victims are a disadvantaged group in coastal areas subject to both social and economic distress. Besides the erosion of the riverbanks, the foreshore and the embankment systems are posing a continuous problem in the coastal areas. This exposes interior lands to the threats of cyclone surges and salt-water intrusion. River erosion has taken a serious turn in Patuakhali and Barguna, districts, and many families have become homeless. Some 30,000 houses, many commercial establishments, hundreds of educational institutions, and over thousands of hectares of cropland have been devoured by different rivers in the southern districts during past few years.

2.5 Water Logging and Drainage Congestion

Water logging is especially experienced in the southwest (Khulna-Jessore) and south - central (Noakhali-Lakshmipur) areas. In the southwest, Khulna-Jessore Drainage Rehabilitation Project (KJDRP) was taken to reduce drainage congestion. The concept of Tidal River Management (TRM) has been reinforced from this project. Localized drainage congestions are reported throughout the coastal zone. Due to the lost hydraulic connectivity, at present, many parts of the country suffer from water logging due to heavy rainfall. All congestions affect livelihoods because of crop damage, water borne diseases, etc. Most affected districts are Bhola, Patuakhali, Pirojpur and Barguna.

2.6 Salinity Intrusion

Water and soil salinity is a common hazard in many parts of the coastal zone. Agricultural activities suffer greatly. Seventy percent of 2.35 million hectares within the Khulna and Barisal Divisions is affected by different degree of soil salinity. This reduces the crop area. It restricts the cultivation of aus (summer rice), boro (dry season rice) and other rabi (dry season) crops. There is a seasonal salinity interface in the estuaries, with the threshold limit for agriculture moving further inward from the coast in May in the southern part of the coastal zone.

In the southwest region, surface water salinity has been accentuated by the reduction in the dry season upland flows entering the Gorai distributaries. Salinity now reaches as far as Khulna city, creating problems to normal agricultural practices and affecting the supply of clean water for industrial use.

Coastal polders were designed to prevent salt-water intrusion. Many polders have lost their function because of both undesired breaching causing crop damage, and "desired breaching" facilitating shrimp farming. Land use conflicts exist in the area. Salinity intrusion inhibits industrialization. For example, a number of industrial units in Khulna are facing shortage of fresh water during the dry season. As a consequence, no new heavy industry has been set up in the recent years in the Khulna region despite increasing infrastructure facilities (road, seaport, etc.).

2.7 Drinking Water & Arsenic Contamination

Lack of safe drinking water has been identified as the number one issue in the daily life of the coastal population. The water supply sector has achieved commendable success over the last few decades; overall about 95 percent of the population now has access to water from tube-wells, taps or ring-wells. Rural water supply is mainly dependent on tube-wells. Pond water is also in use, especially where groundwater is either saline or beyond affordability. There are 316,686 tube-wells in the coastal zone, which is 29 percent of total tube-wells in the country. According to DPHE, the tubewell population ratio is slightly higher in the coastal zone: 111 persons per running tubewell, compared to 115 nationally. The districts of Patuakhali and Barguna have lower than average density of tube-wells nationally. But in recent years, groundwater-based water supply in coastal areas is suffering from a number of major problems, main ones being arsenic contamination, lowering of the water table, salinity, and non-availability of suitable aquifers.

Most of the coastal districts are affected by arsenic contamination. The UNICEF-funded DPHE program tested 51,000 tubewells in 61 districts and found arsenic in 48 districts. Around 29 percent

tube-wells were contaminated with arsenic above the permissible level. The Government has initiated extensive program of tubewell testing and public awareness of the possible danger. Low-cost preventive measures are known but yet to be available at the household level all over the coast. Rainwater harvesting and pond sand filtering (PSF) are being advocated and are practiced in some areas.

2.8 Ecosystem Degradation

The coastal zone of Bangladesh experiences extensive ecosystem degradation. Some of the interventions to cause degradation are: drainage for agriculture; dredging and canalization for navigation and flood protection; filling for solid waste disposal; land use for commercial, industrial or residential purposes; conversion of land for aquaculture; construction of dykes for flood control and irrigation; discharge of pesticides and herbicides; domestic and industrial waste; agricultural runoff and sediment; deep channels and other structures; hydrological alternation by canals; roads and other structures; and subsidence due to extraction of groundwater.

Although the rate of destruction of mangroves is less as compared to the overall destruction of forests, comparison of aerial photographs from mid-eighties to early nineties shows destruction at annual rate over 2,000 ha (UNEP website). Factors responsible for the destruction of the mangrove forests are the removal of forest products for fuel, high pressure of grazing, haphazard fishing activities, human settlement, salt production and shrimp farming. Some initiatives have been taken for conservation and restoration of the ecosystems. But these are not linked with livelihoods of traditional users. Comprehensive ecosystem management plan does not exist.

2.9 Earthquake

Except for a number of sporadic and mild earthquakes, there has not been a major earthquake in Bangladesh in its recent history. However, Bangladesh is situated close to three fault zones in Assam, Tripura and sub-Dauki, which makes it a potent earthquake zone. In 150 years, Bangladesh has experienced seven large tremors. In July 1999, in the off-shore island of Maheshkhali, there was a tremor of 19 seconds duration and the level of intensity was 5.2 on the Richter scale. This killed seven people, destroyed 100 thatched/earthen houses and injured about 200 people (Matin and Taher 2000). The point that needs to be emphasised is that Bangladesh has not faced any large earthquake since the country has developed large urban centres (Ansary 2009).

