Chapter 16
Frameworks, Stories and Learnings from Disaster Management in Bangladesh

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Key Messages

- Bangladesh has developed a robust framework of disaster management institutions, plans and rules to deal with climate vulnerability over three decades.
- The framework includes vertical integration of institutions across various levels of government and horizontal integration of stakeholders within each level.
- Participatory processes and community engagement at the grassroots level have emerged as successful examples of efficient and cost-effective solutions that leveraged traditional knowledge and reduced loss of lives and livelihoods.

16.1 Introduction

> The specter of climate change threatens worsening natural disasters, rapid urbanization, forced migration, and economic hardship for the most vulnerable—Tedros Adhanom, Director-General, World Health Organization (Adhanom, 2017).

As the world warms, the frequency and severity of climate change-related extreme events such as heatwaves, extreme precipitation, and coastal flooding are increasing globally (IPCC, 2014). The link between climate change and natural disasters is

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becoming clearer—especially through developments in impact attribution research. High-resolution datasets and more sophisticated models have allowed researchers to find the fingerprint of climate change in individual weather events (Ornes, 2018). A report published in the Bulletin of the American Meteorological Society included studies examining 168 specific weather events in 2018, of which 122 were found to be influenced by climate change (Herring et al., 2020). IPCC defines climate-induced extreme weather events as climate extremes (IPCC, 2012). The impacts of observed climate extremes have been particularly intense for people and communities in vulnerable and disaster-prone regions of the world (Eckstein et al., 2019).

While Bangladesh accounts for ~ 0.5% of global GHG emissions (Ge & Friedrich, 2020), it has been experiencing the impact of climate extremes for over three decades and thus has had long experience with disaster risk reduction and emergency preparedness programmes. These initiatives are often cited as successful examples that have greatly minimized the loss of life and ensured livelihood and food security for millions of people annually (Molla, 2019).

This chapter summarizes the disaster management framework in Bangladesh. We have deconstructed the vulnerability, impacts and responses to natural disasters and unpacked the national and sub-national institutional mechanisms for disaster risk reduction. We describe how the disaster management process works at the grassroots level from the perspectives of the operatives on the ground through site visits and conversations with stakeholders. We also tell stories of unique initiatives undertaken by the government, a local NGO, and an international organization. We highlight the lessons learned for wider application.

16.2 Climate and Disaster Vulnerability

The character and severity of impact from climate extremes depend on exposure and vulnerability (IPCC, 2012). Bangladesh is geographically, geologically, hydrologically, and meteorologically vulnerable to natural disasters. It is the largest delta on earth facing the Bay of Bengal formed at the confluence of three major rivers: Brahmaputra, Ganges, and Meghna. This unique landscape creates ideal circumstances for cyclones, floods, and storm surges. Meandering rivers change course due to riverbank erosion with silted islands (*chars*) forming and disappearing in a matter of years. Bangladesh has always wrestled with abundance and scarcity of water: too much water floods a large swath of the country in the wet season, while too little water causes droughts during the dry season. The plate tectonics of the Himalayan region also brings moderate to severe earthquakes to the country (GoB, 2009a).

The demography of Bangladesh also adds to its vulnerability to natural disasters. It is the most densely populated country in the world (except a few smaller nations/states with population < 10 million) with a total population of ~ 165 million and a population density of ~ 3,277 per square mile (United Nations, 2019). About 63% of the population living in rural communities are predominantly engaged in farming and fishing, often poor and without access to adequate infrastructure (The

World Bank, 2018). Many of these communities are situated in disaster-prone areas and are exposed to a multitude of natural disasters that exacerbate poverty, landlessness, and loss of livelihood. A study published in Nature Communications states that more than 70% of the total number of people worldwide currently living on climate implicated land are in eight Asian countries, including Bangladesh and India (Kulp & Strauss, 2019).

From the north of the sub-continent, climate-induced glacial melt is bringing more water with heavy sediment loads from the eroded soil of the Himalayas down to the riverine delta. Monsoon rain floods large parts of the country and dry season droughts triggered by extreme heat evaporates the water and deposits silt in riverbeds. This creates the perfect storm for catastrophic annual floods that erode riverbanks and inundate farmlands, villages, and towns. Normal flooding (*barsha*) affects about 25% of Bangladesh each year, but land use and settlements are well adapted to it. Severe flooding (*bonya*) or flash floods (*baan*) can submerge more than half of the landmass—damaging crops and property, disrupting economic activities, and causing injury and loss of life.

