Trend and Impact Analysis of **Internal Displacement** due to the Impacts of Disaster and Climate Change




June 2014

Study Report

Comprehensive Disaster Management Programme (CDMP II)
Ministry of Disaster Management and Relief

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Conducted by

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Message

Historically, Bangladesh is a disaster prone country and every year suffers from innumerable natural disasters. It is predicted, in the changing climate, the country may even suffer more natural disasters.

As a low lying country and with a considerable stretch of coastal lines, climate change impact especially sea level rise could result in displacement of millions of people. Other natural disasters, such as cyclone, tidal surge, salinity, flood and river bank erosion may also displace millions of people in Bangladesh in the coming decades.

Globally, it is predicted several hundred million people may be displaced by 2050 due to climate change impacts. As a result the issue of climate change induced migration has got wider global attention.

I am pleased to know that Comprehensive Disaster Management Programme (CDMP II) commissioned a study, entitled, 'Trend and Impact Analysis of Internal Displacement due to the Impacts of Disaster and Climate Change' to understand the trend of internal displacement due to the impact of disaster and climate change, which was conducted by Centre for Environmental and Geographical Information Services.

I firmly believe, the study findings will improve our understanding of the issue of Internal Displacement in the country and will also add value to the existing knowledge products on climate change and disaster.

Mesbah ul Alam

National Project Director
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Foreword

The impact of climate change is increasingly felt over the globe in recent times. In Bangladesh the impact is even worse due to its geographical location, flat topography, reliance of huge population on agriculture and low level of socio-economic development.

In recent years Climate Change induced migration has got immense importance as one of the major consequences of climate change impact, which is considered the most challenging issue to be addressed in the future at a global scale. In Bangladesh, the issue of internal displacement or migration is considered one of the major challengesBangladesh is going to face due to its huge population living in hazard prone areas. To better understand the issue of internal displacement or climate change induced forced migration, Comprehensive Disaster Management Programme (CDMP II) awarded Centre for Environmental and Geographical Information Services (CEGIS) to conduct the study entitled, "Trend and Impact Analysis of Internal Displacement due to the Impacts of Disaster and Climate Change".

The study has considered four disasters as the main drivers of internal displacement - flood, river bank erosion, water logging and salinity. The study has categorized the studied households into four segments such as; (I) never displaced; (II) temporarily displaced; (III) in between temporarily and permanently displaced and (Iv) permanently displaced.The study tried to analyse the trend of internal displacement for the four considered disasters. The study further identified the impact of disaster on household size, education, occupation, livelihood, health, household income, savings, access to social amenities etc. Finally the study has suggested Strategic Plan and Institutional Framework for Internal Displacement management.

I believe, this study will contribute to the existing national knowledge pool on climate change and will be an important document for Policy makers, planners and government officials to take appropriate decision whether to relocate the vulnerable population to new places or retain them in their ancestral home through enhancing their resilience.

Mohammad Abdul Qayyum

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CDMP expresses its respect to the local people who were involved in sharing their perceptions and experiences to the study team. Lastly, CDMP salutes the displaced peoplewho are living in the vicious cycle of poverty and livelihood insecurity but never give up their will to survive.

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Acronyms

ABM	Agent Based Modeling
ACR	Association for Climate Refugees
ADB	Asian Development Bank
BBS	Bangladesh Bureau of Statistics
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BWDB	Bangladesh Water Development Board
CBOs	Community Based Organisations
CCDPs	Climate Change Displaced Persons
CDMP	Comprehensive Disaster Management Programme
CEGIS	Center for Environmental and Geographic Information Services
CRED	Centre for Research on the Epidemiology of Disasters
CSDDWS	Committee for Speedy Dissemination and Disaster related Warning and Signals
DDCC	District Development Coordination Committee
DDM	Department of Disaster Management
DDMC	District Disaster Management Committee
DFID	Department for International Development
DG	Food Directorate of Food
DJF	December-January-February
DMTATF	Disaster Management Training and Public Awareness Building Task Force
DoE	Department of Environment
DRR	Directorate of Relief and Rehabilitation
DRR	Disaster Risk Reduction
DS	Displacement Solutions
EM-DAT	International Emergencies Disaster Database
FGD	Focus Group Discussion
FPOCG	Focal Point Operation Coordination Group of Disaster Management
GBM	The Ganges, The Brahmaputra and The Meghna
GCM	Global Climate Models
GHG	Greenhouse Gases
GIS	Geographic Information System
GO	Government Organization
GoB	Government of Bangladesh
HH	Household
HIES	Household Income & Expenditure Survey
IASC	International Accounting Standards Committee
ICZMP	Integrated Coastal Zone Management Project
IDMC	Internal Displacement Monitoring Centre
IDP	Internally Displaced People
IDPs	internally displaced persons
IFRC	The International Federation of Red Cross
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
ISDR	Institute for Sustainable Development and Research
IWM	Institute of Water Modelling
JJA	June-July-August
KII	Key Informants Interview
LGED	Local Government Engineering Department