Besides, Bangladesh remains vulnerable to a wide variety of hazards. These include drought, arsenic contamination, salinity intrusion, tsunami, fire, infrastructure collapse, landslide and others. Like flood, drought has been a part of life in Bangladesh from time immemorial. Arsenic contamination is a relatively new phenomenon and it is taking an ever deteriorating turn. While the Asian tsunami has spared Bangladesh, it also generated significant concern in the country. With rapid pace of industrialisation and urbanisation, hazards like fire and infrastructure collapse are increasing in terms of both number and ferocity. Thus, Bangladesh is faced with a wide variety of potential disasters.

2.10 Climate Change

Climate change is expected to increase the intensity of cyclones, resulting in the penetration of storm surges further inland, causing higher damages. Coastal polders offer the first line of defense against sea level rise. But maintenance of sea dykes of polders has to be continued.

The ongoing process of climate change adds a new dimension to the country's risks and vulnerabilities. Bangladesh is likely to be one of the most vulnerable countries of the world in the face of climate change. In more concrete terms, climate change could substantially increase the frequency and intensity of natural disasters mentioned above. Current indications are that floods, cyclones, storm surges and a host of other natural disasters are likely to become more severe, more frequent and affect more areas and people in Bangladesh. More ominous, they will also start to occur outside of their established seasons (Ali, 1999). In the World Disasters Report, 2003, published by the International Federation of Red Cross and Red Crescent Societies, Bangladesh is identified as one of the three most disaster-prone countries in the world. It has suffered 170 large-scale disasters between 1970 and 1998 (Tanner, et al. 2007). On the basis of the past experiences and future projections, in 2005, a World Bank study has ranked Bangladesh as the most climate-vulnerable country in the world (Beck, 2005).

Facing and learning to live with natural disasters are equally an ancient preoccupation of Bangladeshi people. Disaster management in independent Bangladesh has undergone a huge and complex process of development. While it received its impetus from concrete challenges faced at home, it also received inputs from developments, institutions and policies outside Bangladesh. In the process, Bangladesh has developed a workable dynamic system of disaster management that

includes a set of mechanisms and processes, as well as a whole range of ways and means for the management of disasters.

The Bangladesh government is highly concerned both about the development of coastal zone and the ensuing disasters to befall upon the country. The developmental activities in the Payra-Kuakata region is the glowing example. Along with the development, it is important to safeguard the development with adequate disaster management policy, strategy and actions.

This part reviews the disaster management policy, strategy and actions so far taken by the Bangladesh Government.

3. Global Efforts in Managing Disasters

Globally, the number of disaster events are on increase. Asia is the highest in recording water-related disasters by more than double than other continents. The average number of events are just jumping and the estimated loss during the period from 2000 to 2008 was US$ 702.3 billion. Damage and loss are increasing exponentially with the economic development of a country.

Geophysical, meteorological, hydrological and climatological world natural catastrophes in 2018 hugely increased from about 225 to 850 numbers bringing colossal losses to the economy (Geo Risks Research, 2019). Losses due to man-made wars, deadliest bomb explosions, terrorisms world-wide, terrorist attacks, fires in factories, etc. are to increase up to billion dollars in a global scale. Global climate change has also added disaster risks in Bangladesh increase in weather and climate hazards, and through increases in vulnerability of communities to natural disasters, ecosystem degradation, reductions in safe water and food availability. Bangladesh being a part of the globe would to suffer accordingly.

Global disaster events jumped abruptly compared with the beginning of the decade. The world community felt the urge of taking Actions for Reduction of Disasters. First World Conference on Natural Disaster Reduction was held in Yokohama, Japan 23-27 May, 1994. International Decade for Natural Disaster Reduction (IDNDR) from1990 to 2000 was declared. Yokohama Strategy and Plan of Action for a Safer World was adopted i.e. Guidelines for Natural Disaster Prevention, Preparedness and Mitigation. Framework for Action for the Implementation of the International Strategy for Disaster Reduction (ISDR) was adopted in June, 2001. The “World Conference on

Disaster Reduction" was held from 18 to 22 January 2005 in Kobe, Hyogo, Japan, and adopted the present Framework for Action 2005-2015:

- Building the Resilience of Nations and Communities to Disasters (the "Framework for Action").
- The Conference provided a unique opportunity to promote a strategic and systematic approach to reducing vulnerabilities and risks to hazards.
- It underscored the need for, and identified ways of, building the resilience of nations and communities to disasters.
- Sendai Framework for Disaster Risk Reduction 2015–2030 was adopted at the Third United Nations World Conference on Disaster Risk Reduction, held from 14 to 18 March 2015 in Sendai, Miyagi, Japan.