From the south, a rising ocean aided by stronger tidal and wind movements is forcing volumes of water inland causing coastal flooding, erosion, and saltwater intrusion. Formerly fertile agricultural lands have become unfit for cultivation and freshwater fisheries are rendered unfeasible. Before and after the monsoon season, cyclones with wind speeds up to 280 kmph develop in the Bay of Bengal with predictable regularity. Storm surges and associated tidal waves rise to 10 m in height resulting in catastrophic consequences for the coastal inhabitants (Schmuck, 2003). Cyclones bring multiple threats of severe winds, storm surges, and heavy rainfall that result in both surface and riverine flooding, with bigger storm surges often inundating areas protected by embankments. The frequency of floods and storms (including cyclones) in Bangladesh shows a clear increase in the total number of events in the three most recent decades compared to the previous two (Fig. 16.1).

Over the centuries, the people of Bangladesh have learned to develop ways of life adapted to the inevitable natural calamities of the area while still aspiring to improve the socio-economic circumstances of the poor and the vulnerable—especially since the nation's independence in 1971. However, climate change has become the straw that threatens to break the camel's back for this naturally and demographically vulnerable country. It is predicted that with a 0.5-m sea-level rise, Bangladesh could lose approximately 11% of its land, affecting an estimated 15 million people living in its low-lying coastal region by 2050 (EJF, 2020). A 1.0-m sea-level rise could submerge 17% of the coast, inundate 20% of the country, and potentially displace more than 30 million people (Glennon, 2017). It is thus not surprising that Bangladesh has often been labelled as "ground zero for climate change or the poster child of climate vulnerabilities and impacts" (Szczepanski et al., 2018).

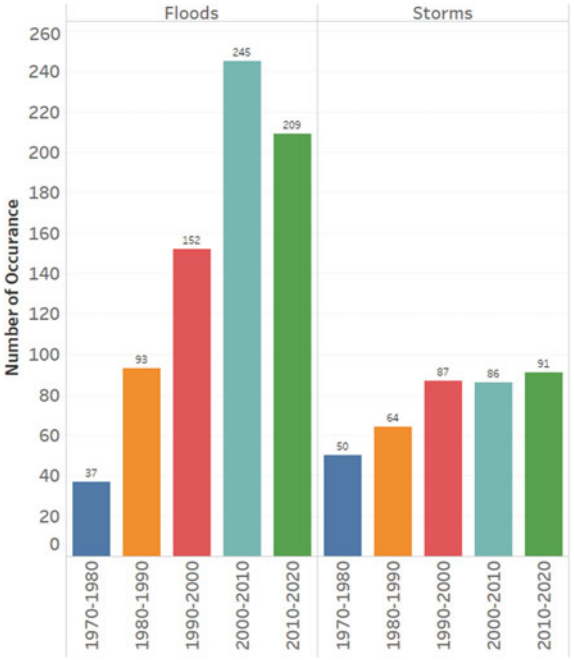

Fig. 16.1 Occurrence of floods and storms by decade in Bangladesh since 1970. *Source* Authors' calculations based on data from the Emergency Events Database, Centre for Research on the Epidemiology of Disasters, Université catholique de Louvain

16.3 Anatomy of Disaster Management in Bangladesh

Major developments in disaster management in Bangladesh began in the 1990s. At the national level, the Ministry of Disaster Management and Relief (MoDMR) was responsible for inter-ministerial planning, coordination, and disaster response. Under the MoDMR, there are two agencies: the Disaster Management Bureau (DMB) and the Directorate of Relief and Rehabilitation (DRR). The DMB, established in 1993, was a small professional unit at the national level that performed specialist functions at both national and local levels. The government also set up a national council and various committees at national, district, Upazila (sub-district) and union (local council) levels for disaster preparedness. The main focus of disaster management was relief and rehabilitation guided by the first Standing Orders on Disaster (SOD) published in 1997—later modified and translated in English in 1999 (Haque & Uddin, 2013).

