

Emergency and Disaster Reports

ISSN 2340-9932

Vol 9, Num 1, 2022



Monographic issue

The Flood Disaster management: A case study of Bangladesh

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Letter from the Editor

The Emergency and Disaster Reports is a journal edited by the Unit for Research in Emergency and Disaster of the Department of Medicine of the University of Oviedo aimed to introduce research papers, monographic reviews and technical reports related to the fields of Medicine and Public Health in the contexts of emergency and disaster. Both situations are events that can deeply affect the health, the economy, the environment, and the development of the affected populations.

The topics covered by the journal include a wide range of issues related to the different dimensions of the phenomena of emergency and disaster, ranging from the study of the risk factors, patterns of frequency and distribution, characteristics, impacts, prevention, preparedness, mitigation, response, humanitarian aid, standards of intervention, operative research, recovery, rehabilitation, resilience and policies, strategies, and actions to address these phenomena from a risk reduction approach. In the last thirty years has been substantial progress in the above-mentioned areas in part thanks to a better scientific knowledge of the subject. The journal aims to contribute to this progress by facilitating the dissemination of the results of research in this field.

This monographic issue is about the flood disaster management in Bangladesh. The geographical location, land characteristics, multiplicity of rivers, and monsoon climate render Bangladesh highly vulnerable to natural hazards. Floods occur annually and affect half of the country. Bangladeshi Community people are habituated for living with flood and they shifting their living paradigm, living but not coping with flood. And it is a common living pattern for disaster prone Bangladeshi Community people. The study assessed the flood disaster management of Bangladesh.

The aim of this study was to synthesize the flood disasters, types, impact and to develop flood risk management profile of Bangladesh. The study was based on the literature review. The descriptive study design was adopted and used to find both qualitative and quantitative evidences. This study was based on secondary data. Data from various open sources such as EM-DAD, IPCC, CDC, WHO, GO, NGO, INGO etc. Since disasters are a long-term process both published and unpublished articles featuring during 1985-2015 were included in the study.

Bangladesh was impacted by different catastrophic floods especially 1988,1998, 2007. The paper will explain the floods types, impact, losses and death and management system by the Bangladeshi Government, different NGO, INGOs role and strategies for managing floods. Now a days, Bangladesh is a role model for disaster management among all other coastal zone areas in the world.

loss) of a major disaster that occurred in Nepal for the last 10 years from the year 2011-2020. The data on disaster incidents used in the report are based on the Nepal Ministry of Home Affairs' (focal ministry for disaster risk reduction and management in Nepal) disaster risk reduction portal database from 2011-2020. Based on the DRR portal database, simple numerical calculations were used for quantitative analysis, and subsequently, the information was summarized in form of tables, figures, and graphs.

Disaster risk management initiatives, existing disaster risk management institutions and mandate, the current status of the country for sendai framework for disaster risk reduction, issues in the implementation of disaster risk reduction and climate policy, and future challenges and priority areas of Nepal are also explained in this report.

Prof. Pedro Arcos, MD, PhD.

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ORIGINAL RESEARCH

The flood disaster management: a case study of Bangladesh

Mohamed Kanrujjaman

INTRODUCTION

Bangladesh is a low-lying country in covering an area of 147,570 square kilometers. The country is borders with India and Myanmar, and the land is characterized by more than 310 rivers and various cannels sourcing mainly from the Ganges, Brahmaputra and Meghna rivers. These form the world's biggest delta system (GBM Delta) draining into the Bay of Bengal.

The interface of rivers and tidal processes contributing to the fertility encompass roughly an area of 100,000 square kilometers of Bangladesh and West Bengal in India, and it has attracted a population of 167.6 million due to its high agricultural potential. The weather is associated three seasons: hot humid summers between March and June, monsoon between June and September which is the main causes of flood as well as cooler winters between October and February. flood is a common phenomenon in Bangladesh. [1]

According to EM-DAD database, natural disasters are one of the major problems of humankind. During the recent decade (from 1985 to 2015) the world has faced an more than thousands occurrence disasters annually. During the recent decade (from 1985 to 2015) the world has faced following disasters in terms of country basis where China picked up the top worst position (733) times and Bangladesh picked up 6th worst position (241) times followed by China (733), USA (713), India (449), Philippines (417) and Indonesia (342) times respectively.

