

# Foundations of Migration from the Disaster Consequences Coastal Area of Bangladesh

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## Abstract

In Bangladesh the most crucial impact of climate change will result in the migration of the people from coastal areas to all over the country. Increases in the frequency and severity of chronic environmental hazards and sudden onset disasters are projected to alter the typical migration patterns of different communities. The relationship between climate change and human security is not necessarily direct, but depends on a chain of consequences. This paper deals with the migration patterns of disaster affected coastal areas of Bangladesh. Life of coastal community is experienced with multiple vulnerabilities due to natural disasters. A questionnaire survey was done with 49 randomly selected people to identify the determinants of migration in the study area. Natural disasters were the most frequently cited cause of insecurity in a household survey undertaken for the present study. Other environmental problems such as riverbank erosion and the loss of natural resources were also recorded as significant challenges. The collected data then were analyzed by computer based software SPSS. Findings show that erosion and cyclone are strongly related with migration in the study area where flood, tornado and drought have no strong influence for that so called “climate change refugees”.

**Keywords:** Climate change, human security, migration pattern, natural disaster, natural resources, climate change refugees.

## 1. Introduction

The impacts of natural hazards on society are substantial and are clearly on the rise (Abramovitz 2001). Despite technological and scientific advances in prediction and mitigation, we have seen a serious increase in both mortality and economic losses from disasters since 1960, particularly in the developing world (IFRC/RC, 1999). Disasters are, in fact, increasing in impact and scope through the combined effects of economic, social, demographic, ideological and technological factors. Greater numbers of people are more vulnerable to natural and other hazards than ever before, due in part to increases in population, but more so to their location in dangerous areas. In fact, disaster risk and losses have dramatically increased, but impact is uneven different region (IFRC/RC, 2003). Coastal disaster (e.g. tropical cyclones, storm surges, coastal erosion and flood) has created significant impact on coastal rural people. These extreme events make the life of coastal community more complicated, keep in risk, destroy property and limit the livelihood options. However, regardless of region, some form of displacement of individuals and communities frequently results from the threat or impact of a disaster. In very graphic ways, disasters serve as indices of the success or failure of a society to adapt, for whatever reasons, to certain features of its natural and socially constructed environment in a sustained fashion (Oliver-Smith, 2002). A wide-ranging continuum characterizes the ways in which environmental hazards might act as a “push” factor in migration decision-making. With regard to natural hazards, forced migration is represented by evacuation (Ziegler and Johnson 1984).

A widespread view that is gaining ground is that climate related migration could evolve into a global crisis by displacing a large number of people from their homes and forcing them to flee. The fourth assessment report of the Intergovernmental Panel on Climate change (IPCC) mentioned the “potential for population migration” due to increase in the number of areas affected by droughts and an increase in the intense tropical cyclones activities (IPCC, 2007).

A significant impact of climate change is the increase of the frequency and severity of certain hazards. Hazards combined with vulnerability can result in disasters. The overall trend shows that the number of recorded natural disasters has doubled from approximately 200 to over 400 per year over the past With almost 20 years of armed conflict and droughts and floods, there is a constant, but increasingly acute, humanitarian crisis in Bangladesh

(Biswas, 2009). Climate change and its impacts such as intensification of natural disasters, coastal inundation due to sea level rise, might induce people to migrate both within the country and even crossing the national borders. In particular, it seems likely that significant numbers of people will be displaced, either temporarily or permanently, from their homes as a consequence of global warming (Stern 2006). Mass migration due to climate change may have negative consequences including escalating humanitarian crisis, rapid urbanization and associated slum growth and stalled development. This may require national governments and international organizations to plan for the relocation and resettlement and protection of affected population inside their country as well as immigration from other countries.

Bangladesh, the world's most densely populated country, is also environmentally one of the most vulnerable regions due to its geographical and spatial location (MOEF, 2002). Higher population density increases vulnerability to climate change because more people are exposed to risk and opportunities for migration within a country are limited. The country is composed largely of low lying areas lands less than sea-level above sea level. About 80% land is floodplain. It is also frequently visited by extreme climatic events, causing damage to life property and economy. The country's geographic location, low elevation, high population density, poverty incidence, and dependence on natural resources and services renders the country particularly vulnerable to future climatic change. Increased precipitation, rapid glacial retreat in Himalayas, and rise in sea-level will increase the likelihood of flooding in the future (World Bank, 2009). Almost every sector of socio-economic life in Bangladesh is likely to be affected by climate change. The sea-level along the coast is rising at about 3 mm each year and the surface temperature is showing a rising trend. Bangladesh is particularly vulnerable to climatic changes in its coastal zones, which covers about 30% of the country.