MAGICC	Model for the Assessment of Greenhouse-gas Induced Climate Change
MAM	March-April-May
MBBS	Bachelor of Medicine, Bachelor of Surgery
MCSP	Multipurpose Cyclone Shelter Programme
MoDMR	Ministry of Disaster Management and Relief
MoEF	Ministry of Environment and Forests
MoF	Ministry of Food
NAPA	National Adaptation Programme of Action
NASA	National Aeronautics and Space Administration
NDID	Natural Disaster-Induced Displacement
NDMAC	National Disaster Management Advisory Committee
NGO	Non-government Organization
NGOCC	NGO Coordination Committee on Disaster Management
NRC	Norwegian Refugee Council
NSIDC	National Snow and Ice Data Center
NWRD	National Water Resource Database
OCHA	Office for the Coordination of Humanitarian Affairs
RCM	Regional Climate Models
RPG	Refugee Policy Group
RRAP	Risk Reduction Action Plans
RS	Remote Sensing
RSG	Remote Sensing and GIS
SCENGEN	SCENarioGENerator
SLA	Sustainable Livelihood Approach
SLI	Sustainable Livelihood Index
SOD	Standing Orders on Disaster
SON	September, October, November
SSC	Secondary School Certificate
UDMC	Union Disaster Management Committee
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commission for Refugees
USGS	United States Geological Survey
UzDCC	Upazila Development Coordination Committee
VGF	Vulnerable Group Feeding
WARPO	Water Resources Planning Organization

EXECUTIVE SUMMARY

The issue of 'climate change induced forced migration' has received immense importance in recent discourses. It is evident that the greatest single impact of climate change might be on human migration/displacement. The stern review report on the Economics of Climate Change, have highlighted the potential for additional mass migration as a result of climate change, with estimates ranging from 150-200 million (Stern, 2007) by 2050; according to Christian Aid the figure could go as high as 1 billion (Christian Aid, 2007). If we take the conservative figure, this means that by 2050 one in every 45 people in the world and one in every 7 people in Bangladesh will be displaced by climate change. Although many scholarly articles have warned about future floods of climate change induced migrants but still, no policy measures have been taken. Even the terms and concepts of referring climate change induced migrants are found dissimilar throughout the literatures.Against this backdrop, it is essential to have strategic and contingency plans to help address this emerging issue and recurring socioeconomic problem. In this context, the Comprehensive Disaster Management Programme (CDMP II) has taken an initiative to carry out an in-depth assessment and analysis of the trend and impact of population displacement due to disasters and climate change. Amongst several, four disasters such as riverbank erosion, floods, salinity and water logging have been selected as the main catalysts behind internal displacement.

The magnitude and intensity of the selected disasters have shown diverse characteristics. Flood is a very common disaster in Bangladesh, as the country has already faced devastating floods in previous decades. Floods affect up to about 80% of land of the country. In a normal year, 20-25% of the country is inundated by river spills and drainage congestion. Riverbank erosion also occurs at an alarming rate. It is estimated that the annual rate of erosion will increase 9% in the next 50 years and 18% in the next 100 years. Due to perpetual siltation in the rivers and as a consequence of unplanned development interventions on the river system, long-lasting water logging in human settlements has become a major issue for Bangladesh. Heavy rainfall in the country during monsoon may not cause floods but it triggers massive water logging problem in the coastal districts namely Satkhira, Jessore, and Khulna, causing massive displacement.

The Multi-stage Random Sampling technique was selected for conducting the study. The stages included the selected severely hazard prone districts, respective upazilas, unions, villages and the ultimate target households.

One upazila from each of the selected districts and subsequently one union from the respective upazilas were selected based on set criteria. The number of villages under the selected unions was one or more depending on the availability of the required number of sample households for conducting the study.

