
Research notes on: Comprehensive Household Vulnerability and Risk Analysis to Natural Hazards (Coastal Region of Bangladesh)

マハメッド マンスール
Mansur Ahamed

ABSTRACT Living with physical hazards is an everyday issue for the people of Bangladesh because different seasons bring different kinds of hazards. In addition to the tangible damages incurred due to hazards, in most of the cases, these hazards injure the internal social organizations at different levels (for example, household, community, and institutional) and affects their assets. The community resilience is greatly weakened, which makes people susceptible to upcoming hazards. This paper explores people's perception and vulnerabilities to coastal hazards. At the same time, it investigates the methods that communities apply to cope with different coastal hazards. By highlighting both community-coping methods and efforts of development organizations, this paper attempts to devise an integrated approach for managing the coastal hazards that occur in Bangladesh.

Background of the study

Bangladesh is one of the most disaster-prone countries in the world (Shahid&Behrawan, 2008). Almost every year, the country experiences disasters of one kind or another, such as tropical cyclone, storm surges, coastal erosion, floods, northwesterners, tornadoes, and droughts, causing heavy loss of life and property and jeopardizing development activities (Ali, 1996). High spatial and temporal climatic variability, extreme events, high population density, high incidence of poverty and social inequity, poor institutional capacity, inadequate financial resources, and poor infrastructure have made Bangladesh highly vulnerable to disaster (Ahmed, 2004).

During the period from 1991 to 2000, Bangladesh has suffered from 93 large-scale natural disasters that killed 0.2 million people and caused loss of properties valued at about \$59 billion in the agriculture and infrastructure sector (Climate Change Cell, 2009).

The cyclone of 1970 and subsequent flood took away the lives of over 300 thousand

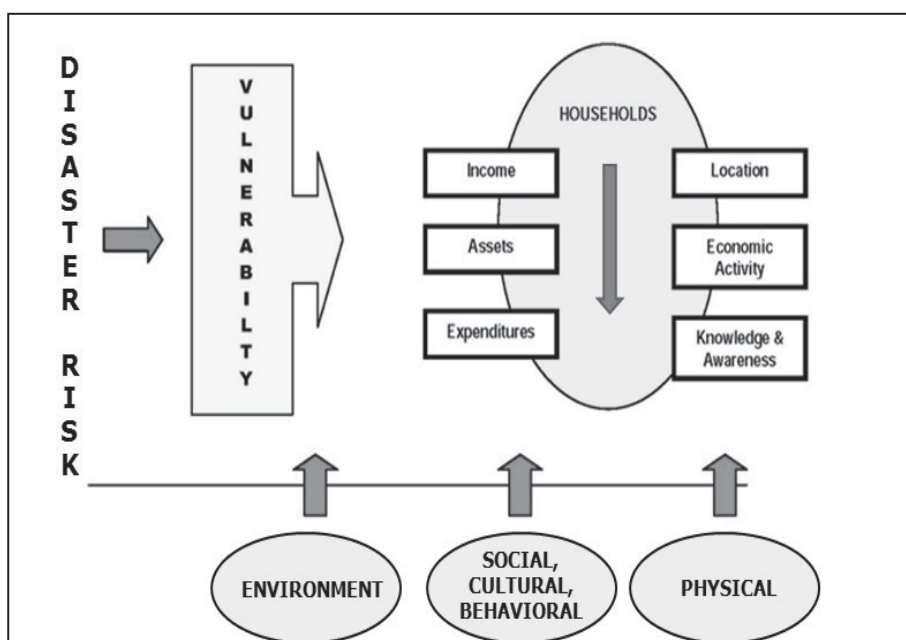
people and damaged the equivalent of about US\$42.5 billion in crops and property; the catastrophic cyclone of 1991 killed over 120,000; and the 2004 floods that inundated over 34% of the country resulted in 747 deaths. The cyclone of 1876, 1919, 1961, 1963, 1965, 1970, 1985, 1988, 1991, 1994, 1995, 1997, 2007, and 2009 were also of severe nature. In 2007, cyclone Sidr made landfall on southern Bangladesh, causing over 2,000 deaths and severe damaged (the cyclone toll mounted to 2,388) ; in 2009, cyclone Aila caused 330 deaths, made 1 million people homeless, and left damages that totaled \$40.7 million. In Bangladesh, an estimated 20 million people were at risk of post-disaster diseases due to Aila (Shaw et al., 2011).

