

# Climate Change and Migration

## Impact on Bangladesh's Coastal Inhabitants

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## **ABSTRACT**

Considering the present environmental degradations, Bangladesh is one of the most affected and vulnerable countries in the world. In particular, its coastal areas are prone to frequent environmental changes. More people are now displaced by climate change than by war (Mehreb 2006: 27). Environmental vulnerabilities have already contributed to large permanent migrations each and every year, almost all over the coastal areas. Objectives of this study are to investigate the impact of environmental change on this migration; pertaining to the coastal area of Bangladesh and also to attempt to find out a widespread pattern of environmental migratory moves, its pervasiveness and consequences. To correlate the association of climate change with migration in this present study, I used various secondary data sources that are in agreement with the above background and stated research problem. The analysis of these secondary data assists us in understanding the climate-based factors of human migration. For easy understanding, the findings are discussed below after analyzing and interpreting the collected secondary data under sub-headings (i.e. social, economic, political perspectives). Concerning the climate change issue on migration, proper investment is essential to make policies and programs; to protect people from environmental risks, reduce involuntary migration and support the displaced populations.

**Kew Words:** Environmental Migration, Social, Economic, Political, and Cultural Consequence.

## ACKNOWLEDGEMENT

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I am grateful to my mother who is in Bangladesh; I am also deeply indebted to my friends.

Thank you

Md. Imtiaz Javed

## **ABBREVIATIONS**

**BBS** - Bangladesh Bureau of Statistic

**IPCC** - Intergovernmental Panel on Climate Change

**IOM** -International Origination for Migration

**IMI**-International Migration Institute

**NIC** - National Intelligence Council

**SRDI** - Soil Resource Development Institute

**UNEP** - United Nations Environment Program

**UNDP**- United Nations Development Program

**UNHCR**-United Nations High Commission for Refugees

**WBGU** - German Advisory Council on Global Change

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## **INTRODUCTION**

### **Climate Change**

According to Intergovernmental Panel on Climate Change (IPCC) definition, climate change refers to a “change in the state of the climate that can be identified (i.e. using statistical tests) by changes in the mean and/or the variability of its properties that persists for an extended period of time typically decades or longer” (IPCC, 2007). Environmental factors always play a pivotal role in global migration drifts. In addition, the magnitude of such kind of human migration, both inter-state and cross-border is likely to increase as a consequence of dynamic changes in the environment; this in turn strongly impacts the lives of people. Climate change has been referred to as a “threat multiplier” by experts with regard to security, community and mass migration (The CNA Corporation, 2007).

UN Secretary General Ban Ki-moon warned that changes in the environment, such as droughts and extreme flooding, were likely to become major cause of violent conflicts and humanitarian disasters, and that climate change therefore is a much greater danger to the world than war (BBC News, March 2, 2007). Natural activity is not the only cause for climate change, but that artificial reasons are mostly causing these changes the reckless human activities e.g. deforestation, increase carbon dioxide emissions, cutting hills, and unwise management etc. are primarily responsible for these kinds of changes. Generally, it is acknowledged that industrialization, population boom, greater consumption, the expansion of war and the use of destructive lethal weapons and the scarcity of environmental friendly technologies all man-made factors are corrupting our environments. In February 2007, the Intergovernmental Panel on Climate Change, organized by the United Nations, published the first part of their fourth assessment report, showing that human activity was “very likely” causing climate change, and predicted rises in temperatures and sea levels (IPCC WGI, 2007).

The shocking effect of climate change is faced by whatever country located in a vulnerable location. Bangladesh is the most vulnerable country facing climate change. Bangladesh many of its resources such as agricultural yield, loss of land by river erosion etc. which is a consequence of the calamite change. Bangladesh is situated in a vulnerable geographical position where natural devastation happens often and causes much damage, especially to poor villagers. This climate changing is also threatening the lifestyle and livelihood of the coastal communities of

Bangladesh. These anticipated natural changes, like rise of sea level, flooding, and loss of land forces many coastal people to become refugees. Voices within the academic as well as humanitarian relief community have repeatedly underscore we may soon need to deal with hundreds of millions of such migrants fleeing the effects of environmental degradation as we face these problems as sea level rise, expanding deserts and catastrophic weather-induced flooding (Myers 2001: 611). The future of the coastal people of Bangladesh rely upon the improvement and disaster management policies of the responsible government and also on the regional cooperation and international effort fighting climatic dangers.

### **Description of Several Migration Processes**

According to the International Organization for Migration (IOM), migration is comprehended as a multifaceted occurrence which incorporates the following factors labor migration, health migration, integration, family reunification, trade migration, development of migration etc. (IOM, 2010).

#### ***A. Social networks and migration (normal migration)***

For initiating a normal migration process, some form of personal link from the destination area is needed. The link might be in the form of a job offer, having an agent, relative, or friend in the area, or the information about opportunities of that particular area. The existing network or social network also is a contributory factor to the normal migration process (Longman, 2005, 143).

#### ***B. Ecological migration***

The ecological migration can be described as people being displaced because of environmental factors. For example, when people's normal livelihood is disrupted and they are unable retain their existence from their lands. People migrate to other places because of the disruption of their basic needs due to tornados, cyclones, or any other climatic disasters (Longman, 2005, 143).

On the basis of different variables, the complex migration phenomena can be classified, although most of the time these phenomena are chosen is related to each other. Migration can be classified as voluntary or forced migration. Voluntary migration is normally considered as a searching for a certain quality of life while forced migration happens due to war, or the transportation of prisoner or slaves. But, considering in broader scale; forced migration is not only the asylum seekers or the refugees but also people who are forced to move due to some external factors i.e. environmental stress (Malte, 2004, 3).

### **Migration Due To Climate Change**

We can easily establish the fact that many adverse effects of climate change are in developing countries, where populations are most susceptible and least likely to adapt to any significant climate change. Changes in temperature, water supply, and water quality can impact agricultural production, human settlement and health, biodiversity and animal migratory patterns (IPCC, 2001a, b). Environmental destruction, besides being an immediate factor in fuel competition natural resources, can also potentially lead to loss of many people's source of living, which in turn may result in the migration of the affected population. The resulting mass migration may bring alteration to the power equation among the various factors in the host society and actuate them to take action (Swain 1996, 1). Concerning climate change issues, few places in the world experience the range of effects and the severity of changes that have been occurred in Bangladesh, for sometimes an increasing these included but are not mutually exclusive both in temperature extremes but also in length of time these periods last average temperature; wider in extreme hot and cold spells; less rainfall, vital for production of agriculture, yet more in the monsoon; resulting in floods; melting of glaciers in the source areas of Bangladesh's rivers, altering the hydrological cycle; leading to more powerful tornados and cyclones; and the sea level, rising alarmingly; displacing communities, turning freshwater to saline and facilitating more powerful storm surges (Pender, 2008, 27).

