

# Climate Change Parameters Relating to Earthquake Disasters and Government Management in Bangladesh

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**Abstract**– Bangladesh is one of the most disasters prone areas of the world. Huge number of natural as well as manmade environmental disaster hit the country in the previous years. This paper deals with the definition of a methodological framework consistent with the need and scope of environmental disaster, the adoption of contemporary mitigation plans and risk management policies. The research paper also illustrates temporal and spatial distribution of past disasters, elaboration of some events and categorization of affected targets at several places. Finally the research paper establishes an aspect of disasters caused by dangerous earthquake phenomenon and those endangered by interrelated human-nature induced factors, such as deforestation, global climate change and hill cutting etc in the context of Bangladesh. The paper also makes an attempt to depict how 'nature' and the natural processes are inextricably bound together in hazardous situations.

**Keywords**— Climate change, earthquake, disasters, cyclones, environmental disaster.

## I. INTRODUCTION

Bangladesh is one of the most disaster prone countries in the world. Bangladesh is exposed to floods and cyclones, and the risk of other disasters such as drought, earthquakes, and tornados is increasing. Bangladesh ranks 5th in the World Risk Index as it are frequently affected by storms and floods. The impacts are becoming more visible at the local level, with greater impacts on poor and vulnerable communities (Selmi Aitsi-A. & Murray V., (2015). Cyclone, flood, landslides, river erosion as well as climate induced hazards are the frequent disastrous phenomena in the country. The geographical location of Bangladesh in the Bay of Bengal leaves the country susceptible to significant climate change impacts that exacerbate environmental hazards. Bangladesh ranks as the 8th most populated country in the world at 1,237.51 persons per square km growing at an estimated rate of 1.59% per year. This very high density exacerbates the impact of localized disasters. Continuing population growth and environmental degradation could further exacerbate the intensity of disasters in the future, contributing to a significant increase in humanitarian needs (Bertrand Albala-J. M., (2004-ECHO 2016).

In the urban context, disasters and hazards are posed by flood and water logging, earthquakes and fires. In the last 150 years, the country experienced damages of five earthquakes having magnitude over 7.0 Richter scale (K Alam, et al 2011). According to Ahmed, et al (1999, in developing countries, megacities often lack the most basic scientific information like risk, exposure, vulnerability and response about natural hazards that threaten them. Though mostly disasters in Bangladesh are concentrated in rural areas (flooding, river erosion and cyclones), increasingly the nature of the disasters are posing an equal if not more risk to the urban centers of Dhaka, Chittagong and Sylhet areas in the country.

According to ADPC, (2005), damages caused to public buildings such as hospitals, clinics, educational buildings, and significant cultural sites such as mosques and temples may lead to further impacts. For example, the disruption to education contributes to disruption of academic sessions and compounds the problem of low literacy rates. A 2010 study conducted by Save the Children International indicated that more than 4,666 schools in Bangladesh are affected by disasters per year (AEZ, Ref SA DVDs, 2009).

When earthquake occurs nothing is spared; may it be a dwelling house, a commercial building, a school, a temple or a mosque. If an earthquake should strike during the day, children would be the worst sufferers as they are usually at school, away from their parents and are not mature enough to look out for themselves.

### *Earthquake Zone of Bangladesh*

Currently Earthquake is a big concern for Bangladesh as in last few years several lights to wild tremors has shook the capital of the country. In the paper Urban Earthquake Hazard: Perceived Seismic Risk and Preparedness in Dhaka City, Bangladesh, Paul and Bhuiyan mentions the existence and junction of two major sub-duction zones created by two active tectonic plates: The Indian plate and the Eurasian plate and makes Bangladesh exposed to sever seismic events (2010: 337) and two fault lines run through the geographical border of Bangladesh, which are 144 km and 370 km away from Dhaka respectively; and have resulted in several mild

earthquakes in the last two decades and two major earthquakes within a century.

## II. OBJECTIVES OF THE STUDY

1. To identify the earthquake disasters and climate change parameters affecting environment.
2. To prioritize the points for disaster management process.
3. To administer rehabilitation management processes for public interest.



Seismic Zones of Bangladesh

Additionally, according to the study of National Building Code of Bangladesh three seismic zones have been identified and are categorized according to the level of earthquake risk; zone III to zone I being the riskiest to least at risk respectively as shown Figure 3. As per the seismic zoning, it indicates that Dhaka is under the Zone II; being at a quite higher risk in case of an earthquake with significant magnitude. In the last few decades the scenario of Dhaka drastically changed and has thousands of multistoried now in the picture, which are mostly unplanned misusing the deficiency in supervision, ending up narrowing the roads and keeping barely much open space surround. Although, zone II indicates to be under medium risk, Dhaka is most likely to face some drastic calamities in case of occurrence of earthquake.