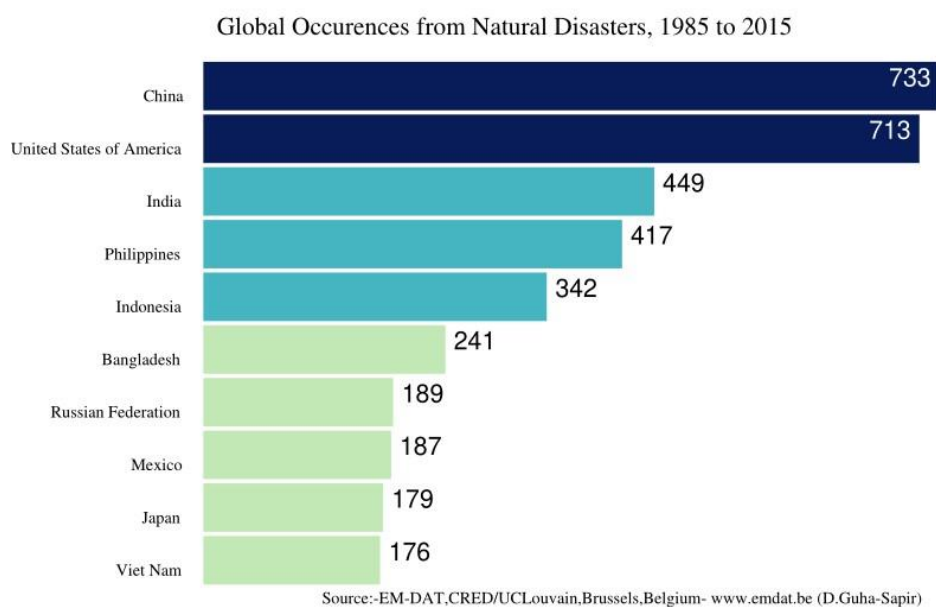


Figure 1 Global Natural Disaster Occurrences, 1985 to 2015

Natural disasters are one of the major problems of humankind. During the recent decade (from 2000 to 2009) the world has faced an annual average occurrence of 387 disasters, with an annual average of 227.5 million victims which changes in different years. The number of victims was 198.7 million in 2009, 217.3 million in 2010, and 96.5 million victims in 2013. However, these large numbers do not show the total picture of disaster-stricken regions due to the unequal distribution of disaster impacts among and within regions and societies. In 2013, about 88% of disaster mortality was shared by the countries of low income or lower-middle income, and the Asian continent accounted for 90.1% of global disaster victims. [2]

After the liberation war, major focus of Bangladesh on disaster related issues was given to disaster control rather than management, which became visible after the two consecutive floods on 1987 and 1988. Almost all the structural measures taken to “control” floods since 1956, collapsed. This has attracted international attention and Bangladesh has been identified as less prepared country to face disasters. There was no institutional mechanism for disaster management till late nineties (Disaster Management Bureau established). A Standing Order on Disasters (SOD) has been published in 1997 for assigning different roles to different institutions from local to central levels. A comprehensive disaster management program has launched later. Formulation of different disaster management policies plans, and legislations have been initiated. Now a days, Bangladesh is a role model for flood disaster management among all other coastal zone areas in the world. [3]

OBJECTIVE AND METHODS

The aim of this study was to synthesize the flood disasters, types, impact and to develop flood risk management profile of Bangladesh, The study was based on the literature review and secondary data. Data from various open sources such as EM-DAD, IPCC, CDC, WHO, GO, NGO, INGO etc. were used to find both qualitative and quantitative evidence. For the analysis purposes, the Emergency Database (EM-DAT) of the Centre for Research on the Epidemiology of Disasters (CRED) has been used as a major secondary data source. And google scholar, journals reports and guidelines are also utilized as a key source of information for disaster analysis and management.

RESULTS AND DISCUSSION

According to EM-DAD database, natural disasters are one of the major problems of humankind. During the recent decade (from 1985 to 2015) the Bangladesh has faced more than hundreds occurrence disasters annually. During the recent decade (from 1985 to 2015) the Bangladesh has faced following disasters in terms of occurrences, affected and killed respectively. Here are the top 10 disaster events in Bangladesh according EM-DAT: The OFDA/CRED International Disaster Database [4].