The Millennium Summit and the General Assembly in September 2000 issued a Millennium Declaration. In September 2001, the UN General Assembly adopted "Road map towards the implementation of the United Nations Millennium Declaration" which was, in fact, "the Millennium Development Goals", a milestone of international agenda of cooperation and resilience development. The 2030 Agenda for Sustainable Development was adopted by United Nations in 2015. It contains a blueprint for peace and prosperity for people and the planet, now and into the future. The 17 Sustainable Development Goals (SDGs) came out as an urgent call for action by all countries - developed and developing - in a global partnership. It intends improve health and education, reduce inequality, and spur economic growth together with tackling climate change and working to preserve our oceans and forests.

The SDGs is built on decades of work by countries and the UN:

- In June 1992, at the Earth Summit in Rio de Janeiro, Brazil, more than 178 countries adopted Agenda 21, a comprehensive plan of action to build a global partnership for sustainable development to improve human lives and protect the environment.
- Member States unanimously adopted the Millennium Declaration at the Millennium Summit in September 2000 at UN Headquarters in New York. The Summit led to the elaboration of eight Millennium Development Goals (MDGs) to reduce extreme poverty by 2015.

- The Johannesburg Declaration on Sustainable Development and the Plan of Implementation, adopted at the World Summit on Sustainable Development in South Africa in 2002 built on Agenda 21 and the Millennium Declaration on multilateral partnerships.
- At the United Nations Conference on Sustainable Development (Rio+20) in Rio de Janeiro, Brazil, in June 2012, Member States adopted the outcome document "The Future We Want" to launch a process to develop a set of SDGs to build upon the MDGs and to establish the UN High-level Political Forum on Sustainable Development.
- In 2013, the General Assembly set up a 30-member Open Working Group to develop a proposal on the SDGs.
- In January 2015, the General Assembly began the negotiation process on the post-2015 development agenda. It was culminated in the adoption of the 2030 Agenda for Sustainable Development, with 17 SDGs at its core, at the UN Sustainable Development Summit in September 2015.
- **2015 was a landmark** year for multilateralism and international policy shaping, with the adoption of several major agreements:
    - Sendai Framework for Disaster Risk Reduc**tion** (March 2015)
    - Addis Ababa Action Agenda on Financing for Development (July 2015)
    - Transforming our world: the 2030 Agenda for Sustainable Development with its 17 SDGs was adopted at the UN Sustainable Development Summit in New York in September 2015.
    - Paris Agreement on Climate Change (December 2015)
    - At present, the annual High-level Political Forum on Sustainable Development serves as the central UN platform for the follow-up and review of the SDGs.

Now, Division for Sustainable Development Goals (DSDG) under the United Nations Department of Economic and Social Affairs (UNDESA) provides all out support and capacity-building for the SDGs. DSDG plays a key role in the evaluation of UN system and wide implementation of the 2030 Agenda and activities relating to the SDGs.

4. National Efforts in Managing Disasters

4.1 Context of Disaster Risks Management and Reduction in Bangladesh

As per 'Ain-E-Akbari' written by Abul Fazal during the reign of the Moghal Emperor Akbar, suffered the havoc of cyclonic storm surge in Satkania, Sitakunda and Mirsarai of Chittagong (MPCS, 1992). A cyclone in 1876 claimed 200,000 lives; another in 1970, over 500,000; in 1991, one took 138,000 lives (Matin and Taher, 2001). The funnel shaped coast, Bangladesh very often becomes the landing ground of cyclones formed in the Bay of Bengal (Choudhury, 1998). About 60 per cent of the global fatalities due to storm surges have occurred in the low-laying arable coastal areas of the countries bordering the Bay of Bengal and the Andaman sea, with Bangladesh alone accounting 40 per cent. People living in the coastal belt, 710 km long (Haroon-al-Rashid 2001), are the most vulnerable in terms of cyclonic disaster.

The concept of disaster management did not take a shape until the 90s. From the British rule to the early 90s, the focus was basically on post-disaster situation, relief operation. The Famine Code, 1913 and the Famine Manual 1941 lay down the general principles of relief operations. After the 1961 cyclone the Pakistan (Bangladesh was part of Pakistan as East Pakistan) government made 'The Emergency Standing Order for Cyclone Preparedness'. This standing order was replaced by 'Standing Order on Cyclone 1985' in Bengali. In 1997, the Bureau of Disaster Management revised the Standing Order and renamed it 'Standing Orders on Disaster' to cover all natural hazards related disaster. After the big 1988, the Bangladesh Government, with help from the donor countries and organisations adopted the 'Flood Action Plan'. It was not only for flood management, but brought the concept of overall disaster preparedness into the country.

A UNDP supported project was set up for disaster preparedness to establish a special unit to plan and coordinate disaster-related activities (DMB, 1998). As part of that project, a short-term project was undertaken to coordinate cyclone relief and rehabilitation following the cyclone in April 1991. In 1993 the Disaster Management Bureau (DMB) was established to initiate and coordinate the disaster management policy and programmes. The Ministry of Relief and Rehabilitation was renamed as Ministry of Disaster Management and Relief (MDMR). Recently, the name has been changed again to Ministry of Food and Disaster management (MoFDM).