## III. METHODOLOGY

Methodology shows the approach by which the study is accomplished. It includes some sequential steps that are required for performing the study effectively. This study is mainly based on primary and secondary data through which the study is completed.

### Primary Data

Primary data were collected from the respondents of the study area.

### Secondary Data

As this is a primary and secondary based report therefore; this study mainly relied on data from published references, materials and information from other secondary sources like internet, published materials and different thesis on our seminar library. Different information from published articles are assembled and presented on this report by sequential steps.

### Source of Data

Data were collected from the capital and the field level conducting interview, discussion and observation using primary source i.e. interview with the respondents from the selected study areas. Primary data were collected through interview. Data were also collected from secondary source through literature review i.e. reference books, newspapers, periodicals, articles from national and international level. Internet sources have been used for research. An attempt was made to include the latest information whenever available. The nature of the study requires combining analytical and empirical approaches in the methodology. Accordingly, both qualitative and quantitative information and data were required. In order to generate database of the study, all necessary information were collected from different primary and secondary sources. Data were also analyzed and presented through the use of necessary figures, tables and charts.

### Variables

#### A. Respondents

- Teachers
- Representatives
- Government agencies
- NGO service providers

#### B. Types of Disasters

- Earth quake
- Flood
- Drought
- Temperature waves

#### C. Sites: (Greater districts)

- Noakhali
- Khulna
- Sylhet
- Rajshahi

D. Climate Change parameters

- i. Temperature
- ii. Humidity
- iii. Fog
- iv. Rainfall

IV. RESULTS AND DISCUSSION

Disaster Events in Bangladesh

The data disaster events happening in Bangladesh are given in the Table 1 and Figs. 1 and 2.

Table 1: Most frequent disaster events in Bangladesh

|             | Teachers | Govt. agencies | NGO service | Local agencies | Mean |
|-------------|----------|----------------|-------------|----------------|------|
| Flood       | 73       | 59             | 65          | 72             | 67   |
| Drought     | 13       | 17             | 52          | 27             | 27   |
| Hailstorm   | 33       | 29             | 67          | 42             | 43   |
| Fog and dew | 34       | 41             | 62          | 47             | 46   |
| Earth quake | 38       | 38             | 82          | 36             | 49   |
| Temp waves  | 40       | 46             | 60          | 39             | 46   |
| Mean        | 39       | 38             | 65          | 44             | 46   |

The data given in the Table 1 above show that the mean grand mean response of the participants under studies were 46%. It indicates that all of them were not equally aware of the events as they engaged in different professions and in different ecological regions. However, it is evident from the results that the flood was the main disaster, while the drought (27%) was less cared disaster event. The local teachers and govt. agency staff were less interested to keep eye on those disaster events, while the NGO workers were much more dynamic to work on the disaster events on livelihood and humanitarian grounds.

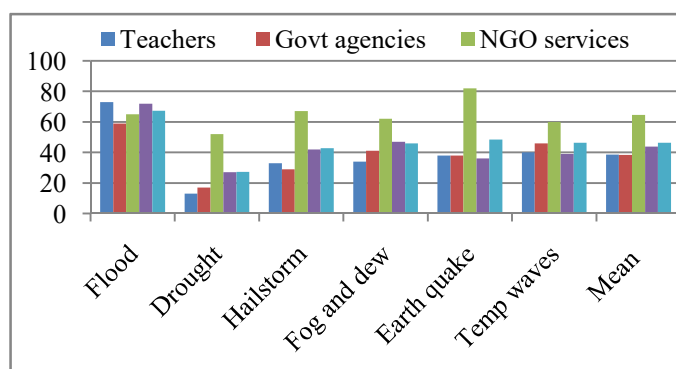


Fig. 1: Most frequent disaster events in Bangladesh as per professions

Out of the major 6 disaster event studies Figs 1 and 2, the profession based events found were highest NGO service, flood by all professions.

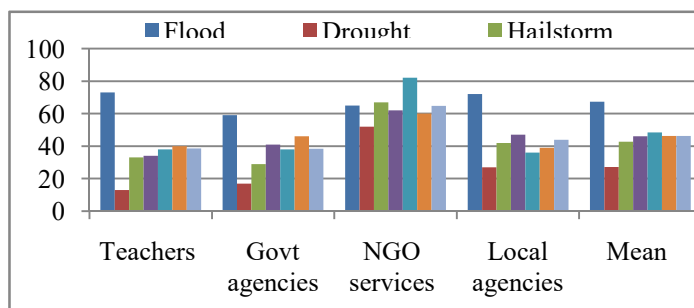


Fig. 2: Most frequent disaster events in Bangladesh as per disaster types

The results given in Fig. 2 show that the mean data show occurrence of most disaster event in all sites. The earth quake was specific to Sylhet while drought was more dominant in the Rajshahi Regions.