The 2000s saw a global shift in disaster management towards a more holistic model that prioritized prevention, preparedness, response, and recovery. The aim was to address multiple types of hazards, harness the power and resources of community-based initiatives, and involve multiple stakeholders. The Government of Bangladesh developed the Comprehensive Disaster Management: A Framework

for Action (2005–2009). Bangladesh also signed the *Hyogo Framework for Action 2005–2015*, adopted at the 2005 World Conference on Disaster Reduction (held in Kobe, Japan), and later, hosted a summit of South Asian countries who collectively adopted *Disaster Management in South Asia: A Comprehensive Regional Framework for Action 2006–2015*. These developments, coupled with two major floods in 2004 and 2007, and the catastrophic cyclone Sidr in 2007 followed by Aila in 2009, prompted revisions to the SOD 1997, catalyzed the creation of national plans and policies, and shifted the paradigm of disaster management in Bangladesh from *relief and rehabilitation* to *disaster risk reduction*.

16.3.1 National Regulatory and Institutional Mechanisms

Under the new paradigm, a National Plan for Disaster Management (NPDM) 2010–2015 was created (and subsequently updated for 2016–2020) and updated Standing Orders on Disaster (SOD) were published (GoB,). These umbrella documents promoted two main categories of activities: disaster risk reduction (DRR) and emergency response management (ERM). These activities are mandated by a set of regulatory and institutional mechanisms at the national level. The current regulatory framework and institutional mechanisms in Bangladesh are shown in Table 16.1.

According to the 2010 SOD, the Department of Disaster Management or DDM (formerly Disaster Management and Relief Division or DM&RD) under the auspices of the Ministry of Disaster Management and Relief or MoDMR (formerly Ministry of Food and Disaster Management or MoFDM) is responsible for administering all disaster management issues. The Disaster Management Information Centre (DMIC) within the DMB is mandated to assist the Ministry with all necessary information during normal time, warning and activation, emergency response, relief, and recovery. The Ministry provides information to the NDMC, IMDMCC, the relevant cabinet committee and the National Disaster Response Coordination Group (NDRCG) and assists them in the decision-making process. The Secretary of the Disaster Management and Relief Division of MoFDM coordinates the activities of all officials engaged either directly or indirectly in emergency response, relief, and recovery activities.

The SOD is the most comprehensive framework for disaster management in Bangladesh. Taking a holistic approach to disaster risk reduction, the SOD created structures for inclusive management and implementation of DRR and ERM. The subsequent development of acts and rules provided the necessary legal authority for local level disaster management institutions to leverage cross-sectoral resources and deliver prompt and well-coordinated response in the event of a disaster. The local level operatives that we have spoken to all mentioned this document as the primary reference for their workflow. It is, therefore, not just a comprehensive document on paper, but an applied document that is actively used for disaster management and response on the ground. The updated SOD released in 2019 is expected to continue the tradition.

Table 16.1 Regulatory framework and institutional mechanisms for disaster management in Bangladesh 2010 onwards

Regulatory framework	Institutional mechanisms
National Plan for Disaster Management (2016–20, 2010–15)	National Disaster Management Council (NDMC)
Standing Orders on Disaster (SOD), 2010 *(updated SOD has just been released in 2019)*	Inter-Ministerial Disaster Management Coordination Committee (IMDMCC)
Disaster Management Act 2012	National Disaster Management Advisory Committee
National Disaster Management Policy (2015)	Earthquake Preparedness and Awareness Committee (EPAC)
Guidelines for Government at all Levels	National Platform for Disaster Risk Reduction (NPDRR)
	National Disaster Response Coordination Group (NDRCG)
	Cyclone Preparedness Programme (CPP) Policy Committee
	Committee for Focal Points Operational Co-ordination Group
	Co-ordination Committee of NGOs relating to Disaster Management
	Disaster Management Training and Public Awareness Task Force (DMTPATF)

Source Authors' adaptation

The National Disaster Management Policy of 2015 was formulated to define the national perspective on disaster risk reduction and emergency management, describe the strategic framework, and outline the national principles of disaster management in Bangladesh. It is strategic in nature and describes the broad national objectives and strategies in disaster management. The NPDM 2016–20, published in 2017 offers several enhancements to SOD 2010 and NPDM 2010–15. It takes inspiration from the four priorities of the *Sendai Framework for Disaster Risk Reduction 2015–2030* adopted at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan, on March 18, 2015: (i) Understanding disaster risk; (ii) Strengthening disaster risk governance to manage disaster risk; (iii) Investing in disaster reduction for resilience and; (iv) Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation and reconstruction. The Sendai Framework aims to achieve substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries (United Nations, 2015). NPDM 2016–20 also incorporates the UN Sustainable Development Goals (SDGs) which became available in 2015 as part of the 2030 Agenda for Sustainable Development (United Nations, 2020). Notable additions in the updated NPDM were: resilience as a central theme; gender equality by ensuring participation of women

in committees; synergy between DRR and climate change adaptation plans; and connecting DRR with sustainable development. Shammin et al. (2021, Chap. 2 of this volume) has developed an integrative framework for climate-resilient communities that incorporates DRR and SDGs.