In the early 2000s, there was a 'paradigm shift' from 'relief and rehabilitation' to the concept of 'risk reduction'. The shift took place with the financial and thematic assistance from the donor agencies. In early 2001 a UNDP and DFID assisted project 'Comprehensive Disaster Management Programme (CDMP)' was initiated to bring the issues 'risk' and 'vulnerability', into the policy framework. This shift was based on the notion that disaster should be looked at within the framework of 'development issues' as overall economic developments 'reduce' the vulnerability of the disaster-prone area (DMB 2004).

International agencies played vital roles in disaster mitigation and management activities (Matin and Taher 2001). Donor agencies stressed the partnership between the government and NGOs (White 1999; Lewis 1993). But there was some kind of tensions between the government and NGOs. Major stakeholders - the government, donor agencies, and local NGOs, were for 'people should be incorporated in disaster management planning process' (Hossain et al. 1992). The people living in disaster-prone areas have built up their own local knowledge base and developed strategies to face it. Unfortunately, people's knowledge is mostly ignored or is problematic to deal with.

The government of Bangladesh is very active to manage and up-to-date in-country disasters through establishment of related Ministries, Department, Organizations, and Institutions by enforcing concerned policies, laws, strategies and action plans. The MoFDM is responsible for Disaster Risk Reduction (DRR). There are three agencies under the MoFDM – the Department of Disaster Management (DDM), Directorate of Relief and Rehabilitation (DRR) and Directorate of Food (DoF). The MoFDM is the focal point of disaster management related activities in the country.

The mandate of DDM is to promote awareness building activities, to prepare local disaster management action plans at Union, Upazila and District levels, to maintain coordination with line departments/agencies, NGOs, social organizations, to monitor disaster preparedness activities through district administrations, etc.

5. Disaster Management and Risk Reduction in National Policies

5.1 Cyclone Preparedness Programme (CPP)

Bangabandhu Sheikh Mujibur Rahman vividly portrayed and devoted himself to the service of the distressed people in different parts of Bhola and Noakhali aftermath of the Bhola Cyclone in 1970. The importance of institutionalizing disaster risk reduction was understood. Due to Bangabandhu's efforts, the people of the world were shocked to hear the news of 'Cyclone 1970'. The UN General Assembly convened a special session and unanimously assigned the League of Red Cross and Red Crescent Society to take effective measures to reduce the damage caused by the cyclone in the coastal areas of the then East Pakistan.

Several delegates from the League of Red Cross and Red Crescent Society visited the country to assist in relief and rehabilitation work and started cyclone preparedness activities. The 'Cyclone Preparedness Programme' was outlined. Bangabandhu gave written approval to the effect that all costs of the Cyclone Preparedness Program would be borne by the Government of Bangladesh and the organization would be jointly managed by the Government of Bangladesh and the Bangladesh Red Cross Society. Cyclone preparedness activities initially started in the then greater Chattogram, Noakhali, Bakerganj (Barishal) districts in 23 thanas. By August 1,972, a total of 19,270 volunteers from 1,926 units under 17 unions of 23 thanas were selected. Today CPP has over 76,000 volunteers.

The Humanitarian Coordination Task Team (HCTT) has worked as a coordination platform to strengthen the collective capacity of government, national and international actors to ensure effective humanitarian preparedness for, and response to the impacts of climate-related disasters in Bangladesh.

Bangladesh is now recognized as a 'Role Model' at disaster risk management in the world Bangladesh as a nation is the living embodiment of resilience. And nowhere is this recognised more clearly than in the worldwide acclaim for its CPP which is a role model for many other climate vulnerable nations seeking to cope with the climate emergency and extreme weather events.

5.2 Disaster Management Act – 2012

The MoFDM has a disaster management regulative framework formulated in the Disaster Management Act – 2012. The disaster management activities are implemented through National

Plans for Disaster Management and are formulated in line with the Disaster Risk Reduction Perspectives of the country. "The Act enacted to make the activities about disaster management coordinated, object oriented and strengthened and to formulate rules to build up infrastructure of effective disaster management to fight all types of disaster".

The Disaster Management Act – 2012 is a legal binding document of the MoFDM in which disaster management activities and actions are carried out to manage any kind of disaster. As per the act, the MoFDM is to formulate national disaster management policy in line with the Government Five Year Plan through sectoral policies. It creates mandatory obligations and responsibilities on Ministries, committees and appointments. It provides effective disaster management for Bangladesh up to bottom level through establishing risk reduction as a core element of disaster management. It is a disaster management regulatory framework for the country. Under this act, the enforcement of standing orders on disaster management will be done.

Strengths

i. The act is sophisticated in binding the various organizations for disaster management in different sectors of the country.
ii. Disaster management institutions are mandated down to union level.
iii. Community risk assessment (CRA) i.e. participatory approaches are proposed.

Weaknesses

i. Government agencies like Disaster Management Bureau (DMB) are not well functional at local levels.
ii. It still bears top down management.

5.3 Standing Orders on Disaster (SOD)

The **Standing Orders on Disaster** (SOD) are an important part of the Disaster Regulatory framework in Bangladesh. The SOD were first published in 1997 in Bangla, modified and translated into English in 1999, revised in 2010 and again revised in 2019. Standing Orders on Disaster (SOD) are aimed to ensure every possible preparedness measure and reducing disaster

risks and clearly outlines the role and responsibilities of the ministries, divisions, agencies, organizations, committees, public representatives and citizens to cope with any natural disaster.