Table 2: Professional disaster rehab management

| Types/Sites               | Teachers | Govt. agencies | NGO service | Local agencies | Mean |
|---------------------------|----------|----------------|-------------|----------------|------|
| Creating awareness        | 34       | 22             | 74          | 64             | 49   |
| Arranging preventives     | 55       | 41             | 68          | 43             | 52   |
| Providing contingencies   | 51       | 14             | 64          | 69             | 50   |
| Things transfer and store | 63       | 48             | 89          | 85             | 71   |
| Buffer stocking materials | 57       | 15             | 78          | 68             | 55   |
| Making temporary shelter  | 7        | 22             | 47          | 31             | 27   |
| Mean                      | 45       | 27             | 70          | 60             | 50   |

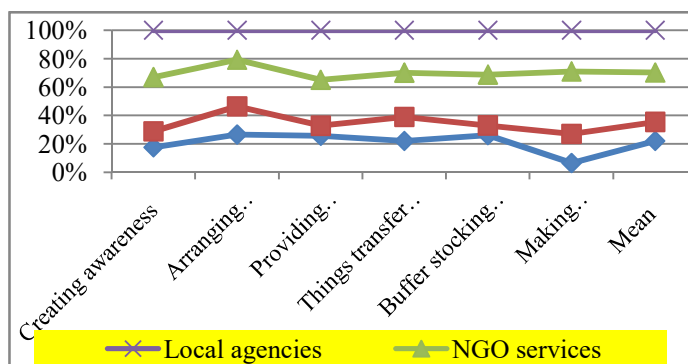


Fig. 3: Disaster rehabilitation management parameters as scored by professionals

Table 3: Professional disaster rehab management

| Types/Sites  | Teachers | Govt. agencies | NGO services | Local agencies | Mean |
|--|----------|----------------|--------------|----------------|------|
| Arranging local Govt. transparent planning workshops | 65       | 43             | 75           | 67             | 63   |
| Implementing shared disaster workshops               | 27       | 12             | 56           | 8              | 26   |
| Skill development for disaster rehabilitation        | 54       | 18             | 74           | 17             | 41   |

|                                     |    |    |    |    |    |
|-------------------------------------|----|----|----|----|----|
| Training for disaster mitigating HR | 71 | 54 | 79 | 81 | 71 |
| Establishing local leadership       | 67 | 19 | 72 | 78 | 59 |
| Adopting international processes    | 58 | 14 | 69 | 53 | 49 |
| Mean                                | 57 | 27 | 71 | 51 | 51 |

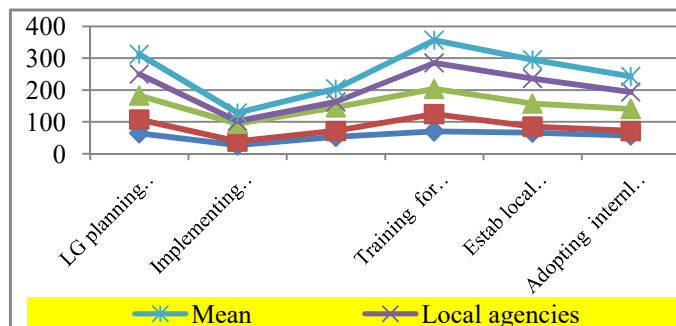


Fig. 4: Disaster rehabilitation management parameters as per strategic activities

### V. CONCLUSION

Earthquake is a newly given importance hazardous phenomena in Bangladesh. A hazard is a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage. The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster. Disasters are often classified according to their speed of onset (sudden or slow), or according to their cause (natural or man-made).

Bangladesh is one of the most disaster prone countries in the world. Bangladesh is exposed to floods and cyclones, and the risk of other disasters such as drought, earthquakes, and tornados is increasing. Bangladesh ranks 5th in the World Risk Index as it are frequently affected by storms and floods.

The United Nations International Strategy for Disaster Reduction (UNISDR) defines Disaster as; a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

### VI. RECOMMENDATIONS

According to the results found from these studies and available results in the country and neighboring countries, the following recommendations may be made.

1. More researches are required to characterize the frequency gaining disasters like earthquake and flash floods.
2. The government steps should be strengthened on the mitigation disaster effects Developing structural materials and support equipments.

3. Strict enforcement of Bangladesh National Building Code (BNBC) for construction of building in Urban & Rural areas in phases on Earthquake resilience.
4. All print and electronic media disseminate positive information on earthquake and other disaster for better combating.
5. More attention given over climate change and earth quake understanding, mitigation and adaptation.

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