### **Temporary and Permanent Migration**

Temporary migration is generally concerned with the destinations that are not very far away from the place of origin. The first purpose aim for this kind of migration is to obtain wealth and then return to the place of origin and provide a better standard of living for family members. But nowadays, this type of migration occurs for other reasons as well such as business, tourism and pilgrimage are but some of these reasons (Malte. 2004, 3). Permanent migration means the permanent reasons by an individual to a destination country. This type of migration is included with all others, and is also called overseas migration (Malte. 2004, 3). Although trafficking is not considered to be forced migration; it can be counted as irregular migration that is being recognized as risky within that category. (UNHCR, 1995). As per Reuveny (2007, 657), people are generally affected by environmental degradation in three ways: first, people remain in this area and stay there until period of environmental degradation is alleviated, or they seek to move to the other destination where there is less environmental stress. The author mentioned that

people from developed countries have the ability to cope up with environmental disaster because they have the necessary technologies and resources. (Reuveny, 2007, 657) This is extremely difficult for the less developed countries due to the lack of means and expertise. This explains there why for the affected people from less developed countries to fight to overcome environmental disasters and so they migrate to safe areas..

### **More people Migrate Internally in Many Countries**

In 2009, the International Organization for Migration provided a report in cooperation with United Nations University and the Climate Change, Environment, and Migration Alliance, in which they estimated between 200 million to 1 billion people, will migrate just because of climate change by 2050. They also mentioned that the environmental drivers of migration are very closely related with other factors such as social and economic development that can be accelerated and to some degree; mask the real affects of climate change impact (Center for American Progress, 2012, 3). The estimated number of 200 million people being displaced by climate change may occur easily under this scenario.an even greater number of areas in South Asia, Southern China, and the sub-Sahara Africa especially in the Sahelin region could be lost permanently due to its uninhabitable. The forced migration from climate change would be obvious and the millions of people displaced at a time because of the adverse weather events like storms or floods, and millions of people will migrate due to extreme climate disturbances such as salinization of agricultural land, desertification, and a rise in sea level. (IMO, 2008, 29)

### **Migration Patterns of Debhata, Bangladesh**

(Rahman, 2000) reported, that there are direct and indirect factors that contribute to the global phenomena of migration of people from one place to another. Debhata is a place in Bangladesh where internal migration occurred mainly due to climate change. Among several climate change issues, flood is an important factor that often affects the Debhata village. The effects of flood as significant factor on migration are vague in Debhata Upazilla in Bangladesh (Rahman, 2000). People who reside in Debhata, Bangladesh continually move from their place of origin to urban areas. The main reasons are different types of natural disasters, combined with other issues cause migration factors like better economic, social, and political, and lack of urban facilities in the rural area etc. As noted above, in addition to 'usual' patterns of flooding within Bangladesh, water-logging (the long term inundation of areas due to inadequate drainage) has been a challenging hurdle recently for the following reasons: natural changes in river flow; rising

sedimentation in rivers due to condensed sediment deposition on flood plains, thought to be protected by ridges and lack of proper use of and maintenance of sluice gates (IOM, 2010). Consequently migration is happens throughout the year here, but especially during the rainy season in this specific area. Since the water level increases due to the fact that the land area is prone to water-logging after the rainy season, floods and tidal streams (Islam, 1992). People usually migrate from coastal areas to urban slums in Dhaka but some come from the Satkhira Sadar district and some other parts of the country too. Those coastal people who are affected by the environmental degradations purposefully to move from one place to another place in search of more suitable livelihood opportunities.

### **Background Information of Bangladesh**

Bangladesh is a small country and geographically located at 20°34' to 26°33' North latitude and 88°01' to 92°41' East longitude. It has about 1, 47,570 square kilometers of land and approximately 142.3 million people (Population Census, 2011, BBS). The southern part of Bangladesh is very flat and considered to be coastal area of the country. The southern coastal area of the country has recently faced an intense climatic disaster named (*Known as Super Cyclonic Storm*) SIDR, which has greatly interrupted the normal livelihood of these coastal people. Today's ecological conditions are changing rapidly, causing lots of damage and destruction to human livelihood. The rapid increase of global temperature which has led to ice-melting in the north and south poles causing a drastic rise of the sea level, resulting in a severe decline of agricultural land, adversely affecting the livelihood of the coastal people. (Sarwar 2005, 4)

A Study by The German Advisory Council on Global Change (WBGU) states that there are at least three million coastal people that have been forced to migrate due to the sea level rising. Most of those migrants have moved to the urban slums. Valuable agricultural land is under water, causing, the country to expend 15% of its GDP to cope with this natural disaster and creating economic instability (WBGU 2007, 122-125). Migration caused by environmental changes is a leading cause of the increased flow of cross-border migration into India and other neighboring countries. Most of them come from coastal areas which have been greatly affected by the hostile environmental changes. Bangladesh finance minister; Abul Maal Abdul Muhith states that 20 million homeless will move from the country by 2050 (Dodds and Strong 2010). Bangladesh has a coastal area about 710 km long that has already been affected by land erosion,

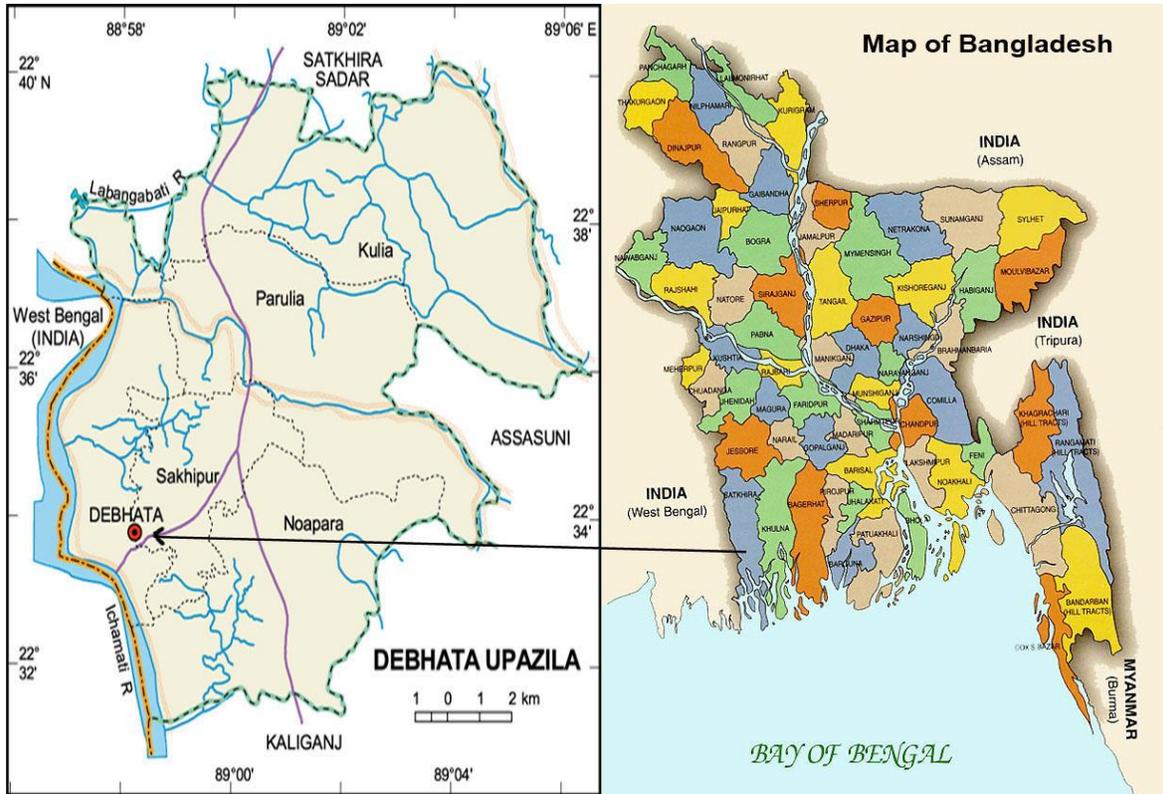
salinity intrusion, and ecological imbalance. These threats are becoming worse day by day. The rise of the sea level will lead to river bank erosion, salinity intrusion, loss of agricultural production, diminishing food production, flooding, destruction of infrastructure, crop failure, loss of fisheries and imbalances between ecological balance and biodiversity etc. A one-meter increase of the sea level will cause a dramatic negative effect on the coastal area and disappearance of a large plain coastal zone. Most vulnerable are coastal natural resources, resources of pure drinking water, agricultural production and the natural ecosystem of Bangladesh (Sarwar 2005, 4).