The national-level framework described above is intended to foster cross-sectoral coordination, streamline collaboration and information sharing to develop and update policy and management guidelines, leverage necessary resources and support local-level organizations in developing and implementing long-term DRR programs and event-specific emergency response measures.

16.3.2 Local-Level Institutional Mechanisms

SOD 2010 outlines institutional mechanisms at the local level (district and below) to facilitate coordination, institutional capacity and logistics of prevention, mitigation, preparedness and response, and relief (Table 16.2). A larger disaster management committee brings together representatives from all government departments including police and armed forces, non-government organizations, key religious and educational establishments, and civil society. A smaller group under the auspices of Local Disaster Response Coordination Group (LDRCG) is created with fewer key stakeholders to ensure coordination during and after disasters at all levels.

While the committees and coordination groups are designed to be inclusive, the lower tiers at the municipal and union levels offer the greatest potential for community engagement, place-based solutions and cost savings.

Table 16.2 Local-level Institutional Mechanisms for Disaster Management in Bangladesh 2010 onwards

Local Level institutional mechanisms
District Disaster Management Committee (DDMC) and Response Coordination Group (DDRCG)
City Corporation Disaster Management Committee (CCDMC) and Response Coordination Group (CCDRCG)
Upazila Disaster Management Committee (UzDMC) and Response Coordination Group (UDRCG)
Pourashava (Municipal) Disaster Management Committee (PDMC)and Response Coordination Group (PDRCG)
Pourashava Ward Disaster Management Committee (PWDMC) and Response Coordination Group (PWDRCG)[a]
Union Disaster Management Committee (UDMC) and Response Coordination Group (UDRCG)
Union Ward Disaster Management Committee (UWDMC) and Response Coordination Group (UWDRCG)[a]

Source Authors' adaptation
[a]Added in SOD 2019

16.4 Economics of Disaster Management

Natural disasters have had significant economic costs for Bangladesh. Between 1998 and 2011, five major disasters incurred damages amounting to roughly 15% of GDP—an average of 2.7% per event (Ahmed et al., 2015). A significant part of the losses can be attributed to climate change (GoB, 2012). From 2010–2015, there were 17 high/medium impact natural disasters in Bangladesh and many localized hazard events, with economic losses ranging from 0.8 to 1.1% of GDP (GoB, 2017). According to a study on disaster-related public spending, the Government of Bangladesh allocated Tk. 15,097 crore (~ US$19 billion) for 164 projects between 2011 and 2015. Out of this allocation, 68.5% was spent for disaster preparedness and risk reduction. Bangladesh contributed 63.4% of the cost and the remaining was funded by external donors (GoB, 2016). During the fiscal year 2020–2021, the Government of Bangladesh has allocated Tk 9,836 crore (~ US$12.5 billion) for disaster management and relief (Dhaka Tribune, 2020).

Mechler (2016) reviewed 39 CBA case studies from around the world, including three from Bangladesh, and determined that the benefits of investing in DRR in terms of avoided and reduced losses outweigh the costs of implementing these programs by a factor of four. Das (2021, Chap. 17 of this volume) determined that the annual storm protection value of mangrove forests is more than twenty times higher than the return from alternative land uses. Taking advantage of indigenous knowledge, local resources and community participation often result in solutions that build on past practices and produce low-cost alternatives to top-down infrastructure-oriented interventions. Valerie Amos, the Under-Secretary-General for Humanitarian Affairs of the United Nations, recognised the DRR initiatives of Bangladesh as examples of low-cost approaches that save lives (UN News, 2012).