Recent statistics indicated that about 17.5 per cent of the total land area will be inundated and 11 per cent of the population will be displaced if there is a 1 meter rise in the sea level (Islam, 2004). Riverbank erosion has also been a regular natural phenomenon along the major and some minor rivers in Bangladesh adversely affecting the people and their properties. The Riverbank Erosion Impact Study (REIS) shows that, of the 462 upzillas (sub-district) bank erosion is taking place in about 94 and of the 64 districts it is taking place in about 50 districts. In 35 upzilas bank erosion is severe and recurrent. It is suggested that erosion due to floods and sea level rise-induced land inundation particularly will be key drivers of migration from Bangladesh (Swain 1996). According to several authors, between 64, 000 and 1 million Bangladeshis are rendered homeless every year due to riverbank erosion alone (Siddiqui 2005). In their study of climate change and associated risks, McGranahan et al, (2007) have established that 40% of the total land area and 46% of the total population in Bangladesh is currently in the Low Elevation Coastal Zone (LE CZ), "land area contiguous with the coastline up to a 10-metre rise elevation", and remains therefore, at risk of inundation. Table 1 listed down the very much common natural disasters and their common features for the impacts of climate change in Bangladesh.

Mass migration is one key feature of the coastal area which distinguishes it from today's natural disaster. The ratio of migration to deaths was higher in richer than in poorer counties (Hansen and Smith, 1984). Natural disaster has a permanent impact on coastal land population and economy, whereas typically famines only reduce population in a transitory fashion. The attempts of the present study deals with the responsible events of natural disasters that forced the helpless community for migration from selected coastal area of Bangladesh.

## 1.1 Materials and Methods

### 1.1.1 Study area

Subarna char Upazilla (Sub district), is a accreted land of the northern Bay of Bengal, Bangladesh was selected for the analysis of migration pattern study. Geographically the study area is situated within Latitude 22°35" N and Longitude 90°10" E. Total area of the Subarna char Upazilla (Sub district) is 1,508 km<sup>2</sup> where about 346,853 peoples are living there and among them 87% is Muslims and 12% is Hindus (Banglapedia, 2004). About 52% of total population is landless and 88% of the people of Subarna char Upazilla (Sub district) live under the poverty line (Banglapedia, 2004). The whole area is under the threats of natural disaster and ground level is lower than 10 m above the mean sea level (Islam, 2004). The inhabitants of this area are mainly dependent on fishing for their livelihood.

### 1.1.2 Data Collection and analysis

Data were collected with the help of a well structured questionnaire. The questionnaire consists of questions which gives data to identify the determinants of migration from the study area. 49 respondents were selected randomly for questionnaire interview. Data were also collected through focus group discussion (FGD) and participatory observation. Participatory observation offer a good opportunity to get a comprehensive and authentic insight in actual situations of the evaluation topic including "actions, conversations, and physical descriptions" (Gittleston and Mookherji, 1997). The focused group interview consists of a guided in-depth interview of a relatively homogeneous small group of individuals purposefully selected by the researcher to

address a specific topic (Saint-Germain *et al*, 1993). Collected data were analysed by application of computer based software SPSS (Statistical Package for Social Science). Some weights were assigned for different migration strategy and help to identify the factors which are responsible for human migration from the present study area.

### 1.1.3 Description of Variables

Weight has been assigned subjectively for dependent variables based on the migration strategy of local community. The weights of dependent variables are shown in table 2. Various independent variables were considered, shown in table 3, through which their respective scores are calculated. Under independent variables five variables are considered which includes erosion, cyclone, drought, tornado and flood ( Table 4). These variables were chosen to get better result about the determinants of migration. River bank erosion is a normal part of life for these people and responsible for displacement of community. Noakhali is facing severe riverbank erosion and the northern part is continuously affected by river erosion (Parvin *et al*, 2009). Cyclone destroys the coastal ecosystem with enormous loss of property and livelihood options of people (Biswas, 2009). Flood increase the threats of epidemic diseases. Tornado is risky for vulnerable coastal communities and force people to migrate from their native place. Drought directly affects water quantity and quality, and can also responsible for both poverty and migration.

## 2. Result and Discussion

Coastal area of Bangladesh is exposed to multiple natural hazards and the study area is situated on the path way for occurrence of natural disaster. These coastal hazards are impacting on the livelihood of vulnerable community (McBean, 2009). By affecting livelihood coastal hazards also influence human settlement in an area. The resulting loss depends on the capacity of the population to support or resist the disaster, and their resilience. Different natural disaster in Subarna char *Upazilla* causes flooding of land, damage of embankments, land erosion and ultimately make community refugee. During the present survey interviewees were asked about hazards. According to their view, main coastal hazards are cyclones, flood, erosion; tornado and drought. From 1970 Subarna char is well experienced by different types of coastal hazards. About 130,000 people have died due to cyclones and the storm surges (Banglapedia, 2004). The northern part of this area is continuously affected by river bank erosion and from 1960 to 1984 approximately 108 km<sup>2</sup> of land north and east of the Island has been eroded (Huq *et al*, 1999, Huq, 2001).