The Simple Random Sampling was followed for identifying the sample respondent households (never displaced, temporarily displaced, and in-between temporarily and permanently displaced) from the selected villages (places of origin). The permanently displaced households were identified using the Snowball Sampling from the place of destination. Male and female respondents were selected from the sample households proportionately following the male and female ratio of the country. Only one respondent, either male or female, was interviewed from each of the sample households from places of origin and places of destination.

The sample size for the household survey in places of origin was 816 HHs in nine districts. The sample size for places of destination in the same 9 districts was 25% of that for the places of origin (i.e. 204). The locations of the permanently displaced households were collected from the places of origin, where they were no longer present. For identifying the households in the places of origin 14 unions were covered and for identifying permanently displaced HHs at the places of destination 27 unions were covered. As per statistical obligation, a total of 1020 households needed to be surveyed. However, 94 households from places of destination were dropped since they could not be located. Thus, a total of 926 households (816 in places of origin and 110 in places of destination) were considered in this study.

The study has categorised the studied households into four segments such as, i) never displaced; ii) temporarily displaced; iii) in-between temporarily and permanently displaced; and finally iv) permanently displaced. The never displaced category includes households that are located in hazard-prone areas, frequently encountering distress situations but are never pushed to be displaced.Instead, they adapt/cope with the situation and are more resilient than the other types of households. The temporarily displaced category includes those households that tend to be displaced during the onset of disasters. These households are displaced temporarily to neighbors' and relatives' houses, adjacent elevated roads preferably on embankments, nearby shelters and other sustained structures, and return to their original habitat when the situation improves. The maximum staying duration of this category is 6 months in a year. The category in-between temporarily and permanently displaced includes those households that were displaced to adjacent areas but are not settled permanently; rather they tend to be displaced again and again. On the other hand, the permanently displaced category includes those households that are displaced permanently to distant locations presumably safe from the selected disasters. These households have little or no chance of becoming displaced further.

By fitting the surveyed households into the mentioned designated categories, it is found here that about 13% belong to the never displaced category, about 46% belong to the temporarily displaced category, about 29% belong to the in-between temporary and permanent category and about 12% belong to the permanently displaced category. It is evident that the rate of either temporary or permanent displacement is comparatively higher than that of never displacement. This shows that people living in disaster-prone areas are somewhat more vulnerable and pushed to become displaced either temporarily or permanently.

In the baseline situation of internal displacement, it has been found that about 62% of households in the study area were displaced temporarily and only 0.4% of households were displaced permanently due to floods. On the other hand, about 38% of households have no experience of displacement and have little or no intention to move. In the case of riverbank erosion, it has been found that about 20% of households were displaced permanently and only 1% had no experience of displacement. However, a different type of displacement was found in the case of riverbank erosion i.e. about 79% of households belonged to the 'in-between' temporary and permanent displacement category. On the other hand, in the case of salinity ingress about 14% of households were displaced permanently, about 82% of households were displaced temporarily and about 4% of households, although living in salinity intruded areas, had no experience of either permanent or temporary displacement. In the case of water

logging, about 13% of households were displaced permanently, about 84% of households were displaced temporarily and about 3% of households, although living in waterlogged areas, had no experience of either permanent or temporary displacement.

Trend analysis of internal displacement is very difficult since no data are available on this issue. In this section, some year-specific values have been considered estimating household responses in terms of experience of displacement in the previous years. These distributions have been made among only either temporarily or permanently displaced households through out their lifetime. This is nothing but a method of history recalling. It should be mentioned here that although the interviewed people were able to recall the events of several years from the earliest past, the study considered only the recent past since it was a more reliable account of what was recalled. Furthermore, the displacement rate of some years was estimated when catastrophic natural events had taken place. This past trend was assessed based on the details of those events remembered by victims.

Since there is no concrete policy or legislative guideline for internally displaced persons in Bangladesh, it is necessary to take essential steps to prepare policy directives. The directives on internal displacement will open an opportunity to bring together all relevant stakeholders to consider the role that each should play in protecting the rights of displaced populations. Based on the findings of this study, some strategic plans and institutional frameworks have been developed here for internal displacement.

CHAPTER 1

Introduction

1.1 Background

The issue of 'climate change induced forced migration' has receive immense importance in recent discourses. It is evident that the greatest single impact of climate change might be on human migration/displacement; an development estimation of the IPCC First Assessment Report 1990 (IPCC AR1) predicted migration of 150 million people by 2050. More recent studies show an even more terrifying figure of climate change induced migrants: a ten-fold increase from today's entire population of documented refugees and internally displaced persons (IDPs). This means that by 2050 one in every 45 people in the world and one in every 7 people in Bangladesh will become displaced by climate change. Although many scholarly articles have warned about future floods of climate change induced migrants, no policy measures have yet been taken; even the terms and concepts referring to climate change induced migrants are found dissimilar throughout the literatures(Shamsuddoha, & Chowdhury-2009).