16.5 Disaster Management on the Ground

We visited several climate-vulnerable, disaster-prone areas in the Cox's Bazar district of south-western Bangladesh to better understand how the disaster management framework was operating on the ground. We had detailed conversations with the District Disaster Risk and Rehabilitation Office (DRRO), Executive Engineer of the Local Government Engineering Department (LGED), local people (e.g. school teachers, volunteers) and representatives of Upazila Porishod (sub-district administration), village police, and non-government organizations. Through these conversations, we documented the local-level DRR and ERM implementation process from their perspectives.[1,2]

[1] Field notes by Md Rumi Shammin from Khurushkul and Cox's Bazar, Bangladesh in 2019.

[2] Field notes by Md Rumi Shammin from Dhaka and Cox's Bazar, Bangladesh in 2020.

The DRRO referred to the SOD 2010, NPDM 2016–20 and Disaster Management Act 2012 as primary reference documents for planning, organization, and implementation at the district level and below. The DRRO talked about the SDGs as an overarching mission and coordination with climate change adaptation as an important operational strategy. Climate change and natural disasters regularly negate progress towards the SDGs goals in vulnerable communities making disaster risk reduction an essential prerequisite. The DRRO emphasized the importance of allocating 15–20% of the SDG budget towards DRR and ERM.

The 2012 Disaster Management Act provides legal mandates to local level administrations to secure logistical support from stakeholders during disasters and ensure action and accountability of all involved. This allows committees at the district level and below to engage with government, private, and non-governmental entities efficiently and authoritatively. For example, transport unions are called to provide transportation support, merchant unions are asked to help with emergency food supply and post-disaster price stabilization, and industries are asked to share warehouses for shelter and/or food storage. Fire service and civil defense forces are leveraged as needed. About 36 local and international NGOs are involved in various stages of DRR and ERM in the Cox's Bazar area including the World Food Program (WFP), Bangladesh Rural Advancement Committee (BRAC), Mukti and the Bangladesh Red Crescent Society (BDRCS).

The BDRCS has been instrumental in Bangladesh for nearly five decades working on disaster management, emergency recovery and relief. One of their flagships programs is the Cyclone Preparedness Program (CPP). The CPP is unique in the sense that it engages volunteers such as students and teachers from the local community (CPP, n.d.).

In Cox's Bazar, the CPP operation is administered by a deputy director who supervises 8 officers, one in each Upazila. Each officer oversees the union level volunteer leaders. Each volunteer group consists of about 20 volunteers. At the time of our field visits in 2018 and 2019, there were 538 cyclone shelters in place and 19 more under construction. Communication infrastructure includes UHF/VHF radios and mobile phones managed through the District Disaster Management Control Room and Emergency Operation Centre (EOC) with generator support for power outages. These are open year-round with 24-hour phone service for people to report events or seek support.

Under normal circumstances, disaster management committee meetings are held once every two months. Anytime there is a warning signal of level 4 or above, the committees at all levels meet on the same day and begin to mobilize personnel and resources. Bangladesh Meteorological Department issues early warnings of impending disasters which are communicated to both national and local level institutions. The control room at the district level then communicates the warning and subsequent development of the event to all local level committees, CPP representatives and other stakeholders down to the union level. Each union consists of nine wards. In addition to cell phones and radios, the ward level action is often handled through volunteers walking through neighborhoods with hand mikes and megaphones. In case of major disasters, people are guided to nearby designated shelters with provisions

Table 16.3 Deaths due to floods and storms by decade in Bangladesh since 1970

	Decade	Total deaths	Total impacted
Floods	1970–1980	29,375	52,614,127
	1980–1990	7,064	123,268,327
	1990–2000	2,944	58,165,806
	2000–2010	2,404	58,649,763
	2010–2020	658	26,156,421
Storms	1970–1980	307,144	3,740,174
	1980–1990	18,977	17,275,998
	1990–2000	142,594	23,658,485
	2000–2010	5,588	13,282,990
	2010–2020	592	9,404,929

Source Authors' calculations based on data from the Emergency Events Database, Centre for Research on the Epidemiology of Disasters, Université catholique de Louvain

for dry food and ramps to allow people to bring their livestock with them. The CPP program volunteers work alongside the government program participants/volunteers to execute this emergency management process. The participants and volunteers are trained beforehand through programs developed in collaboration between public disaster management entities, BDRCS and local fire service personnel. Appropriate chain of command is maintained at all levels of implementation.