Standing Orders on Disaster describe the detailed roles and responsibilities of committees, Ministries and other organizations in disaster risk reduction and emergency management, and establishes the necessary actions required in implementing Bangladesh's Disaster Management Model. The Standing Orders have been prepared with the objective of making the concerned persons understand their duties and responsibilities regarding disaster management at all levels, and accomplishing them.

The adverse impact of climate change and the World Conference on Disaster Reduction 2005, the updating of the SOD was essential. And as a signatory of Hyogo Framework for Actions (HFA, 2005-2015), disaster risk reduction and climate change risk issues have to be mainstreamed in all development sectors of the government. Moreover, as a follow up to the HFA, and the SAARC Framework for Action (SFA) of the 13th SAARC Summit in Dhaka, it was necessary to upgrade the SOD-1997. The SOD was updated in 2010. For implementation purpose, the National Plan for Disaster Management (NPDM) 2010-2015 was prepared. The NPDM was an outcome of the national and international commitments of the Government of Bangladesh (GoB).

The NPDM proposed a simple model to guide disaster risk reduction and emergency response management efforts in Bangladesh. The model has three key elements:

i. Defining and re-defining risk environments.
ii. Managing risk environment (Prevention, Preparedness, Response and Recovery).
iii. Responding to threat environments (Warning period, Disaster Onset, Post Disaster period).

The NPDM proposed a paradigm shift in disaster management to a more comprehensive risk reduction culture and strengthening the capacity of the Bangladesh disaster management system through response and recovery management at all levels.

In the SOD-2019, disaster risk management has been incorporated into all the development plans, including the Five Year Plans, Delta Plan 2100, and National Strategic Plans. It also complies with

the commitments pledged in the Sustainable Development Goals (SDGs), Sendai Framework for Disaster Risk Reduction, and other international agreements and charters. Disaster risk management in Bangladesh has been recognized as a 'Role Model' for the world in reducing the loss of lives and property in disasters such as cyclones and floods. In the spirit of 'Leaving No One Behind,' the SOD ensures inclusion of all stakeholders, and underscore the participation of women, children, elderly people, and persons with disabilities in all stages of disaster risk management.

Strengths

i. The SOD-2019 is good document where BDP 2100 and SDGs are incorporated.
ii. Disaster-related modern concepts, technical knowledge and methodology have been reflected in this updated version.
iii. 'Leaving No One Behind,' the SOD ensures inclusion of all stakeholders - participation of women, children, the elderly people and persons with disabilities in all stages of disaster risk management..

Weaknesses

i. SOD is an order, not act. It is not a binding like an act.
ii. It is still not well functional at local levels.
iii. It still bears top down management.
iv. It is a long time process to be functional at root level.
v. The capacity of the implementer and community functions as barrier.

5.4 Bangladesh Delta Plan 2100

The General Economic Division (GED) of the Bangladesh Planning Commission (BPC) has formulated BDP-2100 with the cooperation of the Government of Netherlands (GoN) for coping with the challenges of climate change and natural hazards. Delta objectives are - removing extreme poverty, attaining upper middle income country by 2030, attaining develop country by 2041, adaptation climate change and natural hazards. Delta challenges are many like water governance and management, flood and disaster management, coastal land use planning, salinity intrusion, food security, regional cooperation, capacity building and cooperation and climate change. Delta

policy includes: developing governance and legal framework, delta scenario development, delta strategy and delta management. Public and private engagement is the top priority policy where human biophysical delta system, socio economic condition and delta ecosystem to be managed.

Besides, BDP-2100 has encircled some specific goals like ameliorating water security and proficiency of water usage, confirming safety from floods and climate change-related disasters, maintaining and preserving wetlands and ecosystems, ensuring sustainable and integrated river systems and estuaries management in the costal Bangladesh and other parts of the country. BDP-2100 takes the middle-term delta agenda until 2050 but keeps in consideration its longer-term implications to 2100.

The BDP 2100 is a broad-based long-term vision about the likely changes and necessary intervention to make the Bangladesh Delta a safe by the end of the 21stCentury. Thus, an integrated, comprehensive and long-term Delta Vision has been stated as: "Achieving safe, climate resilient and prosperous delta". The Mission for BDP 2100 is formulated as: "Ensure long term water and food security, economic growth and environmental sustainability while effectively reducing vulnerability to natural disasters and building resilience to climate change and other delta challenges through robust, adaptive and integrated strategies, and equitable water governance".

BDP 2100 has Volume 2: Disaster and Environmental Management and consists of four Baseline Studies: Disaster Management is being one of them. The Disaster Management Study has six chapters where focus has been given upon disasters in Bangladesh, and their management policies, strategies, and action plans.