Against the backdrop of displacement in the country, it is essential to have strategic and contingency plans to help address this emerging issue and recurring socioeconomic problem. An in-depth assessment and analysis of the issue will reveal the potential impacts and future trends of internal displacement. Although much has been discussed about internal migration/displacement and its socio-economic implications, it is still important to undertake thorough investigations of climate change induced hazards and their social, economic, and environmental consequences. There have been studies conducted on the impacts of disasters and displacement as well as their social and economic and other dimensions. However, exploring and predicting future trendsstill remain critical for providing policy makers with appropriate inputs and recommendations to enable them to formulate new strategies to tackle the emerging problems.

In this context, the Comprehensive Disaster Management Programme (CDMP II) took the initiative of having an in-depth assessment and analysis carried out regarding the trends and impacts of population displacement due to disasters and climate change. Amongst several, four disasters such as riverbank erosion, floods, salinity and water logging were selected as the main catalysts behind internal displacement.

It is known that the issue of 'internal displacement' is multifaceted and many organisations work on its different aspects. As per its mandate outlined in the Standing Orders on Disaster (SOD), the Ministry of Disaster Management & Relief (MoDMR) is responsible for assessing the risks and vulnerabilities in order to prepare Risk Reduction Action Plans (RRAP) and their implementation strategies. The Disaster Department of Disaster Management (DDM) is conducting research on climate change effects and the coping mechanism for any new hazard. The National Plan for Disaster Management (2010-2015) is analysing the impacts of natural and man-made disasters including climate change, on people and society as well as economy and infrastructure, with a view to identifying the locations and seasons that these threats are likely to occur along with the frequency of occurrence. The CDMP-II project document exemplifies how to prepare a draft contingency plan to address climate change induced internal displacement or migration.

A number of terms and concepts such as "environmental or climate change migrants", "environmentally induced or forced migration", "ecological or environmental refugee or climate change refugee", and "environmental displacement" are used in literature. However, there is no generally agreed definition on environmental displacement to pinpoint the issue. This study uses the definitions put forward by the Internal Displacement Monitoring Centre (IDMC), Internally Displaced People (IDPs) are defined as: Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of origin in order to avoid the effects of armed conflict situations of generalised violence, violations of human rights or natural or manmade disasters, and

who have not crossed an internationally recognised state border. David (2004) defines environmental displacement as persons who are initially forced to migrate due to environmental effects. It is assumed that in Bangladesh, a huge population movement may occur in the future as it is one of the countries that are most vulnerable to climate change. It is hard for Bangladesh to handle such an enormous problem alone, as developed countries are mostly responsible for this crisis.

Climate change is a global phenomenon. Therefore, environmental displacement is not only a national problem but also an international one.

CDMP-II intends to reduce the country's climate related vulnerability to the effects of natural, environmental and human induced hazards to a manageable and acceptable level. CDMP-II has been scaling up activities of CDMP-I over the period of 2010-2014, with a view to achieving outcome in six areas: 1) professionalising the disaster management system through policy, training and education support; 2) rural risk reduction through structural and nonstructural interventions; 3) urban risk reduction through vulnerability mapping, contingency planning and risk reduction measures; 4) early warning and emergency response preparedness; 5) capacity building for mainstreaming DRR across 12 development ministries through policy and piloting initiatives; and 6) generate knowledge and information on climate change impacts, adaptation and livelihood options. This information are useful to the community people for risk analysis, policy makers, as they can better assess the level of community risk and devise better adaptation strategies and plans.

In the case of Bangladesh, there are mixed features of displacement ranging from those being displaced temporarily during the onset of disasters; those who are displaced and unable to return to their place of habitual residence that has been ravaged by disasters; to those who migrated in distant locations with little or no intention of returning. Against the backdrop of displacement in the country, it is essential to have strategic and contingency plans to help address this emerging issue and recurring socio-economic problem. An in-depth assessment and analysis of the issue will reveal the potential impact and future trend of internal displacement. Continuous occurrence of natural hazards and resulting displacement but no central repository of data information lay down the basis for contingency planning and prediction of more trends on internal displacement.