Top 10 natural disaster (1985 - 2015) in terms of people being killed		
TYPE OF DISASTER	DATE	TOTAL DEATHS
Storm	1991/ 4/ 29	138866
Storm	1985/ 5/ 24	15000
Storm	2007/ 11/ 15	4234
Flood	1988/ 6/	2379
Flood	1987/7/22	2055
Epidemic	1991/ 9	1700
Industrial accident	2013/4	1127
Flood	2007/7/21	1110
Flood	1998/7/5	1050
Storm	1988/11/29	1000

Top 10 natural disaster (1985 - 2015) in terms of people being affected		
Disaster Type	Start Year	Total Affected
Flood	1988/6	45000000
Flood	6/20/2004	36000000
Flood	7/22/1987	29700000
Storm	4/29/1991	15438849
Flood	7/5/1998	15000050
Flood	7/21/2007	13771380
Flood	6/16/1995	12656006
Flood	7/1/1993	11469537
Storm	11/29/1988	10568860
Storm	11/15/2007	8978541

Top 10 natural disaster (1985 - 2015) in terms of economic damages		
Disaster Type	Start Year	Damages ('000 US\$)
Flood	7/5/1998	4300000
Storm	11/15/2007	2300000
Flood	6/20/2004	2200000
Flood	1988/6	2137000
Storm	4/29/1991	1780000
Storm	5/15/1995	800000
Flood	1987/8	727500
Flood	2000/9	500000
Earthquake	12/26/2004	500000
Flood	7/22/1987	330000

Top 10 natural disaster (1985 - 2015) Occurred	
Disaster	Disaster Time
Riverine flood	157
Tropical cyclone	74
Road	36
Viral Disease	30
Cold wave	18
Fire	15
Rail	13
Collapse	8
Ground movement	7
Landslide	10

From the above-mentioned table we can conclude, Flood is a worst disaster in Bangladesh in terms of occurrence, affected, killed and damages and losses. But the Bangladeshi community people is coping and living with the flood properly every year. They have adopted the flood disaster in their daily life. And the government and NGOs have their own mechanism to overcome the situation of flood disaster.

IMPACT OF FLOOD IN BANGLADESH

In general, the impact of a flood disaster can be viewed in terms of health, economy, and environment. According to Petersen (2001) economic, social, and environmental impacts of flood as follows; Floods have negative impact on the economic in victim area. Basically, when floods inundate a residential area, it is unlikely to become unstable for living. From the personal side, usually the furniture or household appliances affected by the flood cannot be used anymore. When the flow of water from extreme floods, it is possible to damage the residential area of a region. From the government side, to make improvements in flood-affected areas required additional costs, added extra cost of maintaining facilities that can prevent floods such as drainage, dams, or river gates every year. Flood can cause damage to objects, electronic equipment, machinery, home appliances, buildings, and the human soul.

Flood losses Infrastructure such as transportation, communication network, water supply and sewer system, government facility losses, residential losses; property, furniture, Public facility losses such as schools, hospitals, Employing business losses, sales losses, displacement of business and farm, Job losses, Income losses, Agricultural losses: damage of agricultural land and facilities, loss of crops, animal loss, loss of recreational facilities and resources, Increase in operational costs, cost of emergency measures, repair, rehabilitation of infrastructure and public facilities.

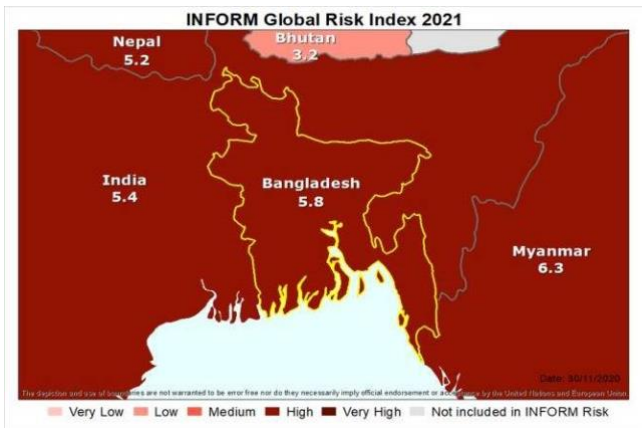
The social aspects of vulnerability to floods can be used as tools to develop policies. Investigations into the past floods impact will characterize the social aspects of vulnerability of individuals and communities. It is difficult to generalize the relationship between the scale of the event and the actual or the potential hardships suffered because the same event may have different effects on the adjacent households.

