
Enquires on Vulnerability to Natural Hazards: A Case study in Hatiya Upazila of Bangladesh

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ABSTRACT: The article examines people's perceptions about natural hazards, disaster risks and vulnerabilities through a case study. The coastal zone of Bangladesh hosts over 35 million people who are exposed to cyclones, storm surges, rough seas, salinity intrusion and permanent inundation due to a possible rise in sea levels. There are 72 offshore islands with an area of 4,200 square km where over 3 million people are extremely vulnerable (MoFDM, 2010). Due to the unusual climatic behavior in recent years, people in coastal areas face serious vulnerability especially in the context of human settlements and consequently move out to the cities to combat the situation. These people need to have innovative strategies for survival. Enhancing local level adaptation to cyclonic hazards through established coping is assumed to be crucial for resilience to any suspected increase in cyclonic hazards. Endogenous cyclone response experiences could be more central to cyclone interventions in Bangladesh. This paper examines, like many other newly devised coping strategies, reducing vulnerabilities is important to save communities from their vulnerability to natural hazards.

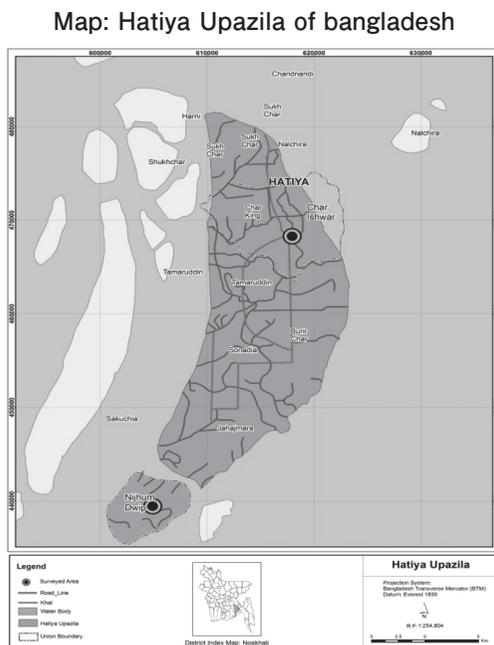
Key words: *Hazard; Risk; Vulnerability; Mitigation.*

Introduction

Hatiya Upazila (noakhal district) with an area of 1508 sq km. Hatiya Island is surrounded by the South Hatiya channel, West Hatiya channel and East Shahbazpur Channel. East Shahbazpur is a flood channel and the south-west Hatiya is an ebb channel. Hatiya is the famous “pathway” of cyclones in Bangladesh. The ground level in Hatiya is 10 m above the mean sea level; therefore the coastal community has been hampered by seasonal tidal inundation and subsequent salinity intrusions, especially in the dry season when the flow of river water diminishes (Islam, 2008). The residents are extremely vulnerable to future sea level rise.

The objective of the study was to explore community's perceptions about coastal hazards, risk and vulnerabilities. The empirical data presented here were collected from

Hatiya upazila through Focus Group Discussion (FGD). The themes discussed varied between the groups, but generally covered issues linked to livelihood, perceptions of their present situation and the future, as well as risks, vulnerability and opportunities.



Background of the study

The Fourth Assessment Report of the IPCC (2007), the National Adaptation Program of Action (NAPA) (MoWR, 2005) and (Parvin, et al., 2008) have recognized the coastal Island of Hatiya as one of the most vulnerable areas of the country due to the recurrent coastal hazards and the threats of climate change-induced impacts. The nature and types of coastal hazards and vulnerabilities have been well documented by the IPCC, NAPA, the World Bank and various researchers.

This study's prime concern is to investigate the coastal community's risk, vulnerability and coping methods from different hazards. Community's risk from hazards depends on the frequency and severity of hazards and their vulnerability (ISDR, 2004). In this study, community's perception about the types of coastal hazards, trends, and the vulnerability of people is briefly presented.

Risk and vulnerabilities in Hatiya Island

The people of Hatiya Island are vulnerable because they live in an extremely dynamic

estuarine environment facing threats such as: cyclones, tidal surges, riverbank erosion, floods, salinity intrusion, and deteriorating coastal ecosystems. These threats affect almost every aspect of life and livelihood choices of the people. These vulnerabilities create a context of insecurity, which in turn, discourages investments, limits economic activities and squeezes employment opportunities.

As elsewhere in the coastal zone of Bangladesh, The Hatiya Island has the highest concentration of natural hazards. Some of these are dreadful and devastating. Major vulnerabilities are summarized as follows:

Table: 1 Overview of vulnerabilities in Hatiya Island

| Vulnerabilities | Vulnerable area | Present status | Risk of aggravation |
|--------------------|--|-------------------------------|---------------------|
| Cyclones | Entire Hatiya Island | Devastating but seasonal. | Increasing |
| Storm surges | Islands, exposed areas. | Devastating but seasonal. | Increasing |
| Riverbank erosion | Northern parts of Hatiya Island. | Serious, localized, seasonal. | Increasing |
| Floods | Entire Hatiya Island | Serious, seasonal | Increasing |
| Salinity intrusion | Northern, eastern and southern parts of Hatiya Island. | Localized, seasonal | Increasing |

Source: Field Survey, 2011.