Interviews linked their migration with different natural hazards. Different migration strategies those are adopted by coastal community are shown in table 2. From the survey it is clear that, about 50% people migrate to different district, 24% people migrate to government owned khas land, 15% people migrate to neighbor house and another 15% migrate to high land of study area by buying plot. Most of the movement to different distant districts is for in search of livelihood activities as disaster disrupts their normal economic activities in Subarna char. A considerable number of households settle on the mainland which is a government property. Small number of people takes shelter to their relative house. Here and is cheap compared to other area. So, those have money can buy land for resettlements in the Subarna char.

In The Table 5 means and standard deviations for all independent variables and dependent variables those included in model are given. The mean number of migration strategies undertaken by interviews of the study area in 3.1633 (out of a possible 4). To assess determinants of migration among the coastal community, a regression analysis was employed. From Table 6, it is clear that the mentioned model was a significant predictor of migration in the study area ( $F=2.830$ ,  $p<0.01$ ). Independent variables those are considered for identifying determinates of migration, the erosion and cyclone was the strongest determinants for the study area ( $Beta=0.041$ ,  $p<0.001$  and  $Beta=0.110$ ,  $p<0.001$ ). Erosion causes destruction of land and force people to migrate from their native place. Cyclone creates strong winds and causes breakdown of house. As a consequences of cyclone people become homeless and poor. Flood is also significant determinants of migration in the study area. Tornado is also a factor for migration but not statistically significant. Drought is negatively co-related and statistically not significant. The model explains about 16 per cent of the variation in migration strategy for the study area (Adjusted  $R^2=0.160$ ).

## 3. Conclusion:

Climate change is likely to expose hundreds of millions of people to increasing environmental risks displacing a large number of people and forcing them to migrate. There is an emerging view that these people should be recognized as climate refugees by international laws and proper institutional arrangements should be made to address their problems. There is a need to recognize the displacement of people within the countries and regions so that proper action can be taken to address their problems. Current knowledge based on the relation between climate change and migration of people is still limited. There is a need for a better understanding of the relation between

climate change and migration. This paper has explored determinants of migration in Bangladesh. Hazards are stated important reason for migration for communities. Main reasons for migration are erosion and cyclone. Flood, tornado and drought are also responsible for migration. Findings of the present study have importance in policy formulation. Governments need to take step to protect coastal people from these extreme events of climate.

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**Table 1: Primary Environmental Disasters in Bangladesh**

<b>Common Environmental Disasters</b>	<b>Geographical spread</b>
Cyclone	On average, 1-3 severe to moderate storm every year. Some travel as far as 200 kilometers inland
Sea level rise and flood	20% of the total area inundated annually on average. May increase to more than 36% in cases of severe flooding. Half of Bangladesh under 12.5 m above the mean sea level
Drought	Common, despite the presence of abundant water resources, western regions are particularly vulnerable to drought.
River Bank Erosion Source: (Chowdhury, 2010)	Recurrent in 35 upzilas (sub-districts) of Bangladesh

**Table 2: Weights of dependent variables based on the migration strategy of local community.**

<b>Migration Strategy</b>	<b>Weight</b>
Migration to different district	0.50
Migration to government land	0.20
Migration to neighbor house	0.15
Migration to high land of study area by buying plot	0.15

**Table 3: Different migration strategies those are adopted by coastal communities**

<b>Migration Strategy</b>	<b>Percentage</b>
Migration to different district	50 %
Migration to government land	24 %
Migration to neighbor house	13 %
Migration to high land of study area by buying plot	13 %

**Table 4: Scale of dependent and independent variables applied for the experiment**

Variables	Coding Scheme
Independent Variables	
Drought	1=Yes 0=No
Tornado	1=Yes 0=No
cyclone	1=Yes 0=No
flood	1=Yes 0=No
erosion	1=Yes 0=No
Dependent Variable: Migration Strategy	Index of 4 items in Subarna char (Same weight for 2 items and relatively high weight for migration in different district and migrate upward by buying land).

**Table 5: Descriptive Statistics of Model Variables**

Variables	Mean	SD ( ±)
Independent Variables		
Drought	.4082	.49659
Tornado	.4694	.50423
cyclone	.1429	.35355
flood	.9184	.27664
erosion	.5102	.50508
Dependent Variable		
Migration strategy	3.1633	.85017

**Table 6: Regression Coefficients for Models of determinants of migration**

Variables	Unstad. Coeff.	Std. Coeff.	t-ratio	Significant
Independent Variables				
Drought	-.094 <sup>***</sup>	-.055	-.373	.711
Tornado	.170 <sup>***</sup>	.101	.596	.554
Cyclone	.110 <sup>*</sup>	.230	1.619	.000
Flood	.054 <sup>**</sup>	0.067	.456	.008
Erosion	.041 <sup>*</sup>	.416	2.245	.000
R <sup>2</sup>		.248		
Adjusted R <sup>2</sup>		.160		
F		2.830 <sup>**</sup>		
N		49		

<sup>\*\*</sup> $p < .01$

<sup>\*</sup> $p < 0.001$

<sup>\*\*\*</sup> Not highly significant



### FIGURE LEGENDS



Fig 1: Map of the study area Subarna char Upazila of Bangladesh



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