The main objectives of the baseline study were to identify the problems associated with major hazards and disasters in Bangladesh, like floods, draughts, cyclones, salinity intrusion and earthquakes, and to find an effective and efficient disaster management system in a holistic way, including disaster preparedness and responses, measures and strategies and also preparation of disaster maps. The existing policies, plans of the Govt and the developments made so far in view of the long term changes were reviewed based on the present practices of disaster preparedness and strategies. The study established a common knowledge base and identified the knowledge gaps for future study and research, and identified exemplary projects for implementation. Bangladesh has now established a structured regulatory framework that provides legal, policy and best practice

documents in which the necessary initiatives and activities relating to Disaster Risk Reduction (DRR) and Emergency Response Management (ERM) are managed and implemented.

The BDP-2100 is a tactical techno-economic, long-term, comprehensive, and water-centric program for achieving a 'safe, climate-resilient, and prosperous Delta by 2100'. In BDP-2100, eight hydrological regions of Bangladesh are defined in six hotspots areas based on vulnerability to natural disasters and climate change. The regulatory framework has five aspects – legal, policy, planning, response and activity coordination, and guidance support for best practices.

Strengths

i. BDP 2100 is a very comprehensive inclusive document with a long time goals;
ii. Proper utilization of natural resources, restoration of natural reservoir and water bodies, excavating river and local water reservoirs;
iii. Strengthening management of rivers and estuaries;
iv. Focuses on alleviating the risk of climate change, diminishing flood risk through infrastructure development,
v. Developing multi-purpose resource management,
vi. Developing a strategy for sediment management,
vii. Developing climate-resilient through a participatory process,
viii. Managing basin, and embankment, increasing drainage facilities, and
ix. Maintaining ecological balance, conducting regular dredging activities.

Weaknesses

i. Marine resources are not focused for proper planning and exploration, exploitation, conservation, and management of maritime resources,
ii. Bangladesh has no maritime court,
iii. All islands should be utilized for various purposes tourism in the first place.

5.5 Perspective Plan of Bangladesh 2021-2041

"Making Vision 2041 a Reality: Perspective Plan of Bangladesh 2021-2041" is a genuine articulation of the government to transform the country from a lower middle income country to Upper Middle Income Country by 2031 and a high Income country by 2041 under World Bank Classification. The other goals are eradicating extreme poverty by 2031 and zero poverty by 2041.

The Strategic Goals and milestones of the Plan include industrialization with export-oriented manufacturing; paradigm shifts in Agriculture to enhance productivity, a service sector of the future-providing the bridge for the transformation of the rural agrarian economy to a primarily industrial and digital economy; the urban transition - an essential part of the strategy to move to a high-income economy primarily motivated by the agenda of the government -"our village, our town"; efficient energy and infrastructure; building a Bangladesh resilient to climate change and other environmental challenges; and establishing Bangladesh as a knowledge hub country.

5.5.1 Managing Environment and Climate Change for sustainable growth

Many laws and regulations have been enacted over the years to protect the environment and programmes and policies are in place to adapt and mitigate the adverse effects of climate change. This progress continued under the 6th FYP and 7th FYP, with special emphasis on air and water pollution control. Important steps were also taken to improve biodiversity. An important breakthrough on the strategy and policy front happened recently with the adoption of the Bangladesh Delta Plan 2100 in September 2018. This is a comprehensive strategy for managing the risks posed by the deltaic formation of the country along with the incidence of natural disasters and climate change.

Evidence shows a strong negative role of climate change and natural disasters on poverty. The districts that are most vulnerable to climate change and natural disasters also show a much higher incidence of poverty. Concerted efforts will be needed to address these vulnerabilities at the source.

5.5.2 Lowering Vulnerabilities of Districts to Climate Change and Natural Disasters

Of the 15 poorest districts of Bangladesh, most are characterized by high vulnerability to natural disasters owing to flooding, river erosion, sea level rise and other natural disasters. The example of Kurigram is particularly telling where the incidence of poverty was estimated by HIES 2016 at 70% even after 45 years of independence. It is well known that Kurigram is one of the most vulnerable districts in terms of natural disasters. Located at the mouth of the mighty Brahmaputra river, Kurigram gets flooded and inundated every year that wreaks havoc on its development efforts. There are similar examples of the link between poverty and vulnerability to natural disasters and climate change. The government has adopted a major long-term initiative called the Bangladesh Delta Plan 2100 (BDP2100) that seeks to improve the management of water, land,

ecology, environment and climate change through strategies, policies, investment programmes and institutions. In particular, the BDP2100 seeks to address the vulnerabilities of Bangladesh caused by geography and climate change by addressing these risks right at the source. The associated strategies for flood control, water storage, irrigation, land management, agriculture, forestry resource management, and ecological balance will be major elements of the policy package for reducing poverty and improving environmental management during PP2041.

5.5.3 Climate Change Impacts

Bangladesh is currently ranked as one of the most climate-vulnerable country in the world. Some of the adverse impacts of climate change that the Bangladesh agriculture likely to face in the next decades are increasing trend in flood, drought, intrusion of saline water, drying up of wetlands due to decrease of upstream flow and intensification of irrigation, resulting in severe degradation of ecosystems during the dry season. The locations most threatened by climate change and natural disasters are charlands, coastal areas, Haor areas, flood plain and drought zones of Bangladesh.