### **Study Area**

DebhataUpazilla of the Satkhira District under the Division of Khulna, Bangladesh is located at 22.5667°N and 88.9667°E. It has 17,724 house hold units and a total area of 176.33 km<sup>2</sup>. According to the Bangladesh census 2010, it contains a population of 99,068 of which males comprise 51.11 % and females 48.89% of the population (BBS, 2007). The average literacy rate in Debhata is 30.9% (7+ years) (Banglapedia) while the national average literacy rate is 43.1% (BBS 2007). It is this coastal area that is more prone to environmental disasters.

### **Debhata at a Glance**

Environmental changes have resulted in the loss of livelihood for a large population in the southwestern part of Bangladesh and have necessitated their migration, in order to survive. (Swain 1996, 1). DebhataUpazila is also known as a coastal area which is frequently affected by natural disasters. Because of these frequent environmental calamities; its infrastructure facilities, i.e. transportation, electricity, gas, pure water, educational institutions are under-developed. The Government cannot construct the buildings, highways not provide other facilities to meet public demands; due to the enormous loss and adverse effects, of these environmental disasters. Consequently, people here are continually migrating elsewhere.



**Figure 1: Map of Bangladesh**

**Source: Banglapedia, DebhataUpazila located in Satkhira district, Bangladesh**

### **Objective of the Research**

The objective of the study is to discuss how climate change affects coastal people and force migration which may occur due to extreme environmental changes. Recent studies and information have shown that climate change can trigger migration of coastal people. It has focused on the consequences which can lead to social, economic, political and competition in this densely populated country. I became interested in environmental issues because I found after reading newspaper and other articles that the world climate is changing day by day and is labeled ‘Climate Change’ and its threat to humans especially in developing countries like Bangladesh, Pakistan, India, Maldives etc. Bangladesh is one of the most affected countries of climate change and has been fighting against this global threat these last few years due to its enormous loss of GDP resulting from natural disasters like flood, cyclone, riverbank erosion etc. It is vulnerable to natural calamities, throughout the year. Another, major concern for Bangladesh is that many people are displaced from their homes, lands, settlement due to river erosion, coastal erosion and

that large amounts of agricultural crops are damaged due to climate change. Generally, People who are living near the coastal areas of Bangladesh are the most vulnerable for migration. They have to change their livelihoods and are forced to migrate to other places, especially urban areas or big cities.

### **Research Questions**

The main focus of this current study is to explore causes and consequences of the migration of these coastal people in Bangladesh. DebhataUpazila located at the southern part of Bangladesh has been selected as case study area.

The following questions should be considered on the issue of climate change as it pertains to migration:

1. How does climate change force the migration of people in coastal areas of Bangladesh?
2. What are the consequences of migration, due to climate change from coastal areas of Bangladesh?

### **Delimitations**

Climate change and migration are two vital areas of study but it would be difficult to cover all aspects related to these areas. Therefore, I have limited my focus on certain aspects including economic, political, social and cultural issues, resulting in climate change-driven migration. There are few models that describe climate change and its consequences on migrating people from coastal areas to urban places.

### **RESEARCH METHODOLOGY**

To link climate change with migration in this present study, I have used various secondary data sources that correlate the above background with stated research problems. The analysis of this secondary data assists us in understanding the climate-based factors of human migration. To assess the legitimacy of the data, I referred to the secondary data on migration, available from various published archives, a wide range of journals, survey information from Governmental agencies, and the available information from published censuses or other statistical data at the provincial (or, district) level. Apart from the quantitative data, I have also employed the qualitative method in this study to evaluate the history of environmental variation and its influence on human migration in DebhataUpazila. This qualitative data was collected from articles, journals, theses, e-books, newspapers, and video interviews using internet and Lund

university data base (e.g. Libhub, Lovisa, Summon etc.). All these played a vital role in understanding the actual situation of the entire southern coastal region of Bangladesh and different climatic problems in this part of the country.

In contrast, the notable drawback of secondary data is that it is mostly compiled by the persons or organizations that collect it; therefore, the secondary data must be analyzed closely. Secondary data may not provide all necessary information. Additionally, there can be concerns over the time-frame from this kind of data because data collected a few years ago may not be correlated with the data collected at present (Flick, 2009). In this study, I reviewed all the available publications from 1990 to present.

### **Validity and Reliability**

One way to establish the validity of a study based on secondary information is to compare empirical findings; with similar data from other secondary sources. The information of one secondary source was compared to those of other sources to avoid misrepresentation. Also I was conscious on the matter of reliability during the selection of theories. Finally, all the data collected and presented here was carefully considered to make this thesis more reliable.

### **Limitation of the Research**

There are some limitations in this study which I could not avoid. First, I could not physically visit Bangladesh due to time constraints and lack of financial ability. Since the research area is very specific, I could not represent the entire scenario of ecologically influenced migration in Bangladesh.

## **THEORETICAL FRAMEWORK**

### **Definition of Migration**

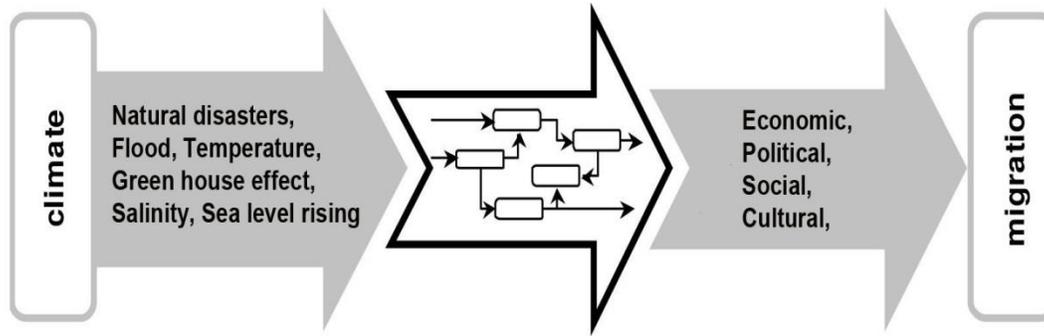
It is difficult to obtain an official definition of environmental migration because of the lack of agreement to define migration between different organizations and countries, which presents a problem for any international study. The definition of migration that has been adopted for this study comes from the International Migration Organization (IMO) (2004: 4), migration can be defined: a process where people are moving from one place to another, either in the same country or to another country. It is a population movement by the people where its composition, length and cause are not determined by the various national statistical offices which use different definitions

of migration. To link the migration, several researchers with different points of view such as political, sociological, economic and anthropological. These diverse viewpoints provide a fragmented vision of the migration theory (Borkert et al., 2006). Migration can be considered as multidisciplinary fields, and multiple paradigms for both issues have been used.