The hallmark of this entire process is a broad collaboration between public, private, and non-profit organizations supplemented by representative public participation and engagement of local volunteers—ensuring financial, resource, and program efficiencies in reducing the impacts of natural disasters in Bangladesh on lives and livelihoods (BDRCS, n.d.; UN News, 2012). Table 16.3 demonstrates that despite the increased frequency of floods and storms shown in Fig. 16.1, the number of impacted people and fatalities have decreased in recent decades.

16.6 Stories of Innovation in Disaster Management

16.6.1 Empowering Women Through Community-Based Adaptation in Teknaf

The Department of Environment (DoE) in Bangladesh has designated ecosystems such as forests, islands, or wetlands in the country as "Ecologically Critical Areas" (ECAs) that require immediate conservation action to halt further degradation. In Cox's Bazar, the DoE manages the ECAs through Village Community Groups (VCGs) and ECA Management Committees at the union, Upazila and district levels. In Cox's Bazar and Teknaf areas the DoE has implemented several initiatives in

recent decades and one noteworthy example is the Community-based Adaptation for Ecologically Critical Areas (CBA-ECA) project. In addition to several anthropogenic threats such as land conversion and encroachment, climate change-induced disasters pose a major threat to the conservation of ECAs and the lives and livelihoods of the adjoining communities. This project aims to build resilient communities that are better able to cope with disasters and withstand the effects of cyclones and tidal surges (DOE, 2015).

The CBA-ECA project uses skills and technology to empower women through various training programs and introduction of alternative livelihood options. It introduced the use of improved cooking stoves that drastically reduced indoor air pollution and made kitchens a safer place for women. Solar irrigation and desalination plants installed in selected sites in Cox's Bazar and Shah Porir Dweep (island) added significantly to the safety and well-being of women who are primarily in charge of collecting water and fuel.

During a Focus Group Discussion held with a VCG in Tulatoli, Cox's Bazar, several interesting findings were revealed from the consultation. The VCG has 30 members—all of them are women. These women members are vulnerable coastal mothers and daughters, who collect molluscs and shells, hunt crabs, and cut small branches of trees to make a living. Ever since they were associated with the project, they have been trained and engaged in making handicrafts such as beaded necklaces, hand-woven lace caps, sewing and embroidery, etc. They are also conversant in maintaining books and accounts and aware of conservation and disaster-related issues. These women contribute a meagre amount of 50 Taka (BDT) every month to the community fund and accumulated a handsome capital; over time, they have started a system of "rotational loans" within the group. When asked how their lives have changed by being members of the VCG, one of the women said "*taka jaar haathe, khomota taar kache"* meaning that the one with money is the one with power. Resilient and economically solvent communities in a gender-balanced society are better equipped to tackle disasters and climate change, as witnessed in the case of the women of Tulatoli.[3]

16.6.2 Ward-Level Organization in Cyclone Fani Response in Goroikhali

Goroikhali is a Union Parishad (rural level administrative unit) under Paikgacha Upazila on the bank of Shibsha River near the Bay of Bengal. An embankment was constructed on the bank of the river after cyclone Sidr of 2007 to protect the land from storm surges and saline water intrusion. The *Panii Jibon* (Water is Life) project of Bangladesh Disaster Preparedness Centre (BDPC) has been working to strengthen disaster preparedness and livelihoods in the south-western coastal Upazilas of Paikgacha and Koyra since January 2018. In the Goroikhali union, BPDC facilitated

[3] Field Notes by Remeen Firoz from Tulatoli, Teknaf, and Cox's Bazar, Bangladesh in 2015.

the formation of the Union Ward Disaster Management Committee (UWDMC)[4]—a level below the UDMCs that existed in the government framework—to strengthen community-based disaster risk reduction. The WDMC consists of 11 members from different strata of the local society under the leadership of local UP member of Ward#4. BDPC organized training for the UWDMC members on disaster risk reduction, climate change adaptation, community risk assessment, and early warning systems. The training was followed by the development of a Risk Reduction Action Plan (RRAP).

When tropical cyclone Fani developed in the Bay of Bengal on 2 May 2019, the water level in the Shibsha River started to increase—causing a part of the embankment to breach near Ward#4. A complete embankment failure could submerge the nearby four Unions. Community members observed the embankment breach and the president of the WDMC immediately informed the Union level committee (UDMC) of Goroikhali. The UDMC immediately called an emergency meeting and informed both the Upazila level committee (UzDMC) and the Bangladesh Water Development Board (BWDB). The UDMC promptly employed 100 labourers to repair the embankment (using an earmarked fund: The 100-day work budget). In addition, 50 volunteers, including the WDMC members of Ward nos. 2, 3 and 4 participated in the repair work. They finished the primary repair in three days—sparing the people of the four Unions from the potential disaster.