Objectives

The objective of this study was to test the questionnaire to conduct a comprehensive household vulnerability and risk analysis study in the coastal areas of Bangladesh. It also aims to examine root causes and reducing exposure and vulnerabilities of people from natural disasters.

Analytical framework

The model below used to analyze the results of the survey. It looks into a number of factors in determining the causes of the risks and vulnerabilities of the households:



Data gathering techniques

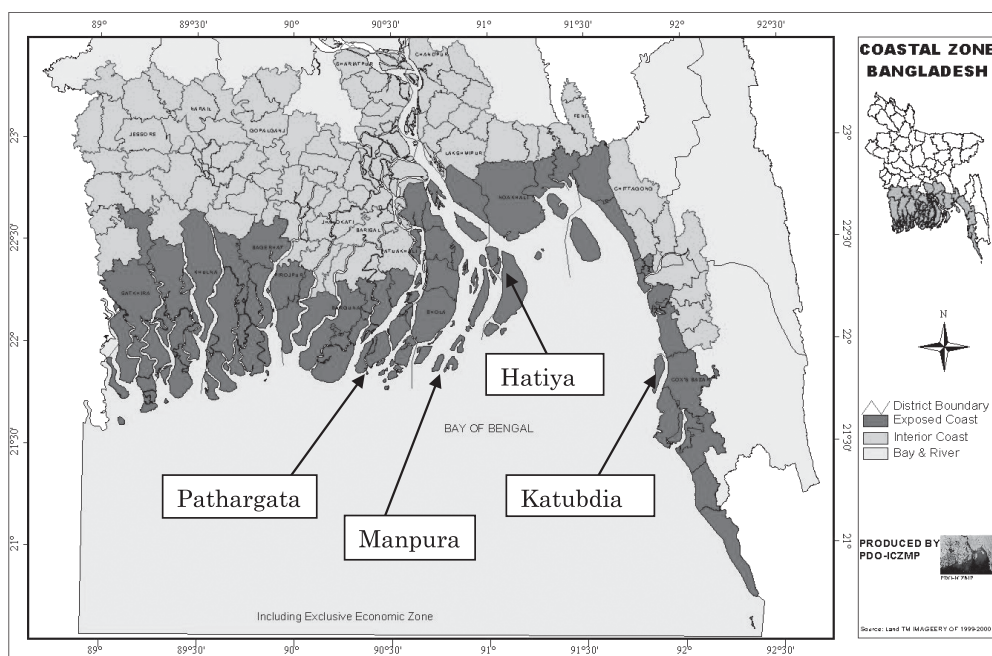
The study utilized both primary and secondary data collection. Secondary data gained from desk research was used to formulate the strategy behind the collection of primary data. Primary data were collected using a combination of approaches that includes one-on-one interviews, key informant interviews. Though, sample size was 55. Household has done one-on-one interview and Union chairman, member was key informant interviewer.

Study areas

I collected data for my pre research field work in the following four local areas (*Upazila* or Sub-districts) of coastal region in Bangladesh.

- | | |
|---|--------------------|
| ① Coxes Bazar, (Kutubdia <i>Upazila</i>) | No. of samples: 18 |
| ② Noakhali (Hatiya <i>Upazila</i>) | No. of samples: 12 |
| ③ Bhola (Manpura <i>Upazila</i>) | No. of samples: 13 |
| ④ Barguna (Pathargata <i>Upazila</i>) | No. of samples: 12 |

Coastal Zone of Bangladesh



Criteria to select the study area

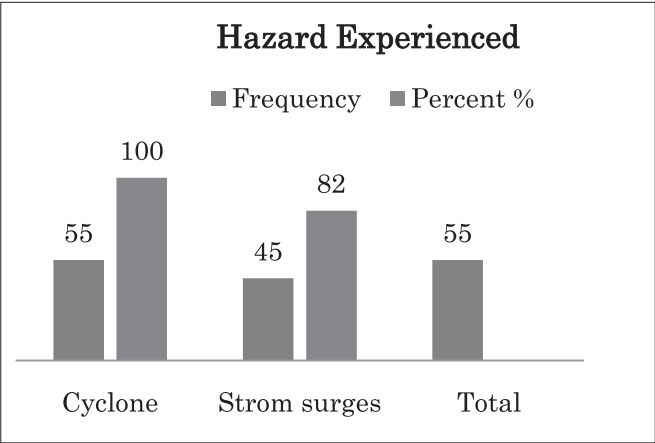
The main criterion to choose the coastal District of Coxes Bazar, Noakhali, Bhola, and Barguna as the study area is the degree of its vulnerability to coastal hazards, especially to cyclone and tidal surges. Therefore, the influence of seasonal cyclones, tidal surge, and the extent and depth of flooding were considered as important variables in determining the vulnerability of this area. I correlated the National, International and NGOs information with local statistical data, to determine finally *Upazilas* more vulnerable by

cyclone and tidal surges. I selected two unions affected by cyclone and tidal surges in each *Upazila*.