Most of the experts have reached the same opinion that migration flows in Bangladesh are happening mainly from the rural areas to urban areas for economic, social and environmental reasons. Natural disasters are the leading cause of severe unemployment problems in rural areas and urban slums; therefore, the displaced people face worsened socio-economic conditions. The displaced people also lose their land and become poorer. (Zaman, 2007, cited in Poncelet et al. 2010, 214).

### **Push and Pull Factor and Migration**

Push and Pull theory recognizes migration as a result of the push and pull factor, where the 'push' factor is motivating people for moving or leaving their places of origin, and the 'pull' factor is attracting people to a certain other places (Portes, 1995). The result forces people to migrate to an environmentally stable place (Plurel, 2010). Factors such as the demand for labor, availability of employment, high wages, and access to resources are considered as the pull factors that attracted vulnerable people to migrate from environmentally stressed areas (IMI, 2010, 7). A discussion to determine the possible protection that should be granted to the people when they are in these vulnerable situations, and the responsibilities of the respective governments and the international community to provide such protection (Piguet, 2011). As per Lee (1966, 51), in his attempt to elaborate on the schema of migration beyond economic motivations, has included other factors which he labels push and pull factors. Environmental degradation leads to population growth or the growth of population accompanied by poverty considered is to be key push forces that increase the number of environmental refugees. Other forces i.e. the pull forces of cities or earning opportunities have the abilities to change the movements of migration and the destination of immigrants (Kliot 2004, 78).



**Figure 2: Basic concept of the study**

### **World System and Climate Change**

Wolf (1982) pointed out that for a long time world had been what Immanuel Wallerstein has characterized as, a “periphery” in the world system, whereas the dominant “core” areas had been in the Middle East and Asia. When the Portuguese seized the port of Ceuta on the African side of Gibraltar and invaded the North African coast, the south Atlantic invited further exploration. They made settlements all along the western coast of Africa, and in 1497 Vasco da Gama went to East Africa and India Just five years earlier Columbus had sailed in the opposite direction arriving to the Caribbean. (Wolf, 1982: 129). Wolf (1982) in his book emphasizes that societies, cultures and environments not fixed entities, but rather ever changing elements of an interconnected world system. Throughout Wolf’s global environmental history it is possible to recognize all three modes of production; their coexistence and overlapping. An element which seems to have been linked to societies operating under all modes of production are the merchants. Somehow, they seem to have been the key link between all the different cultures and societies that existed, making it possible for tributary rulers to enjoy prestige goods produced by kin groups on the other side of the world (Wolf, 1982: 257-258). The one and only option is the migration for the people who lost their land because of the river erosion or other environmental degradations. Global environment problems have been so established as to screen the fact that the local globalization is responsible for the destruction of the local environment thus making earning livelihood difficult in these respected locales. The structure has become a political device because not to free the leading damaging forces operating by the world –wide but also putting fault and responsibility for all devastation on to the respective societies that have no global reach (Marie A.Mater. 1999, 76). Moreover, Sjaastad (1962) used what he called human capital in his early work to explain internal migration as well as international migration (Cited in Mikkonen,

2011, 20). Sjaastad has shown the individual migrates in order to maximize the present value of lifetime incomes and utility (Mikkonen 2011, 20). Coastal people who are affected by the environmental destruction choose an area to migrate in consideration of earnings potential.

### **Changing Society and Climate**

Gare (1995) stated that “humanity is in a war for survival, a war in which all nations must be allies. This implies that gaining universal recognition of a global environmental crisis is critical and that there should be cooperation to achieve a consensus on it” (Gare, 1995: 73). (Gare, 1995) The history, environment and nature were always there but the description was different. It was formerly related only with nature, then it went into other species and nature and then human and nature. For example the idea of “nature has to be managed” (Worster, 1977) is anthropocentric because it focuses on human involvement to achieve the other species from the nature. From Marxist point of view, environmental economics tries to solve environmental problems through the addition of the principle modes of production, are responsible for a global environmental crisis. The Marxist system says ‘capitalism’ is where things are by exchange and monetary value. (Gare, 1995), labor power is considered capital here and market is dominated.

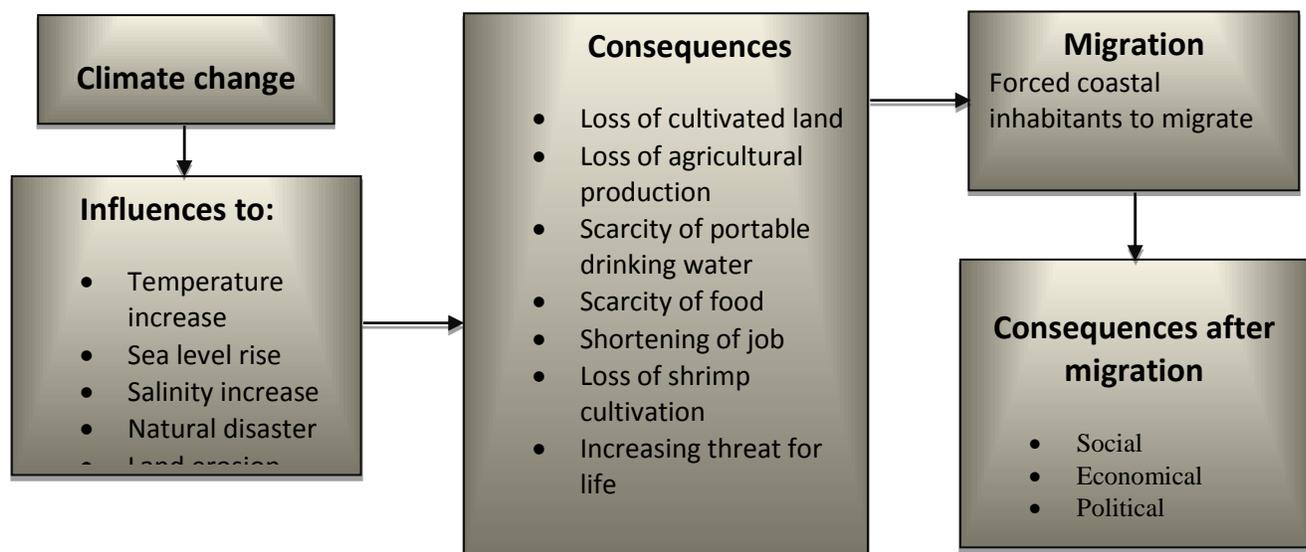
Marx in his Economic and Philosophical Manuscript pointed out that ‘the material of nature transferred into the human organism’ (Marx in Economic and Philosophical Manuscripts [1844] quoted in Gooch, 1998:4). It declares that man is a part of nature that nature is an inorganic body and they have continuous interchange (Gooch.1998) as Gooch(1998) took the example from the Van Gujjar, where they meld natural environment with interaction, like trees or grass transformed into milk, which is for Gooch(1998) related to Marx’s term praxis. Changes in geographical environment of significance require millions of years, but a few hundred or a couple of thousand years are sufficient to important changes in the system of human society. (Chakarabarty. 2007:204). But in currents time scholars’ writings on the recent climate change crisis are somewhat different. Climate scientists posit that the human being has become something much larger than the simple biological agent that he or she always has been. Humans now wield a geological force. We have changed the chemistry of our atmosphere, causing sea level to rise and melting ice in polar areas causing, and changes in climate. (Crosby, 1995)

## DISCUSSION

### Climate Change and Forced Migration

Climate has been changing in Bangladesh during the last several decades and temperature increases, during the monsoon and pre-monsoon seasons is common, each year; leading to increase in salinity, sea level rising, increased land erosion and natural disasters. Ultimately, these climate changes lead to massive loss of cultivated land, reduction of agricultural production, scarcity of portable drinking water, food scarcity, loss of shrimp cultivation, increased threat to life, unemployment etc. The following section will describe how environmental factors play an important role in people migration. Some people stay within the areas of environmental disaster prone areas, while others choose to migrate elsewhere within the country. Some people are forced to move, but most often decisions are based on a range of factors, such as; economic, social and environmental – with individuals, households and communities actively trying to minimize the risks and maximize the benefits of migration (IOM, 2010, 8-9).