Bangladesh has a much better track record in disaster management and the progress continued during the 7FYP periods. The progress with disaster readiness and disaster response continued to improve as reflected in well-functioning early warning systems and sharp reductions in loss of life and injuries from natural disasters. This progress was defined by the government's implementation of the National Disaster Management Plan 2010-15, the enactment of the National Disaster Act in 2012 and the establishment of the new Ministry of Disaster Management and Relief in 2012.

These important strategic and institutional reforms brought in a major strategic change in disaster management away from the emphasis on relief distribution to disaster readiness. Nevertheless, the continued substantial loss of crops, housing, assets and livelihoods, especially from flooding and riverbank erosion, suggests that in addition to continued progress with strengthening disaster preparedness increasingly the government's attention has to shift to better management of the environmental and climate change risks by taking long term investments in water management.

5.6 8th Five Year Plan (July 2020-June 2025)

Each Five Year Plan is a back bone document of developmental activities of a country. The 8th Five Year Plan reflects the implementation as per Perspectives Plan Initiatives taken up by the

govt. It is a follow up action of the govt. This Review focused upon the govt. actions regarding reduction of vulnerabilities to different disasters.

The 8th Five Year Plan also follows the progress of the 7th Five Year Plan to continue the taken up tasks. Progress with environment, climate change and disaster management during 7th Five Year Plan was remarkable. Many laws and regulations have been enacted over the years to protect the environment and programmes and policies are in place to adapt and mitigate the adverse effects of climate change. This progress continued under the 7FYP. Not only the legal framework, implementation was strengthened with significant progress in managing the air pollution from brick kilns and reducing water pollution from the leather industry. Important steps were also taken to improve biodiversity. An important breakthrough on the strategy and policy front happened recently with the adoption of the Bangladesh Delta Plan 2100 in September 2018.

Bangladesh has fullfilling in the NDC (Nationally Determined Contributions) to take action on mitigation in order to reduce GHGs emissions. Bangladesh is a forerunner on adaptation endeavours. Bangladesh has a NAP Roadmap for a comprehensive National Adaptation Plan (NAP) for reducing vulnerability of the climate impacts. Building on NAPA (National Adaptation Programme of Action) and BCCSAP (Bangladesh Climate Change Strategy and Action Plan), the NAP facilitates the integration of climate change adaptation into relevant new and existing policies, programmes and activities in a coherent manner, in particular, development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

5.6.1 Natural Disasters

Bangladesh has a good track record in disaster management and the progress continued during the 7FYP. The progress in disaster readiness and disaster response continued to improve as reflected in well-functioning early warning systems and sharp reductions in loss of life and injuries from natural disasters. This progress was defined by the implementation of the National Disaster Management Plan 2010-15, the enactment of the National Disaster Act in 2012, preparation of Disaster Management Rules in 2015 and the establishment of the new Ministry of Disaster Management and Relief in 2012. These important strategic and institutional reforms brought in a major strategic change in disaster management away from the emphasis on relief distribution to

disaster readiness. Nevertheless, the continued substantial loss of crops, housing, assets and livelihoods, especially from flooding and riverbank erosion, suggests that in addition to continued progress with strengthening disaster preparedness increasingly the government's attention has to shift to better management of the environmental and climate change risks by taking long term investments in water management. The Delta Plan during the 8FYP is to play a major role in implementing the government's strategic shift towards better management and reduction of natural disaster incidence, especially from flooding, sea-level rise, salinity and water logging.

Notwithstanding this progress in the 7FYP, the government understands that institutional strengthening and governance improvements are a continuous process that evolves and creates new demands for changes as Bangladesh moves forward. Consistent with the long-term goal of PP2041 to attain upper middle-income status in FY2031 and high- income status in FY2041, the government's institutional and governance improvement goals will target a time path to attain the institutional arrangements found in present upper middle income and high-income countries. Consequently, the institutional and governance improvement targets of the 8FYP will be set up as a step towards these long-term goals defined in PP2041.

The global COVID-19 pandemic was a major blow to the economy of Bangladesh. The government took quick actions to control the COVID-related damage to life and livelihoods. The government has taken a series of measures to reduce the spread of the infection and announced several stimulus packages, estimated at Taka 1196.4 billion (4.3% of GDP), to help the needy and stem the downward spiral of economic activities. The **Government Policy Response** to mitigate the adverse socioeconomic impact of 'global pandemic' from COVID-19 was remarkable and adopted a Work Plan with four major strategic programmes to be implemented in immediate, short-term and medium-term span.

5.6.2 Disaster Management

Bangladesh has been rated 7th most vulnerable on the Climate Risk Index in 2019. Bangladesh's hydro-geological features substantially enhance its vulnerability to disasters and climate change, as 88 per cent of the country's landmass consists of a floodplain.