Analysis of data

Presence of Hazards

The people all in the survey areas are vulnerable to natural disasters. Due their geographic location and the topographic composition of the areas in which they live, almost all respondents in the survey areas are exposed to cyclone and strong winds and storm surge that accompany or result from the cyclone and tidal surge have the greatest impact on homes, farms, fishing activities and small business resulting in damages to property and assets and loss in income.



In the survey areas 100% have experienced cyclones and 82% have experienced tidal surges. Fortunately, in all of the survey areas, injury or death due to natural disasters has been negligible even though most of the respondents live close to bodies of water like river and the sea.

Demography

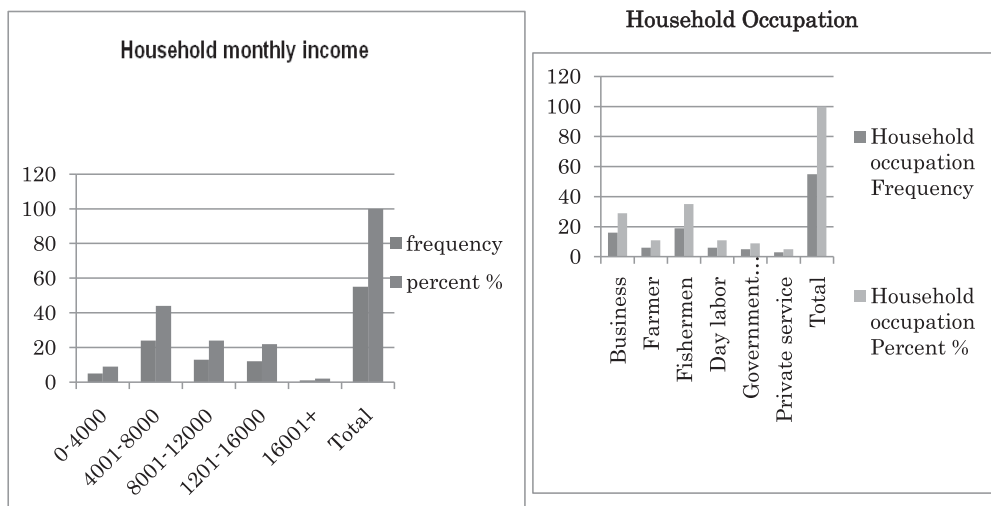
Respondents from the survey areas have large-sized households. On average there are about seven members per household with an average of three children, about one of which are below 5 years of age, though household members over 60 years old very few. This shows that every household has about two members who may have special needs during and after disasters, especially during evacuation periods.

Economy

In terms of occupation, 35% people in the surveyed areas are fishermen and 29% people are occupation small business, while day labor, farmer and Government job 11%,

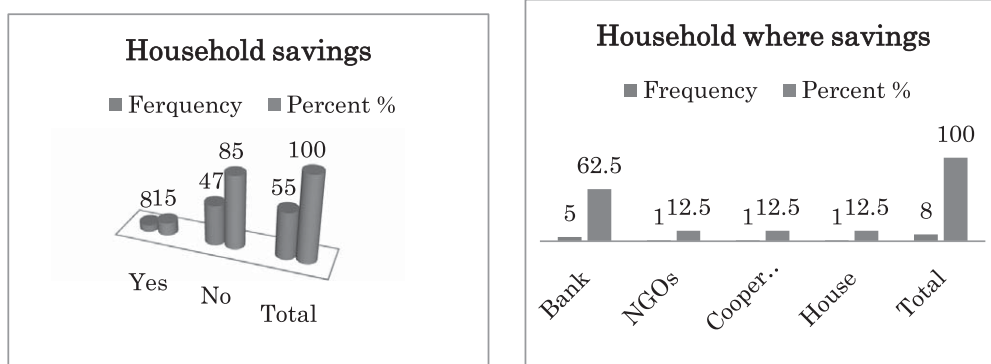
11% and 9% respectively. The majority of the people 44% income per month 4000 to 8000 Taka, on the other hand only 2% people monthly income more than 16000 taka.