The present selected study area, Debhata, as well as the coastal areas of Bangladesh is more vulnerable to be affected by the disaster. As a result, people of these areas are forced to migrate to the other places of the country. The conceptual framework of how climate change is forcing coastal people to migrate is shown in figure3.



**Figure 3: A general overview of forced migration regarding to the climate change**

### **The Impact of Natural Disasters**

Several natural disasters have occurred regularly last couple of decades in the coastal area of Bangladesh including Debhata Upazila; forcing the people of this area to migrate to other areas within Bangladesh. Some natural disasters in this area due to climate changes are described below:

### **Flooding of Low Lying Areas**

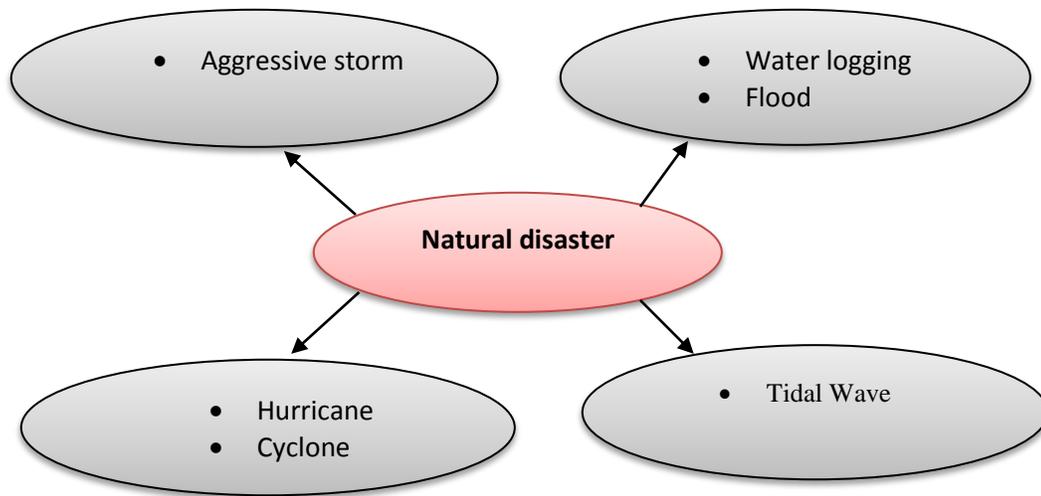
Bangladesh receives huge quantity of runoff from upstream waters due to its geographical position. There are large rivers like *Meghna*, *Padma* and *Brahmaputra*, originating in the Himalayas and emptying in the Bay of Bengal, passing through the country. The melting of glaciers in the Himalayas saves the rivers in Bangladesh from drying, during the summer (May to August). But during the rainy season, it is greatly increased by monsoon wind from the South-West causing great precipitation. The collective outcome of precipitation, upstream flows and terrestrial run-off causes water-logging, over-flooding, land erosion with prolonged floods. These lead to disastrous consequences causing loss of lives and livelihoods (Ahmed & Neelomi, 2008, 2,) (Bangladesh State of the environment, 2001). As per the quantitative data from UNDP (2004), Bangladesh tops the list of countries affected by tropical cyclones and stands 6<sup>th</sup> among the countries which are affected by floods.

**Table 1: Most vulnerable countries for floods and storms in the world**

1	Venezuela	4.9		1	Bangladesh	32.1
2	Afghanistan	4.3		2	India	20.2
3	Pakistan	2.2		3	Philippines	8.3
4	China	1.4		4	Honduras	7.3
5	India	1.2		5	Vietnam	5.5
6	Bangladesh	1.1		6	China	2.8

**Source: UNDP (2004)**

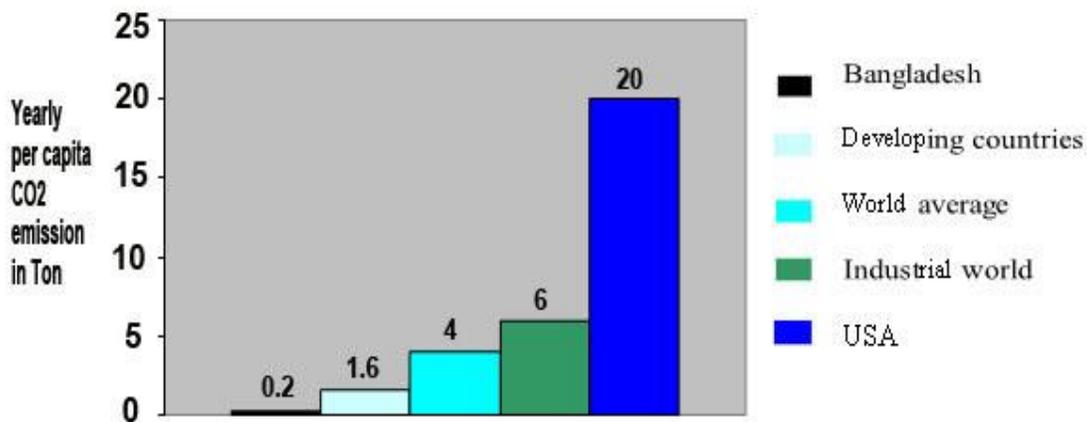
During pre-monsoon and post-monsoon seasons, the whole coastal region faces aggressive storms and tropical cyclones. For this reason, the coastal zone of Bangladesh could be considered a geographical 'death trap' (Bangladesh State of the environment, 2001). Various types of natural disasters affecting the coastal livelihood are shown in the figure below:



**Figure 4: Different Kinds of Natural Disasters facing by the coastal inhabitants**

**Temperature Increase in Bangladesh**

World temperature has increased the last century. The developed countries are more responsible for the increasing of temperature through CO<sub>2</sub> and greenhouse gas emission; those affected are mainly developing and under-developed countries. Another important reason of increasing temperature, especially in developing country like Bangladesh, there is the high rate of deforestation. In addition, the present economics of every country is more dependent on its industries i.e. garments, food, electrical, mine and electronics industry. As a result, every day; a large amount of carbon dioxide emission occurs; increasing the temperature of the globe and worsening the ecological imbalance. From the following figure 5, it is easy to understand a comparative regional scenario of carbon dioxide emission.