When flood water comes, not only water, but also waste, sewage, factory / chemical waste, oil (oil, gasoline, diesel, kerosene, etc.), and much more. In addition to polluting the source of clean water, floods also contaminate the yard or even our homes so it becomes unhygienic. The more rapid flood water come, the possibility to erode the edge of the flood stream can be higher so that erosion or even landslides can be happened. And Flood also destruction of flora and fauna, damage to habitats, food chains, species diversity and stability, damage to rare to endangered species, damage

to natural recreational resources, damage to scenic resources, damage to archaeological and historical resources. [5]

According to Petersen (2001) economic, social, and environmental impacts of flood as follows: [5]

<i>Economic Impacts</i>	<i>Social Impacts</i>	<i>Environmental impacts</i>
<i>Infrastructure losses such as transportation, communication network, water supply and sewer system</i>	<i>Human endangerment, loss of life</i>	<i>Destruction of flora</i>
<i>Government facility losses (including military)</i>	<i>Human injury (physical, emotional, psychological)</i>	<i>Destruction of fauna</i>
<i>Residential losses such as property, furniture</i>	<i>Displacement of people</i>	<i>Damage to habitats, food chains, species diversity and stability</i>
<i>Public facility losses such as schools, hospitals</i>	<i>Health hazards: polluted water, communicable diseases, shortage of food supply, exposure to cold, rain etc. due to lack of shelter</i>	<i>Damage to rare to endangered species</i>
<i>Employing business losses, Sales losses</i>	<i>Emotional and psychological trauma associated with loss of relatives and loved ones, loss of personal property and memorabilia, homes, communities</i>	<i>Damage to natural recreational resources</i>
<i>Displacement of business and farm</i>	<i>Loss of social (community) cohesion</i>	<i>Damage to scenic resources</i>
<i>Job losses, Income losses</i>	<i>Disruption of educational program</i>	<i>Damage to archaeological and historical resources.</i>
<i>Agricultural losses: Damage of agricultural land and facilities, loss of crops, animal loss</i>	<i>Loss of security related to job and income interruptions</i>	
<i>Loss of recreational facilities and resources</i>	<i>Loss of recreation opportunity</i>	
<i>Increase in operational costs such as fuel and lost time due to traffic delays and use of alternative routes and resources</i>	<i>Disruption of cultural program (sports events, church program)</i>	
<i>Cost of emergency measures</i>	<i>Disruption of law enforcement program</i>	



	Value	Rank	Trend (3)
INFORM Risk	5.8	26	→
Hazard & Exposure	7.4	11	→
Vulnerability	5.4	43	→
Lack of Coping Capacity	5.0	72	→

Increased taxes due to cover costs of replacement, repair and rehabilitation of infrastructure and public facilities