Five key vulnerabilities have been identified in Hatiya Island. These are Cyclones, Storm surges, Riverbank erosion, floods and salinity intrusion. It is forecasted that these vulnerabilities would be acute due to the combined effects of climate changes, sea level rise, subsidence, change of upstream river drainage, and coastal embankments.

Table: 2 Disaster, Risk, Vulnerabilities and Coping Capacity

| Disasters | Risk and vulnerabilities | People's coping capacity |
|--------------------|---|---|
| Cyclones | a.) Causes infrastructural damage b.) Damages houses & crops c.) Roads and communication are also hampered d.) Tree and animals are hampered | a.) There is a cyclone shelter present. b.) Cyclone warning disseminated by Cyclone Preparedness Program (CPP) |
| Tidal surges | a.) Damages roads and structure. b.) This makes the agricultural land unfertile and creates inundation ponds. | a.) Construction of embankment by Government. |
| Salinity intrusion | a.) This makes the agricultural land unfertile and creates inundation ponds. | a.) Construction of embankment by Government. |
| Flood | a.) Damages agricultural crops and housing | a.) Construction of embankment by local government. |
| Riverbank erosion | a.) Agricultural lands are disappearing. b.) Roads and homes get engulfed and disappear. | |

Source: Field Survey, 2011.

Community perception to coastal hazards and vulnerabilities

The coastal areas of Bangladesh are divided into different geo-morphological regions, so its climate, geology, soil, and hydrology are different in different parts of the country (Islam, 2004). The people of Hatiya were asked about their most prevalent coastal hazards, and according to the people's perceptions, the most prevalent coastal hazards in Hatiya are cyclones, tidal surges (storm surges and tidal floods), and river bank erosion (Field survey, 2011). As noted, Hatiya is located on the southern coast, which is relatively more vulnerable to cyclones and associated storm surges. In addition to this, being located at the estuary of Mehgna River, the northern part of Hatiya is facing severe riverbank erosion. Fortunately, arsenic contamination and salinity, which are catastrophic problems in many other parts of coastal areas, are not remarkable hazards in Hatiya (Parvin, et al., 2008).

Regarding the trend of coastal hazards in Hatiya, 97% of people perceived that both the intensity of the hazards and vulnerabilities of the people have increased over the last three years, (Field survey, 2011) though they have no perception about climate change (Parvin, et al., 2008). Especially the intensity of cyclones, tidal surges, and riverbank erosion has increased in Hatiya. Moreover, decreases in incomes along with a rapid increase of the price of food and daily necessities have enhanced the vulnerabilities of most of the coastal population.

Response to warnings delay

The Hatiya Island people's particular process of response to cyclones can make them vulnerable to disaster. As they are used to facing multiple hazards each year, their responses to warnings depend on the intensity of wind speed, experience of hazards, local belief in the probability of dangerous cyclone events, or the presence of a cyclone signal hoisted by the Bangladesh Meteorological Department (BMD). If the symptoms of previous hazards coincide with a Bangladesh Meteorological Department (BMD) warning of about six to seven on average, they start to prepare to save belongings or decide to leave their homes for a cyclone shelter or stronger buildings nearby. Before that, they adopt a 'wait-and see' approach, observing whether the cyclone intensity is rising. These study findings were consistent with Haque and Blair, 1992; Edris and Collins, 2008; Paul, 2009a.

Traditional disaster forecasting

The indicator of traditional forecasting of disasters by the communities of Hatiya

Island was broadly divided into two categories: hydro-metrological and biological. Some forecasting signs were quite straight forward. For example, high temperatures and humid conditions were indicating heavy rainfall; heavy rainfall was resulting in flood. Some forecasting indicators observed by Hatiya communities were similar to those in other areas, like birds flying to and fro restlessly and dogs barking abnormally before cyclones. Some signs were very specific and exact, like the movement of ants. In the case of hailstorms ants only climb up houses, in the case of cyclones or *kalboishakhi*, they only cross roads, but in the case of heavy rainfall they do both. The present study findings were consistent with Khan, et al., (2000); Howell, (2003); Motaleb, et al., (2011).