1.2 Objective of the Study

The overall objective of the assignment has been to carry out an in-depth assessment and analysis of the trend and impact of population displacement due to the impact of disasters (riverbank erosion, inundation, salinity and water logging) and climate change.The specific objectives of this study have been to -

- Develop a database on internally displaced people, disaggregated by gender, age and other relevant characteristics, due to riverbank and coastal erosion, salinity intrusion, inundation, and water logging over the designated period of time (1981 - 2011).
- Analyse the social, economic, environmental, and other impacts of internal displacement on the directly affected population and the receiving / hosting communities.
- Investigate the destinations of the internally displaced people and their conditions.
- Prepare the trend of population displacement in terms of prevalence, incidence, and options for durable solutions (up to 2030 or beyond).
- Make recommendations for institutional/strategic/contingency plans for handling internal displacement and the potential for generating a local level trust fund along with a pilot demonstration on adaptive social protection for the internally displaced people.

1.3 Scope of Work

As mentioned earlier, the study has aimed to carry out an in-depth assessment of the trends and impacts of population displacement due to the impact of disasters and climate change. Therefore, the study has covered the following features:

Table 1.1: Delineation of major scopes and tasks of the study

Scopes	Major tasks
Literature Review	Review of ▪ CDMP project document ▪ Concept note on internal displacement ▪ Updated literatures and secondary reports related to climate change, migration and displacement
Methodology Development	▪ Determining indicators to measure climate change, disasters and internal displacement and showing the interactions between them
Situational Analysis of Households	▪ Assessment of socio-economic, environmental, gender and other impacts of displacement due to climate change induced disasters ▪ Analysis of the impacts of displacement on directly affected populations and the receiving/hosting communities ▪ Investigation of the destinations of internally displaced people and their conditions
Climate Impact Analysis	▪ Observing scenarios of climate change and its potential impacts
Trends of Internal Displacement	▪ Push and pull factors of internal displacement ▪ Trend of population displacement in terms of prevalence, incidence and options for durable solutions (up to 2030 or beyond)
Participatory Brainstorming Sessions	▪ Finalisation of methodology, trends and impacts of climate change and internal displacement ▪ Supplementing and complementing the study findings from the communities at local, regional and national levels ▪ Sharing of results and findings of the study with the government and other stakeholders and potential users
Database on Displacement	▪ Development of a database on internally displaced people, disaggregated by gender, age and other relevant characteristics, due to riverbank and coastal erosion, salinity intrusion, inundation, and water logging over the designated period of time (1981 – 2011). ▪ Measuring intensity, magnitude and indicators of internal displacement
Policy Directives	▪ Formulation of policy directives to address internal displacement in the future ▪ Assessment of potentials for generating a local level trust fund and pilot demonstration on adaptive social protection for internally displaced people

1.4 Study Limitations

Limitations are the matters and occurrences that arise in a study which are out of the researcher's control. Every study, no matter how well it is conducted and constructed, has limitations. Additionally, throughout initiatives of climate displacement research, some challenges have always limited the scope of research. The limitations of the study have been thefollowing.

Lack of clear definition: There is no internationally recognised term to date that defines people who move for environmental reasons. Terms and concepts such as environmental migration, climate change-induced migration, ecological or environmental refugees, climate refugees, climate change migrants, and environmentally induced migrants are found scattered throughout the emerging literatures. The authors interpret these terms haphazardly based on their own concepts and the protection mechanisms they suggest. Warner identifies two substantial points responsible for the failure to establish clear definitions of concepts and terms related to climate change-induced displacement. First, the inherent difficulties in isolating environmental factors from other migration drivers make the conceptualisation of the issue complex. Second, "defining" climate change displacement creates obligations on the international community to adopt appropriate institutional and governance measures to address the problem (Naser, 2011).

Lack of statistics: There are no global statistics on migratory movements prompted by natural disasters. At best, there are estimates and indications that can be derived from displacement data relating to particular crises or other data on general trends. Moreover, existing data on internal displacement do not usually distinguish between those displaced by natural disasters and those displaced for other reasons - violence, human rights violations etc. Nor is there any indication of those displaced internationally by natural disasters. Thus, while there are some data on

migration and displacement caused by specific natural disasters, they are not systematically compiled or analysed at a global level; the overall picture of migration trends following natural disaster is, therefore, piecemeal (Laczko & Aghazarm, 2009).