While the repair work was ongoing, the local BWDB officials visited the damaged embankment area and initiated the process of permanently repairing the embankment with proper design standards administered by their engineers. The WDMC of Ward#4 played a critical role in reducing the risk of embankment failure throughout the process: from the initial communication and information dissemination to the evacuation of people and completion of the emergency repair work. Cyclone Fani caused widespread damage elsewhere including the death of 81 people in India and Bangladesh and USD 8.1 billion in economic losses (AON, 2020). The President of the WDMC said: "As a local community member it is our responsibility to do the immediate response, the WDMC gave us a platform and idea about formal process of response through the appropriate authority. Our quick response has saved a large area of Paikgacha and Koyra from being submerged by saline water."[5]

16.6.3 "Let's Hear Rana Bhai": A Climate Education Program in Noakhali

In association with the Char Development and Settlement Project (CDSP) III, the Bangladesh branch of the International Union for Conservation of Nature (IUCN) implemented an education and awareness project in the coastal areas of Noakhali,

[4] Even though the official name has the 'Union' prefix to distinguish it from the 'Pouroshova' level committee, these are referred to as WDMC in practice.

[5] Field notes by Rashadul Hasan from Goroikhali, Paikgacha, Bangladesh in 2019.

Fig. 16.2 Educational material showing Rana Bhai talking about climate change. *Source* IUCN (2010) (with authors' translations)

with a special focus on the children of 15 different schools and madrasa (religious school). The activities consist of essay and writing workshops, art camps, participatory drama, and distribution of awareness materials like posters and stickers and creation of a climate change mascot named "Rana Bhai".

Inspired by the success of 'entertainment education' of UNICEF's *Meena Communications Initiative*, the mascot 'Rana Bhai' was created, with close consultation of children from the coastal communities (see Fig. 16.2). Rana Bhai is an iconic character who radiates knowledge and wisdom. His very name Rana has been derived from the scientific name for bullfrogs, *Rana tigerina.* As a Bangladeshi national, he takes the appearance of a *shona bang*, a frog species indigenous to Bangladesh. Being an indicator species, the amphibious bright yellow Rana Bhai is very susceptible to climate change. Children related to him better because Rana is a common Bangla (Bengali) name and the suffix 'bhai' literally means 'brother.' The participatory drama 'Let's hear Rana Bhai' was performed and filmed to advocate climate change messages and encourage school children to discuss adaptation measures with friends and families. Rana Bhai, the climate change mascot, is also the star of his own documentary on climate change targeted at school children (Adrika et al., 2011) (Fig. 16.2).

Although there is no documented evidence of the impact of the communication materials of the project, we had consulted the school children and local communities following cyclone Sidr and Aila. They informed us that because of the enhanced awareness, there were fewer casualties as most of them had taken shelter in the

nearby school buildings. The project also went on to become one of the 100 most impactful climate change projects in 2012, selected by the British Broadcasting Corporation (BBC). Some of this project's activities were replicated and scaled up for other coastal regions in Bangladesh like Barisal, Potuakhali and Borguna through the Climate Livelihood Adaptation Project (CLAP) funded by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).[6]

16.7 Lessons Learned and Recommendations

An overview of the disaster risk reduction and emergency response mechanisms employed in Bangladesh to deal with ongoing and worsening exposure to natural disasters reveal the importance of coordination at multiple levels and broad engagements of stakeholders. These systems have greatly reduced the scale of loss of lives, livelihood and property in the country (see Table 16.3). The takeaway lessons from the DRR and ERM systems in place in Bangladesh are summarized below.

Government Commitment and Institutional Framework

Disaster preparedness, management and recovery are high priority activities for Bangladesh. The government has taken a holistic, multi-level, multi-sectoral and multi-stakeholder approach to develop policies, guidelines, management and action plans, legal frameworks, rules, and implementation plans to address these issues. The Prime Minister of the country heads the National Disaster Management Council (NDMC). Legal mandate afforded by the Disaster Management Act of 2012 empowers the disaster management institutions to coordinate across various levels of the government and leverage resources from a wide range of stakeholders.