**Figure 5: Worldwide per capita carbon dioxide emission (NAPA, 2002, cited in Sarwar, 2005)**

From the dialogue of the National Adaptation Programs of Action (NAPA, 2002), it is shown that per capita of carbon dioxide emission in Bangladesh is 0.2 ton per year. It's also shows that the emission of carbon dioxide per capita for the developing countries, world average, industrial world and United State of America (USA) is 1.6, 4.0, 6.0 and 20.0 ton respectively (shown in the figure 6) (Sarwar 2005,10). When USA is solely providing 23% of the total fossil-fuel carbon emission to the atmosphere, then the OECD countries are responsible for the 44% of the total CO<sub>2</sub> emission. But, Bangladesh is contributing only 0.06% of the total CO<sub>2</sub> emission (Warrick at el., 1993). It also stated that the temperature of the globe is significantly increasing and the land region is increasing faster than that of the ocean. From the observation since 1961, it has been shown that the usual temperature of the world ocean increased at least to its 3,000 meter and over 80% of the ocean heat is being added to the atmosphere (IPCC, 2007). All these factors play an important role in increasing environmental disaster .All the coastal areas are impacted from the bad effects triggering environmental migration in the coastal areas of Bangladesh.

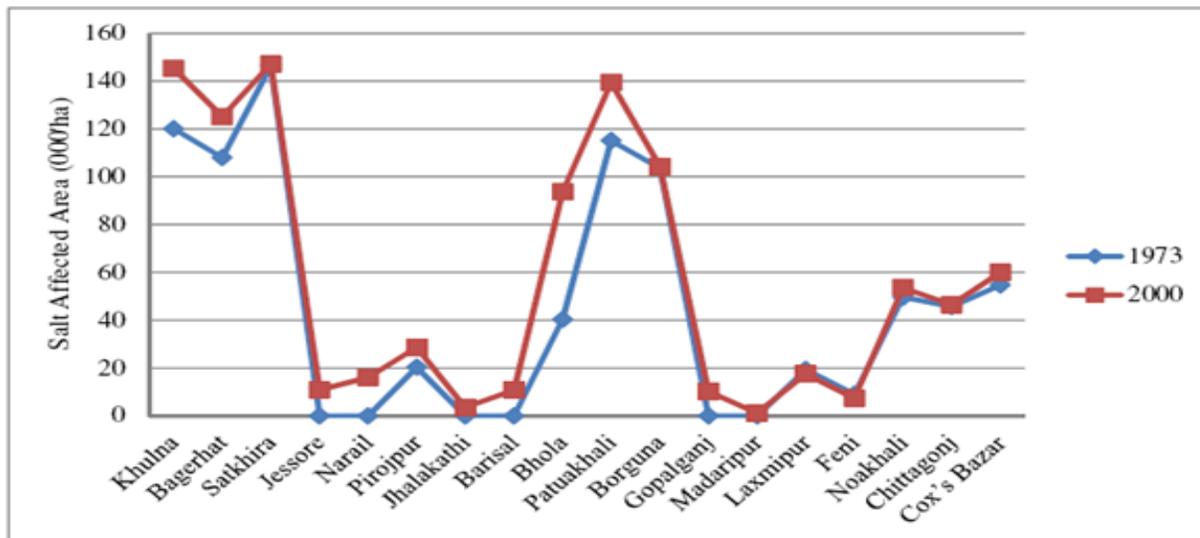
### **Sea Level Rise**

Bangladesh is the most vulnerable country the sea level rising because of its huge population along the coastal area (Brammer et al., 1993). According to the World Bank's report (2000), 10 cm, 25cm and 1 m sea level rise by 2020, 2050 and 2100 will submerge around 2%, 4% and 17.5% of total land respectively. Carbon dioxide (CO<sub>2</sub>) and other greenhouse gases are increasing in the atmosphere causing climate change from these various human activities. Volume of the water in ocean is increasing two ways in the following. First, temperature increase is causing the melt-down of a large volume of ice in the polar region. Second, this has caused the thermal expansion of water of the ocean. The main human activities responsible for global warming and sea level rise are use of fossil-fuels and deforestation. According to Miller (2004), since 1980 there has been 75% human caused carbon dioxide emission increase due to the fossil fuel burning and the consequences of the deforestation, cultivation, and other human activities that change the use of land for different purposes. Presently, two largest contributors of carbon dioxide emission are the thousands of coal-burning power plants and industries and more than 700 million gasoline-burning motor vehicles where 555 million of them are cars. Carbondioxide emissions by the U.S. coal burning power and industrial plants exceeded the collective carbon dioxide emissions by the 146 nations, which contain seventy five percent of the world's population (Miller 2004 cited in Sarwar 2005, 10). So, as a small nation, Bangladesh is playing an

insignificant role in increasing greenhouse gas emission. On the other hand, this country is affected acutely by these consequences in general and coastal areas are affected greatly, in particular. As a result, the size of immigration is increasing primarily from this coastal area. UNEP (1989) predicts a 1.5 meter sea level increase in Bangladesh coast by 2030. As a result, around 22,000 Sq. km of land will be covered by sea water which is the 16% of total landmass, affecting 17 million people living in this area, amounting about 15% of its total population. When it was predicted in 1989, the anticipated pace of sea level rise has been tailored because of the uncertainty. Now at the estimated rates, this condition will occur in about 150 years later from now. However, the number of the probable 17.5 million inhabitants will be affected by the projection of World Bank due to one meter of sea level rise and that of UNEP by 1.5 meter sea level rise (Sarwar 2005, 12). Thus, the coastal area like DebhataUpazila will be affected severely by the increasing of sea level. First, low-lying land is inundated by sea water which leads to a decrease of cultivable land, causing the scarcity of food and portable drinking water in the coastal areas. People are losing their shrimp farm due to the sea level rising; plus many other difficulties for the inhabitants of the DebhataUpazila. These are reasons compelling people to migrate from the coastal area.

### **Salinity Intrusion**

The principal hindrance to the increase of crop production in the coastal area is due to the high content of salts in the soil during the cultivation seasons. Generally, salts enter into the soil through canals and rivers during the end of the winter season, because during this time, the downstream flow of the pure water is lower. The salinity of the river water increases during this period. The salts enter in the soil because of the water leakage from the river or flooding with saline water and the salt becomes more concentrated on the upper level of soil due to the evaporation of water. This saline river water is also increases the salinity of the ground water; making it inappropriate for the irrigation of our paddy crops. The summary of the salinity increase is shown in figure 7.



**Figure 7: Salt affected coastal area 1973 to 2000 (SRDI, 2003)**

Approximately, 75 % land area of Satkhira district is affected by soil salinity (SRDI, 2003). The present study area Debhata Upazila is also in this district. So, it can be easily assumed that most of the land area of Debhata would also be affected by salinity. This soil salinity leads to lessening of food in the coastal area. It also decreases the terminative energy and the germination rate of some plants (Rashid et al., 2004; Ashraf et al., 2002). According to the World Bank reports (2000), increased salinity only from a 0.3 meter sea level rise is destroying rice production by about 0.5 million metric tons. Sea-level rising is also affecting the agriculture production in the coastal area, mainly the rice production in two specific ways. First, increased salinity of the soil and reducing the soil quality and thereby, reduction of or inhibiting the rice production in coastal area. Second because with increased salinity; many shrimp cultivating ponds are created by converting the agricultural land and thus, total crop production declines.

There is a growing awareness amid the investors of climate change and its consequence as they related to the southern coastal parts of Bangladesh. The study area Debhata, Shatkhira is the hot coastal spot in Bangladesh. Various climate change factors are affecting on the studied area. It takes time to evaluate the impact of climate change and to discover necessary preventive measures to cope with this Climate change. Deforestation causes severe erosion and increase the probability of climatic disasters like hurricanes and frequent torrential rainstorms. Half of the mangroves are considered endangered. Mangrove loss occurs due to the clear cutting and changing hydrology which is connected with recovery for aquaculture and coastal improvement.