Table: 3 Traditional disaster forecasting by the Hatiya Island Communities

| Hazards | Traditional forecasting of disasters | |
|----------------|--|--|
| | Hydro-meteorological | Biological |
| Heavy rainfall | a.) High temperature and humidity b.) Wind moves from south to north in April to May | a.) Ants climbing houses and crossing roads in lines 1-2 days before heavy rainfall. |
| Floods | a.) Heavy rainfall b.) Irregular rainfall c.) Very strong wind for 3-4 days | |
| Cyclones | a.) High temperature b.) Fast moving clouds in the sky c.) No wind for 5-6 days, thus no movement of leaves on the tree d.) Clouds roaring like the sea | a.) Dogs barking abnormally b.) Birds flying to and fro unusually c.) Ants crossing roads in lines |
| Hailstorm | a.) Black stripes in the sky before rainfall b.) Very hot and humid conditions for 3-4 days c.) Clouds rumbling heavily | a.) Ants climbing houses in lines |

Source: Field Survey, 2011

Women's vulnerability in a disaster

Discussions with family groups indicated that the decision to save belongings and to leave home in most cases depended on the arrival of the male head of the household. Therefore, other family members wait for the arrival of the family head from outside. Due to conservative religious beliefs, many of the male heads of households prefer not to move to cyclone shelters, thinking that the female members of household might lose their *purdha* (a scarf worn by Muslim women on their heads) while travelling to or staying at cyclone shelters. The household also considers the problems that can arise at cyclone shelters, such as space issues, lack of light and poor sanitation.

Cyclone shelter

Hatiya has more than 100 cyclone shelters that have been constructed with financial support from the Red Crescent Society, the Saudi Government, and the Japanese Government. Nonetheless, from the people's perception, it was observed that most of the communities have need of more cyclone shelters in their villages. Also, according to Islam (2008a, b), in coastal areas, the capacity of the cyclone shelters was insufficient for the quantity of those who need shelter from the cyclones.

It may be noted that, there are more than 2,000 cyclone shelters along the coast of Bangladesh, but these can only accommodate one-fourth of the population in high-risk areas (Hasan, 2004). A similar situation also exists in Hatiya. According to union disaster management plans of two of the most cyclone-prone unions in Hatiya, namely the Jajajmara Union and Nijhum Dwip union, the total capacity of cyclone shelters was about 10,000 and 5,000 persons, respectively, whereas the total population of both of the unions was more than 90,000 (Field survey, 2011). This means that if strong cyclones like the ones that occurred in 1970 and 1991 were to strike Hatiya again, there would be no space to accommodate all the population who would be evacuating to their nearest shelter, regardless of the perfect dissemination of warnings worked out in advance.

Not only the lack of capacity but also the distance to the nearest cyclone shelter was a concern with the proper functioning of a cyclone shelter. In some parts of Hatiya, especially the southern part, unpaved, undulated and discontinued (due to rivers and canals) rural roads have made the communication system very difficult and time consuming (Parvin, et al., 2008). This caused people to perceive that the emergency shelter was too far away. Besides this, the southern part of Hatiya, namely Nijhum Dwip, is a small Island, exposed to the Bay of Bengal, and was not protected by any embankments. In total, about 50,000 people of this area are highly vulnerable to cyclone and tidal surges (Field survey, 2011).

Livelihood-related coping methods for different hazards

It is said that rather by being specialized, and therefore, vulnerable to hazards, people in coastal communities are well suited to adapt to changing situations (Pomeroy, et al., 2006). This statement is also true for the people of Hatiya. Among the different coping methods related to livelihood or income sources, people primarily try to use whatever savings they have. Those who have no savings or no property like poultry or livestock to sell must then take a loan from relatives, neighbors, moneylenders, or from local NGOs.

However, during these events, most of these relatives and neighbors also have to face similar socio-economic crises.

On the other hand, in order to get a loan from an NGO, one must meet some terms and conditions, such as, membership, full payment of a previous loan and submission of an application, etc., so some people turn to the moneylender as an easy and prime source of loans during an emergency. People have claimed that though moneylenders charge high interest rates, they can negotiate with them and can change their repayment dates (Field Survey, 2008).

Another common method of livelihood-related coping was that each household tries to raise poultry between August and November, which is the peak season for tidal surges and cyclones. They will then sell the poultry at this time to raise needed capital, even though they get relatively lower prices at this time. Since the majority of Hatiya's people were landless or had only a small amount of land, selling land or mortgaging their property is a very rare method of coping with crisis circumstances (Field survey, 2011). At this time, leaving one's village for a job was also very common. Chittagong, which is the second largest city and serves as the largest sea port of Bangladesh, is relatively close to Hatiya. After any coastal hazards or disasters, many people go to Chittagong city for opportunities. Finally, those with no access to any of these alternatives usually were forced to resort to starvation (sometimes only one meal a day or nothing at all).

Conclusions

It is advised that understanding a community's unique perceptions and assessments of their adaptive and proactive capacities is important in creating successful coastal hazard management programs. The development of effective hazard-reduction programs requires cooperation and exchange of experiences between hazards affecting the community and local government. Therefore, this case study has tried to disclose people's perceptions about coastal hazards, their vulnerabilities to these hazards, and the methods they employ to cope with a variety of hazards.

The complete investigation reveals that both the intensity of coastal hazards and people's vulnerabilities are increasing over time. A number of socio-economic and location factors are enhancing their vulnerabilities though they are relentlessly struggling to minimize their vulnerabilities by undertaking various coping methods. It is necessary to build a bridge between the efforts taken at the community level and development organizations. The efforts of development organizations need to ensure adequate accommodation in cyclone shelters, which should be connected by a better transportation system, and the location of the center, should be selected with the community's participation.

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