Table 2.1: Economic, Social, and Environmental impacts of Flood

RISKS AND VULNERABILITIES

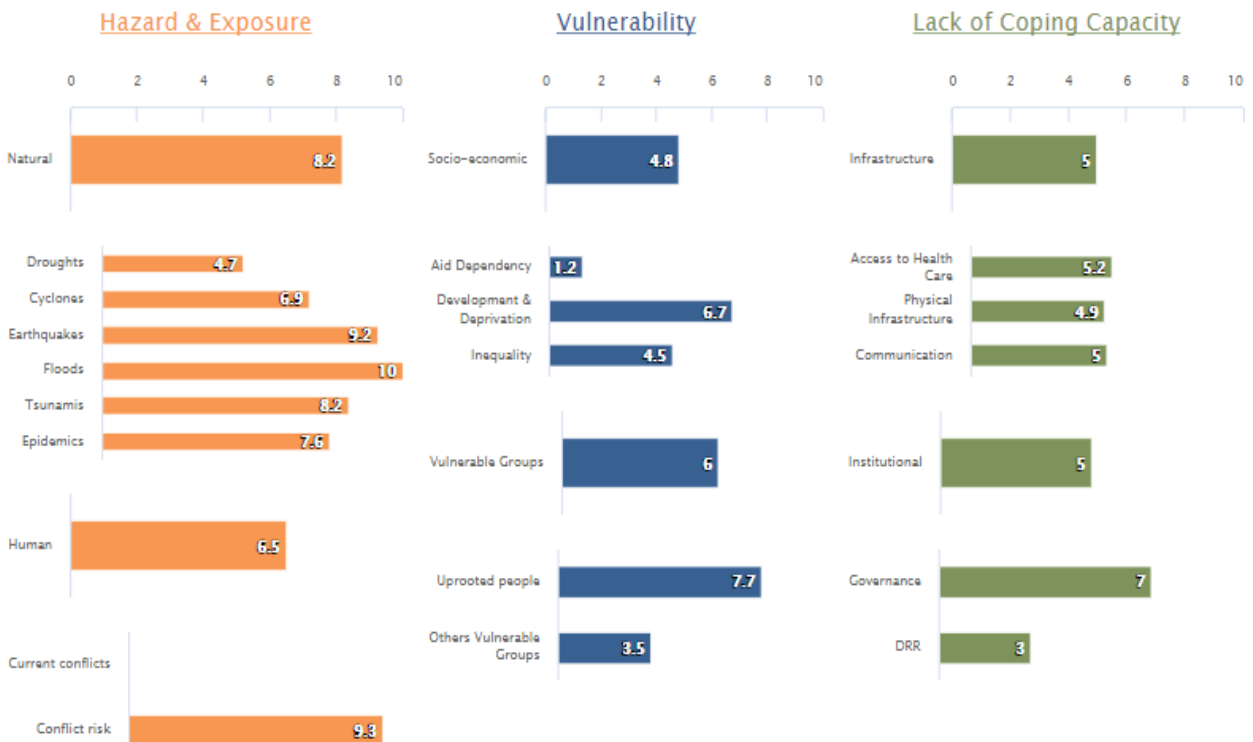


Figure 2 risks and Vulnerability of Bangladesh

Table 9: Risk Indicator

	Indicator	Rank	Score
HIGHEST 5 RISK INDICATORS	Physical exposure to storm surge (absolute) – raw	8	9.00 Physical exposure to storm surge (absolute)
	Physical exposure to tsunami (absolute) – raw	8	8.60 Physical exposure to tsunami (absolute)
	Physical exposure to earthquake MMI VI (absolute) – raw	5	10.00 Physical exposure to earthquake MMI VIII (absolute)
	Physical exposure to flood (absolute) – raw	3	10.00 Physical exposure to flood (absolute)
	Physical exposure to flood (relative) – raw	2	10.00 Physical exposure to flood (relative)
LOWEST 5 RISK INDICATORS	People affected by droughts (relative) – raw	75	0.30 People affected by droughts (relative)
	Highly Violent Conflict Probability	28	8.70 Highly Violent Conflict probability Score
	Violent Conflict Probability	27	9.70 Violent Conflict probability Score
	Total affected by Natural Disasters last 3 years (% of total pop)	20	4.00 Recent shocks
	Physical exposure to earthquake MMI VI (absolute) – raw	5	10.00 Physical exposure to earthquake MMI VIII (absolute)

Bangladesh's risk components and dimensions (Source: InFoRM Risk Index)

Bangladesh is considered to be a country at very high risk for disasters. The INFORM Risk Index ranks Bangladesh as the 26th most vulnerable country in the world, being peered by countries such as Papua New Guinea, Guatemala, and Mauritania, and one of the most vulnerable in the world. As figure shows, the country's vulnerability and lack of coping capacity contribute the most to its overall risk.

The main weaknesses are socio economic, aid dependency, development and deprivation vulnerable groups and uprooted people, and other vulnerable group. Bangladesh's highest 5 risk indicators in the INFORM global ranking are the frequency of earthquake, flood, access to health care, epidemic and current conflicts Intensity.[6]

Bangladesh classified as 7th among the most impacted countries between 1998 – 2017 on the Climate Risk Index, experiencing the frequent impacts of cyclones, flooding, flash flooding, storms and periodic droughts depending on the season. Annual rainfall can reach 2,000 mm during the monsoon, which can lead to significant water logging and flooding on improperly managed wetland areas on the delta regions.