The threat from rising sea levels putting land under the sea water and increasing salinity of the soil is causing trees and plants to die. Local people are equally responsible for shrinking the mangrove forests.

## RESULTS

In this section, illustration of empirical data and consequences of environmental migration are shown to fulfill the study purpose. There were various studies which attempted to discuss the post-migration consequences having an impact on the coastal people of Debhata Upazila. For a clear understanding these findings are discussed below. After analyzing and interpreting the collected secondary data under sub-headings (i.e. social, economic, political therefore, it was determined there exist four types of consequences mentioned below that affect the migrated people of today.

### Economic Consequences

**Table 2: Number of affected people of Debhata Upazila**

Satkhira	Total population of Satkhira district (2011 census)	Upazila are as affected	Total population of affected Upazila(2011 projection)	Population affected	Affected population as a % of total population of Upazila	Upazila statistics for education facilities fully or partially damaged
Satkhira	1,973,000	Assasuni	326729	127,850	39.13%	111
		Tala	329085	225,400	68.49%	57
Satkhira		Kalaroa	247704	89,164	36.00%	24
Satkhira		Sakhira sadar	458702	220,600	48.09%	37
Satkhira		Debhata	132958	72,500	54.53%	7
Total	1,973,000		1,495178	735514	49.25	236

**Source: Disaster Management Bureau (DMB)**

According to the Bangladesh bureau of statistics (BBS) Debhata Upazila is the area of greatest impact as far as the percentage of total affected population is concerned. Coastal people are severely affected economically after migration. From these studies, it can be established that the migrant people in the new area are considered as intruders to economic access. These environmental migrants became burdensome to the economic and resource base of the host

area. As a consequence they have to face competition over resources. In this struggle they are unable to survive because they lack skills and other abilities as most of the coastal people are illiterate and unskilled. Moreover, most of them were involved in fishing and cultivation at their native place before migration to these unfamiliar places i.e. cities or border areas. Unemployment is very common scenario among these migrated people. (Reuveny, 2007).

The impact of climate change is crucial to Bangladesh because 35 percent of the GDP and 63 percent of the labor comes from. The Agriculture sector in Bangladesh is facing massive pressure due to increased demand for food due to the severe, reduction of cultivated land and scarcity of water from overuse and pollution. Climate inconsistency and probable worldwide climate alteration makes this subject vital. The salinity level in the soil is also dramatically increasing. As a result, the lands of coastal area (Debhata Upazilla) are losing their fertility and production of agricultural products is dropping, creating less food and loss of jobs creating impossible living conditions. These those people are being forced to migrate from this coastal area to other places like Satkhira, Dhaka, and Khulna etc. in order to improve their chances to make a living. Migrated people also face other problems to a new area. The unknown and uncertainty are considered as a big problem. The host society considers the migrant out-siders. Most of these costal people usually migrate to the slums of nearby city, railway station, hilly areas and border area. The amenities of all these areas are often limited. As a result migrant success to opportunities is greatly diminished directly and indirectly. In many cases these awkward situations give rise to violence between different groups. This is also fueled by differences in i.e. political, religious, regional, ideologies etc. As a result several types of social disorders are created from this situation. For lack of occupation some people get involved in unethical practices. Thus, different types of crimes i.e. robbery, corruption, hijacking, human-trafficking, illegal drug-trade etc. become a common negative scenario among these migrated people (Ericksen et al 1997).

**Table 3: Economic consequences after climate change affected Satkhira District & Debhata**

Serial No	Upazila Name	Affected family (No)	Damaged House (No)	Partially Damaged of House (No)	Damage of Livestock (BDT in Thousands)	Damage of poultry (BDT) in Thousands	Damage of crops (BDT) in Thousands	Damage of Shrimp farm (BDT) in Thousands	Provisional Camp Family
1	Tala	52902	19328	12500			11571/537960	18364/509562	101/10012
2	Satkhira Sadar	43900	4100	14700	30510/5530	35421/2000	10868/321120	16599/611956	68/8096
3	Kolaroa	22420	28	1540			3038/6900	776/93120	08/156
4	Debhata	24335	552	3200	335/705	15000/1500	395/9402	7954/8845	31/4322
5	Assasuni	26382	865	2975		89/28	5180/883320	13400/125001	44/1630
6	Kaliganj	11300	780	5700	72/176	12000/1440	203/8736	8400/10850	
7	Satkhira Municipal	16500	1560	2475		375/70	1600/44800	1200/162000	36/3600
9	Total	197739	27213	43090	30917/6411	62885/5038	32855/1017238	66693/1521334	288/27816

**Source: UNDP (2011)**

### **Social Consequence**

All the above data shows that Debhata is one of the most severely affected areas of climate change in the Satkhira district. This has caused destruction and created deficits in many different sectors like Housing sector, educational institutions, Agricultural land and raising crops in Debhata Upazila. An end result is that coastal people suffer from lack of work and the ability to create a livelihood, thereby forcing them to migrate in new place. Wherever these environmental migrants settle, food and labor undergoes increased pressure and consequently adds to the local demand for food and other basic necessities. It is a real tragedy, that everyone has a history of his own misfortune. River erosion reduces the people's property in a very short time. Where once

they had ample wealth, after river erosion they now become destitute. (Ericksen et al 1997, World Bank, 2010, Azam, 2011).

Those sorts of natural disaster are making their life hard and the common people of Debhata Upazilla go to sleep with this threat over their lives. These unfortunate situations lead them to dream of a normal life. The coastal inhabitants are therefore migrating and trying to establish themselves in other safer places where they will not face these kinds of natural disasters. Another large social consequence is seen in the education sector. The impact on education can also be direct or indirect. Floods and cyclones often cause schools to remain closed for months which also create communication problems for children. Many educational institutions become badly damaged by cyclones, tidal-waves and other environmental disasters. As a consequence education is severely affected. (World Bank, 2010, 37). In Bangladesh education is considered as an opportunity rather than a human right. This is because the number of our educational institutions is much less than the demand. In most cases there is fierce competition to be admitted into the educational institutes. In conclusion students who belong to these migrated families do not get the chance for admittance education institutions in the new place. They must relevantly accept the misfortune of being illiteracy.

One more significant social consequence for environmental migrants exists in the health sector. In general our overall health facility is subpar. Coastal people are deprived basic health facilities as these areas are considered as remote. There is a lack of infrastructure development as well as resources (World Bank, 2010). Often, the new places where they have been migrated to are also subject to health related problems as these areas are often also underdeveloped. Human health therefore often suffers from different climatic variability's and receives shocks in different ways. The study revealed that health is affected, especially during and after catastrophes like floods and cyclones. Slums often spring up in affected areas along drains, around garbage dumps or adjacent to ditches or flood-prone areas. The health and hygienic condition of these areas is terribly lacking. Living conditions in these areas are difficult, and the unavailability of alternatives compels people to migrate and live elsewhere. Floods affect sources of drinking water and sanitation system through contamination which lead to outbreak of diarrhea, cholera, skin diseases including scabies, drowning, mental disorder and dengue etc. ( Rhaman 2008,20, climate change cell 2009, 30,). Moreover, Cyclone, sea level rise and salinity intrusion often

causes outbreaks of diarrhea, cholera and other water borne diseases, use of saline water causes hypertension, increase blood pressure, corrosive effects due to salt in air, scabies and other skin diseases. Besides that, drought, erratic rainfall and temperature variation increase vector borne diseases, heat stroke, malnutrition (Rhaman 2008, 19). In addition, cold wave creates respiratory problem, especially that of children and the old, we can see on table 4.