Stakeholder Engagement

The national level committees have representation from all relevant government units and ministries as well as inclusion of international agencies, non-governmental agencies, and private entities as appropriate. At local levels, government representatives interface with local organizations (religious and educational institutions), local dignitaries and volunteer networks. Vertical integration of management bodies between all levels ensures chain of command, information flow, clear designation of roles and responsibilities and appropriate legal and logistical support. This institutional setup also facilitates the development of joint implementation programs by government entities, international organizations, NGOs, and the civil society.

Community-Based Programs

NGO initiatives parallel to government programs are creating innovative new programs at the grassroots level on education, awareness building, infrastructure solutions and grassroots-level disaster management. The *Let's Hear Rana Bhai*

[6] Field Notes by Remeen Firoz from the coastal areas of Bangladesh in 2013.

example illustrates one such initiative. These community-based approaches coordinate local response with the engagement of local institutions and people through trained volunteers, prior installation of critical infrastructure (e.g. cyclone shelters) and logistical support during and after disasters. Access to local knowledge, resources and volunteers facilitate the development of cost-effective alternatives to top-down infrastructure solutions.

Livelihood Solutions

Forest conservation programs in several coastal communities in Bangladesh are achieving disaster risk reduction while protecting community access to subsistence resources. All along the coastal belt, there are thousands of multi-purpose cyclone shelters which function as schools during normal times and act as a refuge during disasters. Many of these shelters in the Cox's Bazar area have been retrofitted with ramps for movement of livestock during disasters—thus saving lives. Livelihood and income-generating opportunities empower vulnerable communities in tandem with DRR efforts.

Gender Inclusive Approaches

Women are often disproportionately burdened by natural disasters. For example, water scarcity due to salinity intrusion often results in women having to travel longer distances to collect drinking water. The institutional mechanisms in Bangladesh require representation and participation of women in all committees at the local levels. The DRR program development process also mandates consideration of gender-specific issues and solutions. The CBA-ECA program in Teknaf demonstrates how this can be accomplished. Ensuring women's health and well-being make their communities more resilient.

Resilience Building and Sustainable Development Goals

NPDM 2016–20 is organized around the theme of building resilience for sustainable human development which recognizes how building resilient communities go hand in hand with DRR and ERM. NPDM 2016–20 had also introduced attainment of SDGs as an umbrella mission of disaster management. Both infrastructure solutions and community-based programs of DRR and ERM have potential for reducing setbacks towards SDGs. However, there are untapped opportunities for proactive planning and program development that are designed to enhance SDG attainment in the process of DRR and ERM.

Feedback and Learning

The existing disaster management mechanisms in Bangladesh are receptive to feedback, innovation, and new ideas. NGO initiatives to pilot WDMCs like the *Panii Jibon* project by BPDC in Goroikhali have led to formal adoption of the WDMC model in the updated 2019 Standing Orders on Disaster (SOD). The DRRO of Cox's Bazar, the lead government official at the district level, lauded the idea of WDMCs promoted by NGOs and acknowledged that this model would fill a gap at the grassroots level and make DRR and ERM more effective. This positive and collaborative

culture of cooperation is not a happenstance, but the result of a multi-level institutional framework that fosters relationship building in the service of an essential humanitarian cause.

Finally, we note that this study is an effort to document the framework of disaster management in Bangladesh and tease out important lessons and best practices. A critical analysis of the limitations and opportunities for improvements of disaster management systems in Bangladesh is also important but has not been addressed in this chapter.

16.8 Concluding Remarks

Disaster management and emergency response will be part of the new reality as the world experiences a rapidly changing climate with uncertainties and inadequate global response to reverse the course of human activities that fuelled this crisis. Unexpected events such as the Covid-19 pandemic will further endanger communities, exacerbate vulnerabilities and alter the traditional ways of life. We hope that the detailed description of the institutional mechanisms, perspectives on implementation of the programs at the ground level and stories of innovation from Bangladesh presented here will offer useful lessons on disaster management for other South Asian countries, developing nations around the world and vulnerable communities of western countries. As for Bangladesh, while the country has managed to significantly reduce human casualty, many more are likely to succumb to future disasters. There is a long road ahead with opportunities for further innovation, but no room for complacency.

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