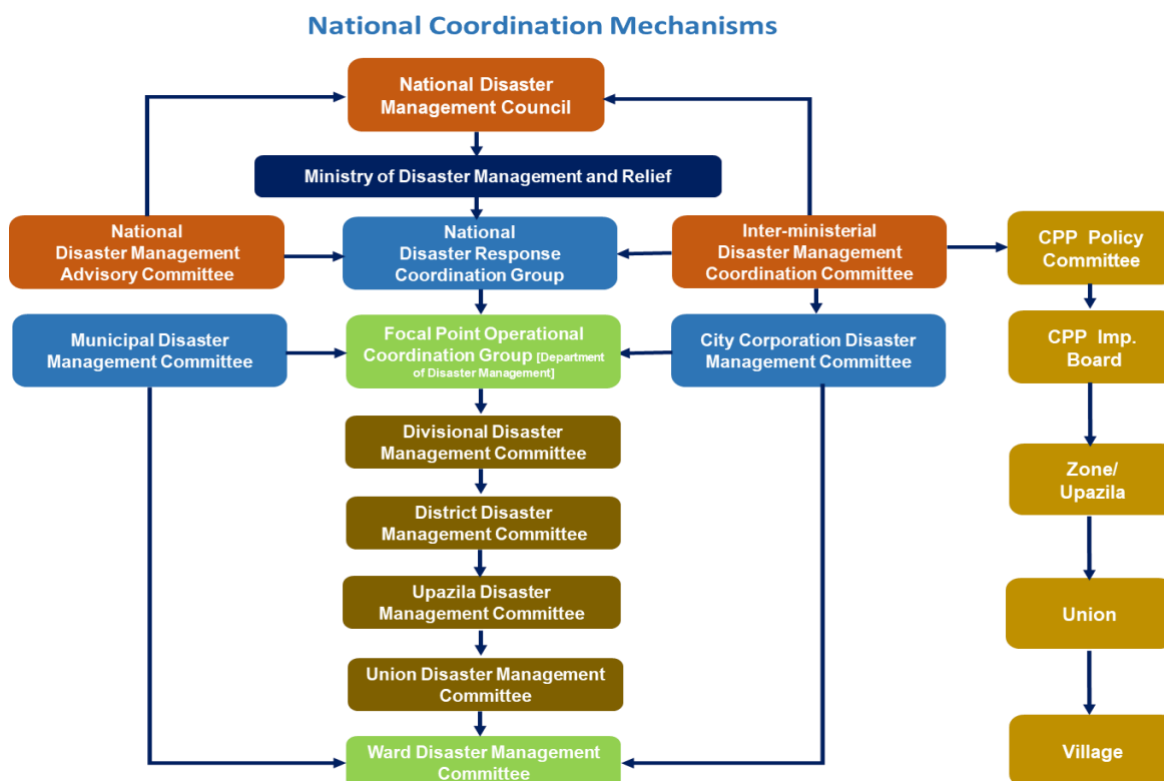
Other hazards include earthquakes, landslides, lighting strikes, possible tsunamis, epidemics as well as on-going riverbank erosion which constitutes to the high flood risks and increasing vulnerabilities across the settlements located in the vicinity of the coast and river catchments. [7]

DISASTER MANAGEMENT IN BANGLADESH

NATIONAL COORDINATION MECHANISMS

The Disaster Management Act 2012 and associated 2019 SOD provide the basis of the national natural disaster management system and strategies. Institutional arrangements include the Department of Disaster Management (DDM) under the Ministry of Disaster Management and Relief (MoDMR) and disaster management committees at central, divisional, district, upazila and union levels for management and coordination. Government NGO, network & consortium are involved in DRM. [8]

Organizational Structure: Figure 20: Disaster Management Structure in Bangladesh



Three (3) fora coordinate natural disaster response in Bangladesh at the national level: The National Disaster Management Council (NDMC), headed by the Prime Minister, is the supreme body for providing overall direction for disaster management (DM) which includes disaster risk reduction, mitigation, preparedness, response and recovery; the Inter-Ministerial Disaster Management Committee (IMDMC), responsible for coordination across ministries; and the National Disaster Management Advisory Committee, responsible for policy development and advice. The NDMC is the highest-level decision-making body and top of the organizational chart with several departments, committees, and boards reporting to the NDMC.

The Ministry of Disaster Management and Relief (MoDMR) of the Government has the responsibility for coordinating national disaster management efforts across all agencies. As Disaster Management is a multi-sectoral and multi-functional discipline, functional and hazard-specific planning and execution responsibilities are vested in agencies with primary technical /management focus on specific sectors, while MoDMR have an overall coordinating and facilitating role as “Secretariat” to NDMC. The Standing Orders on Disaster (SOD) issued by the ministry in 1997, revised in 2010, and updated recently in 2019 is an important milestone towards guiding and monitoring Disaster Management activities in Bangladesh. A series of inter-related institutions, at both national and sub-national levels, function to ensure effective planning and coordination of DRR and emergency response management. [9]

Table 12: Summary of Institutional Mechanisms and Committees for DRR [10]