**Table 4: Top ten disease chart of Debhata Upazila.**

Total number of admitted patients in 2012	Disease name	No. of Cases
Serial No		
1	Diarrhea	156
2	ARI	32
3	Assault	157
4	Peptic ulcer	109
5	Scabies	18
6	Viral Fever	21
7	Respiratory tract infection	39
8	Myocardial Infraction	60
9	Road traffic accident	118
10	Pain	88

**Source: Ministry of Health and Family Welfare.**

According to the Ministry of Health and Family Welfare (MOHFW, Health Bulletin 2012) Diarrhea is very common disease in Debhata due to supply of impure drinking water. Most of the people use river water during rainy season and other season as well. Women and children are most vulnerable for Diarrhea. Another remarkable disease is pneumonia, which is very common in winter season (MOHFW, 12).

### **Political Consequence**

Politics also plays an important role in environmental migration situation. When people are affected by the environmental devastation, the political leader's role becomes biased. They are more inclined towards achieving their political ambition (Hoorn 2010, 30). As so, discrimination is very common in accessing opportunities. The same condition also happens in the post period of migration. In the new place some people get more facilities than other in consideration of political alignment. In most cases this leads to violence of group versus group conflict (Reuveny,

2007). Cultural conflict between the host society and migrated people also leaves remarkable consequences in the post migration period. When environmental migrants and residents are from different ethnic groups, the migration may promote tension. Due to this the residents may feel threatened, host society may fear separatism, migrants may attempt to reunify with their previous society and permanent residents might respond aggressively. It primarily because of to the difference in language, culture, religious ideology and prejudice. Moreover, some local rules and regulations by the cause barriers for the migrated people to cope with, as all the social matter are not dealt with by the same rules and regulations. There are many differences among local society's rules and regulation and practices (Reuveny, 2007).

Mismanagement, corruption, and other irregularities add further fuel to the fire of complexities, political stability and good governance is important to protect the environmental victims. Thus lives became more vulnerable and ways of earning a living vanish before their eyes. Some resort to earn money by begging or by working as maid-servants to the local landlords. (Center for Global Change, 2008, 33). On one hand it is a matter of social prestige and at the same time it is a question of survival. Often they are treated as subordinates or groups with low status. The assimilation of the migrants in to the new society is not easy in any case, but when it takes place in developing society, the overall situation worsens. Thus the influx of migrants is likely to deplete local food supplies and escalate food prices. Migrants can hurt hosts who depend on labor for all or part of their livelihood, by reducing their opportunities for work and by driving down wages. The most common scenario is that the increased competition for property, resources, water, and grazing areas, forests, is likely to be damaging to the local hosts. At the same time group interests can become a factor leading to violent activities (Ericksen et al 1997, Butz, 2010).

## **SUMMARY**

Though environmental disaster has shaken the world, the world must come under a single umbrella to find a solution, there is very little being done to lessen its devastating impacts as yet. Many reports suggest that within next couple of years many low-lying countries will disappear from the world map. Among these countries, Bangladesh will lose a lot of area including world's largest mangrove-forest Sundarban. Most of the coastal areas of Bangladesh including the research area Debhata are very prone to this environmental disaster. Already they have been roughly affected by many environmental disasters. More specifically the size of land of all

coastal areas is either decreasing or abandoned because of environmental disasters which are resulting into the massive forced migration. The government has taken some measures to protect the environmental disasters.

Many countries who have already adapted to climate change at their national, provincial, state, district and local levels in short, medium and long term stages. Accurate adaption techniques are vital to balance the needs to decrease the impact climate change through the national policy making processes. In 2003, the government of Bangladesh approved a programme named Comprehensive Disaster Management Programme (CDMP) as a key technique to promote government and agency risk reduction activities within the country. The CDPM is following a strategic institutional and programming approach to discuss the risks linked with the climate variability and change. In this program, it attempts to reduce vulnerability from long term climate change by linking livelihood adaptation techniques in the agricultural sectors. Here they give priority towards women and poorer communities for adaptation to the climatic changes among those of the lowest capability. Though the government is considering these issues seriously, its accomplishment is still far off due to the lack of resources to fight it. Mismanagement governmental corruption, political instability, improper planning etc. are careful adding fueling the problem conspicuously. In addition, the government has not drafted any well-established and detailed plan for dealing with environmental migration. Since both governmental and non-governmental organizations should join together come forward to tackle this problem seriously. Consensus among the world communities should be anxiously sought to identify the problems and find solutions.

Together with factors of population growth and urbanization, these environmental events and processes have complex but significant effects on patterns of migration in environmentally vulnerable regions (IMO, 2010, 41). There are many different ways which population migration patterns can be influenced through both gradual and extreme environmental changes. Extreme environmental events force people to leave their homes suddenly in large scale and their returns also causes chaos in the long run. The gradual degradation of environmental conditions is leading large numbers of people to migrate permanently. Migration can be regarded as a multi-casual phenomenon where the environment is the key driver of the migration, and combined by with other factors social, economic, and political and many others. It's very complex to make the

decision about staying or moving since it depends on so many important factors related to resources, social networks and other alternatives to migration. All of those depend on the ability of the individual, society and culture to cope up with and adapt to the climate change like climate shocks or stresses. Environment IS therefore considered a key factor driving migration by many groups of people.

## **RECOMMENDATIONS**

Altogether the factors that have been identified in this study are not adequate to investigate the issue climate change on migration. Further research is needed in some areas. In spite of this there are still sufficient indications existing to demonstrate the value of focusing on environmental migration as it relates national, regional, and international discussions. Systematic migration can contribute to the development of migrated livelihood as well as keeping the environment. It should therefore become a priority issue for policymakers seeking to plan for the challenges of environmental change and human mobility over the coming years. Concerning the climate change issues on migration, proper investment is essential to find policies and programs to protect people from environmental risks, reduce involuntary migration and support displaced human being. As the demonstration illustrated in this study makes clear, planned migration can also be a positive aspect for livelihood and adaptation strategy and there is ample opportunity for supporting innovative ideas and maximizing benefits for individuals, families and even for a whole community. Precisely, a strategic and integration approach is necessary on the national level that forms and strengthens associations between environment, climate change and migration policies and practice, as well as between the humanitarian and development sectors. No doubt about it, each and every government has an important role to play in such migration process and to adapt suitable migration policies to facilitate order and ease the traumatic effects so prevent to day.

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## **APPENDICES**

### **APPENDIX-1: GLOSSARY**

**ABUL MAAL ABDUL MUHITH:** Ministry of Finance, Government of the People's Republic of Bangladesh.

**SIDR:** Known as Super Cyclonic Storm Sidr was the strongest named cyclone in the Bay of Bengal. The Storm eventually made landfall in Bangladesh on November 15, 2007.

**TAKA:** Bangladeshi Currency, 1 USD 77Taka (24 March, 2013)

**UPAZILA:** An administrative area composed of several unions. Several Upazilla combined together form a district (Zila)