Household Occupation



● Taka is Bangladeshi currency

Household expenditures, which are largely expended for food and children's education, do not leave much left over for households to generate savings. Most of the household respondent 85% have no saving, only 15% household have savings, which are mostly kept in bank (58%), NGOs (14%), cooperative (14%), and home (14%) respectively.

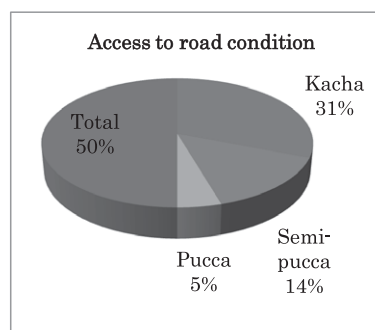
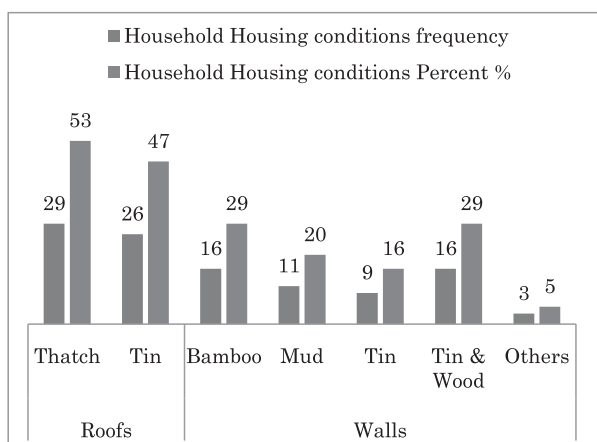


Housing and other facilities

Housing units in all the survey areas are commonly made of mixed materials.

- *Kacha* means mud road
- *Semi-pucca* means brick road
- *Pucca* means paved road

Most of the houses roof made of thatch (53%) and tin (47%) respectively; on the other

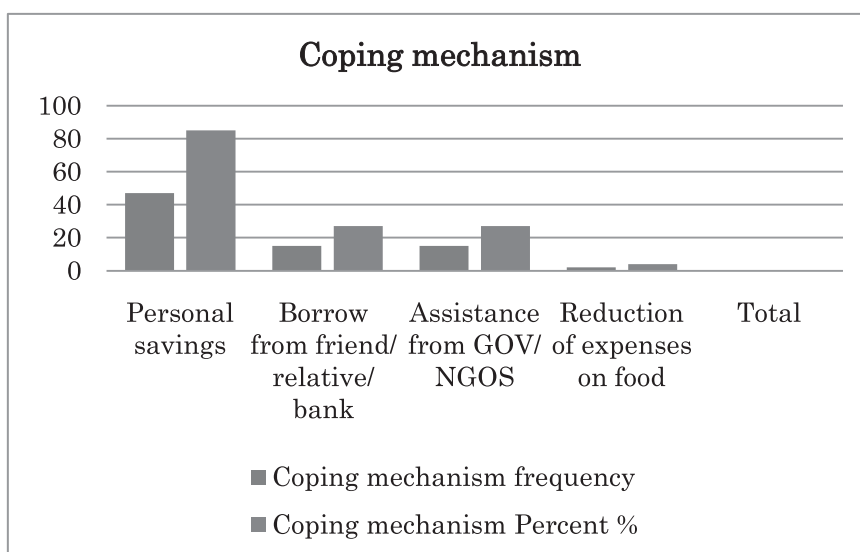


hand wall made of wood&tin (29%), bamboo (29%), mud (20%) and tin (16%) respectively. However, a larger proportion of those who are poorer have dwellings that made of light materials. This type of housing, being wall made of wood and bamboo and thatch as roof, is very vulnerable to strong winds. The poorer segments of the respondents who have this type of housing are the fishermen, tenant farmers and wage earners.

Government infrastructure in the survey areas meets some basic needs. Public school buildings were rated by most respondents as good or average by the respondents. The access road condition is not good. The respondent's survey areas road access *Kacha* (62%), *semi pucca* (29%), and *pucca* (9%) respectively. However, access roads to the more remote areas are still muddy during the rainy season.

Access to potable water in surveyed areas are mostly from community tube-well (81%) and own tube-well (17%) respectively.