The Government recognizes this proneness to disasters and has (over the years) formulated various laws and plans to develop an effective response capacity to the threat of natural disasters. The Disaster Management vision of the Government is to reduce the risk of people – especially the poor and the disadvantaged – to 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 management system capable of handling large scale disaster. Some of the notable are mentioned in Table below:

Policy Document	Description
Disaster Management Act, 2012	Aims to make disaster management activities coordinated, object-oriented, and strong in formulating rules to build infrastructure for resilience.
Coastal Zone Policy, 2005	Acknowledges the importance of ecosystems and biodiversity conservation on the coasts and supports coastal people in developing sustainable livelihoods.
National Plan for Disaster Management, 2008-2015	Calls for comprehensively addressing DRR and CAA in all development plans, programmes, and policies through assessing climate change risk, emphasizing community-based programmes, building public awareness, improving early
National Adaptation Programme of Action, 2005	Identifies 15 priority activities for adaptation action, including general awareness raising, capacity building, and project implementation in vulnerable regions, with a focus on agriculture and water resources.
National Disaster Management Policy 2015	Defines the national perspective on disaster risk reduction and emergency management, and to describe the strategic framework, and national principles of disaster management in Bangladesh.
National Plan for Disaster Management 2016-2020	Updates NPDM 2008-2015
Standing Order on Disasters, 2019	Works to make relevant persons understand and perform their duties and responsibilities regarding disaster management at all levels.

The two central laws and action plans that guide policies and activities under disaster management are the "National Plan for Disaster Management 2008 – 2015" and "Standing Orders on Disasters 2019". The overall objective of disaster management is to reduce the underlying risks and to promote the adaption to the effects of climate change. This will result in a substantial reduction in the losses of lives and in the social, economic and environmental assets of persons, communities and the country from disasters.

5.6.3 Objective and Strategies for Disaster Management under the 8th FYP

The 8th FYP is to build on the progress made during the 7th FYP, while also internalizing the lessons of past experiences. The Government will undertake specific activities to ensure that the management of the environment is sufficiently improved under the 8FYP. Some of them are:

i. Institutionalization of DRR and CCA.

ii. Promote private sector resilience to disasters and climate change risks through improved public private partnerships.

iii. Develop adaptive research on disaster and climatic issues.

iv. Develop a vulnerability index which will help channelize equitable resources to the targeted districts.

v. Develop a focused and specific DRR-CCA indicator in the overall performance tracking for the plans programmes and projects.

vi. Increased investments in gender sensitive DRR and climate risk reduction to reduce the cost for response and recovery.

vii. Support skill development by giving training to GOs, NGO officials and volunteers concerned in Disaster Management and develop greater partnership with NGOs to improve "cyclone preparedness" capacity.

viii. Incorporate best practices and technology in Disaster Management of Bangladesh from around the world.

ix. Improve guidelines for Disaster Shelter Management.

x. Strengthen Disaster Impact and Risk Assessment Guidelines.

xi. Improve Emergency Fund Management Guidelines.

xii. Strengthen Indigenous Coping Mechanism Guidebook.

xiii. Enhance Community Risk Assessment Guidelines.

5.7 Coastal Zone Policy 2005

The coast of Bangladesh is known as a zone of vulnerabilities as well as opportunities. It is prone to natural disasters like cyclone, storm surge and flood. The combination of natural and man-made hazards, such as erosion, high arsenic content in ground water, water logging, earthquake, water and soil salinity, various forms of pollution, risks from climate change, etc., have adversely affected lives and livelihoods in the coastal zone and slowed down the pace of social and economic developments in this region.

The Government initiated the coastal zone policy for three reasons - the coastal zone is lagging behind in socio-economic developments on many aspects like poor initiatives to cope with different disasters and gradual deterioration of the environment. The coastal zone has the potential to contribute much to national development. A total of 48 upazilas/thanas are considered as 'exposed' directly to vulnerabilities from natural disasters. The exclusive economic zone (EEZ) is regarded as the seaward coastal zone. For the coastal region special measures will be taken during the

period of disaster. So, the Government formulated the coastal zone policy (CZPo) to provide a general guidance to all concerned for the management and development of the coastal zone in a manner so that the coastal people are able to pursue their life and livelihoods within secure and conducive environment.

The goal of integrated coastal zone management is to create conditions for the reduction of poverty, development of sustainable livelihoods and the integration of the coastal zone into national processes.

The policy includes economic growth for the reduction of poverty through integrated actions and fulfilling basic needs and opportunities for livelihoods. Special measures are be taken during the period of disaster for protecting livelihoods.

Reduction of vulnerabilities from cyclone, drainage congestion, land erosion and drought are necessary. Depletion of natural resource would be reduced. The Government policy aimed the reduction to vulnerability to natural disasters as an integral aspect of the national strategies. Integration is to be made with 'Comprehensive Disaster Management Plan' on aspects concerning the coastal zone. The coping capacity of the poor during the period of disaster would be enhanced. Protection against erosion would be taken up and rehabilitation of the victims of erosion would be done. Safety measures would be enhanced by combining cyclone shelters, multi-purpose embankments, killas, road system and disaster warning system. Special measures for children, women, the disabled and the old would be taken up. Sea-dykes will be regularly maintained as first line of defense against storm surges and afforestation on it as per the existing policy. Earthquake management will be strengthened and capacity to cope with earthquakes will be enhanced. Safety of livestock during disaster and post-disaster period would be enhanced. Tree plantation in a planned manner in the coastal zone will be encouraged. The asset base of the poor, with special focus on women, will be improved through ownership or access for improving coping capacity.

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