Level	Summary
National Level Bodies	<p>National Disaster Management Council (NDMC) headed by the Prime Minister to formulate and review the disaster management policies and issue directives.</p> <p>Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC) headed by the Minister for Food and Disaster Management to implement disaster management policies and decisions of NDMC/Government.</p> <p>National Disaster Management Advisory Committee (NDMAC) headed by an experienced person nominated by the Prime Minister.</p> <p>Cyclone Preparedness Programme Implementation Board (CPPIB) headed by the Secretary, MoFDM, to review the preparedness activities at the initial stage of an impending cyclone.</p> <p>Disaster Management Training and Public Awareness Building Task Force (DMTATF) headed by the Director General of the Disaster Management Bureau (DMB) to co-ordinate disaster related training and public awareness activities of the government, NGOs and other organizations.</p> <p>Focal Point Operation Coordination Group of Disaster Management (FPOCG) headed by the Director General of the DMB to review and co-ordinate the activities of various departments and agencies working on DM & also to review the Contingency Plan prepared by relevant departments.</p> <p>NGO Coordination Committee on Disaster Management (NGOCC) headed by the Director General of the DMB to review and co-ordinate the activities of NGOs working on disaster managememe</p> <p>Committee for Speedy Dissemination of Disaster Related Warning/Signals (CSDDWS) headed by the Director General of the DMB to examine, ensure and identify the ways and means for speedy dissemination of warnings and signals to the population at risk.</p>
	<p>District Disaster Management Committee (DDMC) headed by the Deputy Commissioner (DC) to co-ordinate and review the disaster management activities at the district level.</p>

Sub-National Level Bodies	<p>Upazilla Disaster Management Committee (UZDMC) headed by the Upazilla Nirbahi Officer (UNO) to co-ordinate and review the disaster management activities at the Upazilla level.</p> <p>Union Disaster Management Committee (UDMC) headed by the Chairman of the Union Parishad to co-ordinate, review and implement the disaster management activities of the concerned union.</p> <p>Pourashava Disaster Management Committee (PDMC) headed by the Chairman of Pourashava (municipality) to co-ordinate, review & implement the DM activities within its area of jurisdiction.</p> <p>City Corporation Disaster Management Committee (CCDMC) headed by the Mayor of City Corporations to co-ordinate, review and implement the DM activities within its area of jurisdiction.</p>
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Decentralized disaster management networks in Bangladesh [11]

Cluster	Organizations
Rangpur	UN sub-Offices, Begum Rokeya University, Rangpur. RDRS, HDAU, Dinajpur
Rajshahi	Rural Development Academy (RDA), Bogra, Rajshahi University and BMDA
Khulna	Khulna University, Jessore Science and Technology University
Barishal	Patuakhali Science and Technology University (PSTU),
Dhaka	Dhaka University, BUET, BAU, BPATC, BCS Admin Academy, NAEM, AFD Jahangirnagar University; Mawlana Bhashani Science and Technology University, Tangail, BSMRAU, Gazipur
Sylhet	Shahjalal Science and Technology
Chittagong	Bangladesh Academy for Rural Development (BARD), Chittagong University of Engineering and Technology (CUET), Chittagong University (CU)

VARIOUS SUPPORTING INITIATIVES BY THE NGOS

The NGOs played relatively a better role in providing food, water, clothes, medicine, etc. Therefore, non-govt. organizations took various initiatives to support to the flood disaster-affected people. And long term rehabilitation includes, provision of financial assistant, housing reconstruction, Income generating activities facilities, new work opportunites beyond locality, infrastructure reconstruction & development.; supports are not suficient to cover the entire disasterprone area or to cover entire disaster-affected people. [12]

The government plays its supplementary roles with whatever limited resources it may mobilize. The NGOs often come forward either to build resilience through a well chalked out preparedness plan, or to overcome a continuing disaster or to take part in post-disaster relief and rehabilitations. The NGOs support has been received by the government for building over coastal cyclone shelters, resilience.

The donors have mobilized a significant amount of money to engage NGOs for a variety of activities towards reducing risks from known hazards and building resilience towards facing the climate change challenge in future. The creation of

knowledge base on climate change vulnerability and adaptation assessments has been materialized primarily by generous support of the donors that mobilized the research community and action research by the NGOs and culminated into a solid knowledge base to fight against future threats of climate change.