Coping mechanism

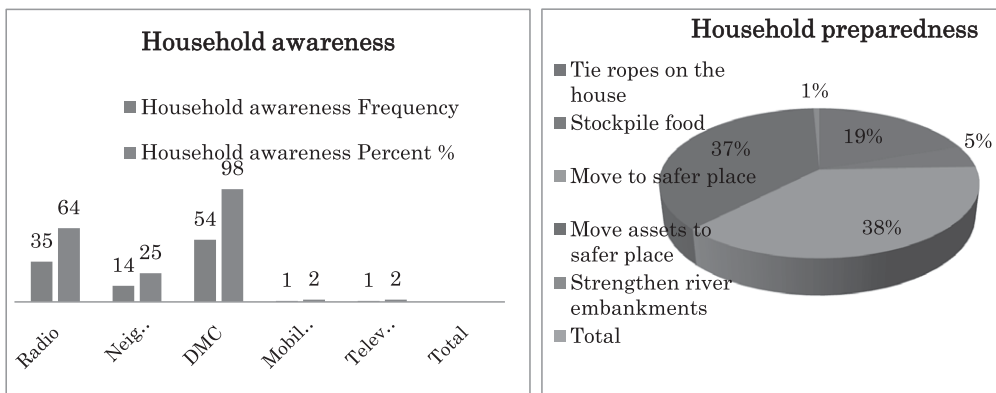


I considered in survey areas for coping mechanism personal savings, borrow money from friend/ relative/ bank, aid from Government/ NGOs, reduction of expenses on food, children stop schooling and temporary migration.

Respondents in the survey have varying ways to cope with disasters. Most of the people (about 85%) cope with effects of disasters use personal savings; on the other hand borrowed money from friend/ relative/ bank (27%) and aid from GOV/ NGOs (27%) respectively. A few proportions coping mechanism was the reduction of expenses on food and other household consumption.

Awareness, preparedness and mitigation

Most of the people in the surveyed areas receive disaster warning information from their radio, neighbor&kin and Disaster Management Committee (DMC). The main source of warning for disaster come from radio (64%), neighbor&kin (25%), and the Disaster Management Committee (98%) respectively. A few proportions knew early warning from television and mobile phone. However, it is important to note that, in the study area, most of the households do not own personal television and mobile phone.



In terms of preparedness and mitigation, the respondents have several practices. In the surveyed areas most of the people have seemingly standard practice as far as preparedness is concerned. They tie rope to secure their houses (19%) when cyclone is coming; move to safer place (38%), move assets to safer place (37%), stockpile food (5%) respectively. Only 1% people went to strong embankment or levee.

Across survey areas, although the respondents are aware of and prepare for disasters, it has been noted that they are not much involved in more community level activities such as improving river embankments or levee. They consider such activity to be the responsibility of the local government units.

Summary of findings and conclusion

Aside from the presence of natural hazards due to both climatic conditions and topography, several other factors, as mentioned above, were considered when determining

the vulnerability of the areas. This study showed that a number of factors increase the vulnerability and risk of the target population.

First, foremost of the cause of vulnerability is the source of income of the household. Those dependent on farming, self employment, wage labor, and fishing are the most vulnerable groups. The income derived from such activity is marginal and often uncertain. Therefore, the amount of income and sources of income, which can indicate the capacity of the people to afford physical mitigation and their capability to, recover from disasters. Large incomes mean that people can build better houses, build savings or purchase insurance that cushion the impacts of disasters. On the other hand, some sources of income are very vulnerable to disasters such as cyclone. For instance, open sea fishing is dependent on the size of the wave of the sea, which normally grows bigger during cyclone and monsoon season.

Second, the quality of houses can approximate the risks that people face from certain natural disasters such as cyclone and tidal surges. Wooden and bamboo houses with thatched roofs can be easily blown by strong winds. The people are aware of this, however, a strong correlation was found between the type of housing families live in and their income levels.

Third, scant financial resources hinder the fast recovery of the households from external shocks and crises like calamities and disasters. They are unable to invest in preventive mechanisms like repair and improvement of houses, healthcare services, sanitation, children's education, and weakens ability to accumulate financial assets through savings. As a consequence, children's welfare and development is affected and sometimes sacrificed in order for the whole family to survive and get through a crisis. Children of vulnerable groups are more prone to stop going to school.

Fourth, the age and sex of household members is key factor to determining vulnerability. Households with more children, more elderly or more women can experience more difficulties during evacuation and will require greater resources like food and water after a disaster

Fifth, the household composition and size is another contributory factor to a family's vulnerability. Households with large family size and higher number of dependents, i.e., children and old age pose a big challenge to their recover after a disaster. In the survey, families of farmers, wage laborers, self employed and fishermen were found to have high dependency ratio and bigger family size.