Although in DRR, there have been a tripartite collaboration between GOB agencies, the donors and the NGOs that enabled communities to do better for managing disasters. Bangladesh has successful experiences of working with community-based organizations in disaster management involving different partners. Initiatives have been taken to revise the national Platform to develop partnership with civil society organizations (CSO), private sector, and different non- governmental actors in DRR practices. Budgetary provision has been included in the GOB plan to enhance the Public-Private partnership in this regard.

Most of the time NGOs developed a unique set of resources to assist high-risk countries in gender-sensitive disaster risk reduction and recovery planning and programming, which include awareness and advocacy; analysis and review; capacity development; gender-aware DRR knowledge products; gender-sensitive risk assessment; gender-responsive recovery, etc. INGOs; BDRCS, Oxfam GB, CARE, ActionAid, IUCN and others have been working in disaster fields since long.

Most of the DRR programs run by NGOs in Bangladesh are related to the micro level community based DRR. NGOs have been working on disaster preparedness and mitigation activities with community and some from an inclusive and gender focused strategies to improve adaptive capacity of individuals and households in target communities. [13]

CONCLUSIONS

The research shows the Bangladesh response to achieve successful flood risk reduction interventions. But still now, Bangladesh needs more information, encouragement and support during flood disaster events from government and other actors, particularly from NGOs. Community's participation and control is essential for any successful implementation, orientation and maintenance of any flood DRR interventions. Although the government runs several DRR intervention programs to reduce vulnerability, it is important to involve people in the decision-making process for the greater wellbeing of the community. However, community-based Disaster Risk Reduction can play a vital role to bridge communities, governments, donors and other stakeholders. Community driven disaster risk reduction approach will be more reliable and effective, because without community involvement no DRR interventions can sustain in the long run. But then again, it successful DRR interventions require political commitment of the highest level of the government. DRR in development

initiative is an integral part of the national policy. So, it is a vice versa intervention for the sustainable development and we hope Bangladesh can manage it in future to achieve SDGs.

REFERENCES

1. Chowdhury P. *Combating Urban Hazard: A Qualitative Study of Disaster Preparedness in Dhaka, Bangladesh*. Lund University, Faculty of Social Sciences. [2017]
2. NAHID R. Disasters and access to healthcare in the coastal region of Bangladesh: a gendered analysis. Durham University. 2016. Available at Durham E-Theses Online: <http://etheses.dur.ac.uk/11432/>
3. Nasreen M. Gender and Disaster Risk Reduction Issues in Bangladesh. Institute of Disaster Management and Vulnerability Studies. Dhaka, University of Dhaka; 2006. P. 1-4
4. Center for Epidemiology and Research in Disasters. Database | EM-DAT [Internet]. [cited 2021 June 7]. Available: <http://www.emdat.be/database>
5. Petersen M. Impacts of flash floods, Coping with the Flash floods – Grunfest E and Handmer J (eds) Nato Science series 2. Environmental security, Kluwer Academic Publishers. [2001]
6. IASC/European Commission. INFORM country risk profiles: Bangladesh [Internet]. 2021 [cited 2021 Jun 19]. Available from: <http://www.informindex.org/Results/Country-profiles>
7. Perwaiz A, Parviainen J, Somboon P, Mcdonald A. Disaster Risk Reduction in Bangladesh: Status Report 2020. Bangkok, Thailand: UNDRR;2020. P. 4-31
8. Rahman K S, Glorieux H. Handbook: Humanitarian Coordination and Collaboration in Bangladesh, United Nations Resident Coordinator's Office. [2020]
9. Ministry of Disaster Management & Relief. National Disaster Management System in Bangladesh. Ministry of Disaster Management & Relief Government of the People's Republic of Bangladesh. [2020]
10. LUXBACHER K, UDDIN A M K. "World Resources Report Case Study. Bangladesh's Comprehensive Approach to Disaster Management." World

Resources Report. [2020]. Available online at <http://www.worldresourcesreport.org>

11. Rezoane Q A. A study on Disaster Management Policy of Bangladesh: Institutional Capacity Enhancement. Thesis submitted to the Public Policy and Governance (PPG) Program, North South University, [2016]
12. Hossain B, Role of Organizations in Preparedness and Emergency Response to Flood Disaster in Bangladesh, *Geoenvironmental Disasters*, Durham, USA. 2020. 7:33. P. 1-16.
DOI: <https://doi.org/10.1186/s40677-020-00167-7>
13. Islam M. Disaster risk in public education system in Bangladesh: emphasis on tornado, Comprehensive Disaster Management Programme (CDMP). Disaster Management and Relief Bhaban, [2010]