Sixth, level of education of the household head is another factor to their increased susceptibility to crisis and shocks. Majority of the target population have reached the basic education level usually up to primary school level. Many of the vulnerable groups are found to be within this educational level hence increases their risks. Improving the level of skills and knowledge will go a long way to enable vulnerable families to cope with disasters since they will have better work opportunities.

Seventh, physical location of the households adds to their risks and vulnerability. Risk exposure from cyclone is high in many areas and poor families who do not own house or their lot often resides in dangerous areas such as river side, beach areas or cost-lines, and other low-lying marginal areas. This is further compounded by the fact that with their meager income, they will not be able to build strong houses or fortify them to reduce the risk of getting cyclone or damaged by strong winds or tidal surges. Relocation is usually a long term solution to families in these areas but it needs significant investment. Usually, they just manage this risk by strengthening their social capital. **Finally**, more and more the vulnerable households are realizing the relationships and interconnection of the different factors in their environment that contributes to their risks. The problem is shared by many more communities and a form of cooperation or rationalization is needed if they want to mitigate or alleviate the perennial destructive events.

Conclusion

Vulnerability to natural hazards is becoming a major issue in international arenas, especially in coastal regions where the impact of hazards is expected to be the most severe given the natural conditions and poor development in this area. Bangladesh is one of these countries. The presence of natural events in the absence of social vulnerability is not sufficient to create disasters. Poor infrastructure development, human and social capital, and access to services, marginalization and social inequality tend to amplify the social consequences of hazards. These factor increase sensitivity to hazards and reduce adaptive capacities of human populations, posing a critical threat to individual, household and community.

The relief and recovery approach of disaster management in Bangladesh has been replaced by a holistic approach incorporating the process of hazard identification and mitigation, community preparedness, and integrated response efforts (IWM, 2009). Efforts are being implemented that target the strengthening of preparedness capacities and enhancing community resilience under the disaster risk reduction approach.

Focusing disaster mitigation programs on increasing adaptive capacity and lowering human sensitivity to natural hazards can also be a useful strategy in the context of other types of hazard event elsewhere. Reducing social vulnerability to hazards should always be the center of any disaster mitigation policy because it is the most important factor that shapes the human experience with natural events.

■ References

- (1) ADPC, (2005), *"Handbook on Design and Construction of Housing for Flood Prone Rural Areas of Bangladesh"*, published by Asian Disaster Preparedness Centre (ADPC)

- (2) Ahmed A. U. (2004), *Adaptation to climate change in Bangladesh: learning by doing*, UNFCCC workshop on Adaptation, Bonn, Germany, June, 2004.
- (3) Ali, A. (1996), *Vulnerability of Bangladesh to climate change and sea level rise through tropical cyclones and storm surges*, Water Air Soil Pollution, 92 (1-2), 171-179.
- (4) Climate Change Cell (2009), *Generation of PRECIS scenarios for Bangladesh (Validation and Parameterization)*, Climate Change Cell, Department of environment, Ministry of Environment and Forests, Component 4b, Comprehensive Disaster Management Programme, Bangladesh.
- (5) Pk. Md. Motiur Rahman, Noriatsu Matsui and Yukio Ikemoto (2009), *The Chronically Poor In Rural Bangladesh; Livelihood constraints and capabilities*, published by Routledge
- (6) Rajib Shaw, Juan M. Pulhin, Joy Jacqueline Pereira (2010), *Climate Change Adaptation and Disaster Risk reduction: An Asian Perspective*, Emerald Group Publishing Limited.
- (7) Rebecca Clements, Mario Cossio and Jonathan Ensor (February, 2010), *Climate Change Adaptation in Peru: The local experience*, Published by Soluciones practicas
- (8) R. B. Sing (2006), *Natural Hazards&Disaster Management: Vulnerability and Mitigation*, Published by Rawat Publication
- (9) IWM (2009), *Assistance to climate change adaptation and disaster risk reduction in Bangladesh: Support to national flood forecasting and warning services in Bangladesh*, Report supported by Danish Government, Institute of Water Modeling, Dhaka, Bangladesh.
- (10) Wisner, B., Blaikie, P., Cannon, T.,&Davis, I. (2005), *At Risk: Natural Hazards, People's Vulnerability and Disasters*, London: Routledge.