Lack of adequate normative frameworks: The lack of a relevant normative framework to deal comprehensively with internal displacement resulting from environmental change, or even to acknowledge that it is occurring, currently constitutes a major protection gap. An understandable preoccupation with the short-term impacts of rapid-onset events dominates government and civil society actors and as a result, there is a lack of comprehensive normative frameworks to protect the rights of internally displaced people. A protection gap is evident in the lack of political will to provide protection, the absence of normative apparatus, weak implementation capacity and limited public resources dedicated to responding to environmental change. In contrast to the broadly optimistic stance adopted in the academic literature, the real world challenges are more profound than anticipated (Zetter, 2011).

Structural limitations: Underpinning the challenge in developing more effective protection for environmentally displaced peoples are structural constraints - historical experiences and contemporary contextual factors - which mediate the way in which displacement and human rights discourse and policy are framed and effective implementation is inhibited. Notably in Bangladesh, population movement is a highly sensitive issue which is marginalised in political discourse. Policies to tackle internal migration and displacement are poorly developed and unrealistic with lack of transparency (Zetter, 2011).

The complexity of linking migration to environmental events: Some authors argue that environmental displacement is a complex and challenging issue not because the environmental impacts cannot be fully known; rather, the ways humans respond to such changes make the study complicated. They identify faults in some of the statistical analysis. For example, the causal link postulated between an identified environmental event, such as drought, and human movement is not explicitly demonstrated. In many cases, researchers calculate the extent of environmental displacement by simply considering the predicted environmental changes and the number of current or predicted population in the affected areas without applying any widely accepted methodology. Their assumption is based merely on "common sense" that people will eventually decide to flee in the face of environmental disasters. These generalised assumptions about "common sense" often fail to take into account human reaction and adaptation to environmental change. Thus, it remains unclear whether and how many people at risk choose migration as the main strategy (Naser, 2011).

The scientific basis for climate change is increasingly well-established but much less time, energy and resources, however, have been spent on empirical analysis of the impacts of climate change on population displacement. This is partly because the relationship is so unpredictable: the science of climate change is complex enough. It is also partly because individual migrants' decisions to leave their homes vary so widely: deciding causality between economic "pull" and environmental "push" is often highly subjective. And finally, disaggregating the role of climate change from other environmental, economic and social factors requires an ambitious analytical step into the dark. For example, Hurricane Katrina, which lashed the Gulf Coast of the United States in August 2005 and temporarily displaced over a million people,is often presented (quite rightly) as a preview of the kind of more intense and frequent extreme weather events that can be expected from climate change. However, the hurricane was more than just a meteorological event: the damage it caused was a product of poor disaster planning; consistent underinvestment in the city's protective levees as well the systematic destruction of the wetlands in the Mississippi delta that might have lessened the force of the storm. Labeling it a "climate change event" over-simplifies both its causes and its effects (Brown, 2008).

Limitations and caveats of a quantitative analysis: Estimates and predictions of people displaced by environmental changes have been highly stimulated by growing media attention to climate-induced migration. Figures ranging from tens of millions of people to one billion have been found not only in headlines of the mainstream press but also in official communications and research reports. The current interest in the topic is due not only to the specific nature of these migration flows but also to their potential magnitude. Yet no consensual estimate exists, let alone a commonly agreed methodology. The multi-causality of displacement, as well as the confusion between forced and voluntary migration, makes it difficult to identify an exact number of environmentally displaced persons. Given the lack of comprehensive methodology and empirical studies, the field is wide open for guesses and pessimistic estimates rather than actual numbers. As a result, predictions and estimates have become one of the most contentious issues in the debates on climate-induced migration (ADB, 2011).

Problems in tracing out displaced households: Tracing out displaced households is not easy because places of destination vary as some households tended to be displaced to locations other than the adjacent areas. In this context, in spite of performing 'snow-ball' sampling, a good number of households could not be surveyed since local people knew nothing of their displaced locations. Moreover, the survey team faced distinctive problems considering selected hazards/disasters. For instances, in the case of riverbank erosion the targetnumberof displaced households were easily located since displacement was common in the erosion prone areas. On the other hand, in the case of the remaining three hazards/disasters namely floods, salinity and water logging, displaced households were too difficult to locate since these were semi-direct and indirect catalysts for displacement. Displacement, in these cases, had occurred slowly and a significant portion of thehouseholds tended to be displaced and relocated in distant areas.

Problems in conducting survey at destination: In the case of flooding/inundation, temporary internal migration has been widely found i.e. the victims were found to have moved to adjacent shelters, elevated roads/streets, neighbours' and relatives' houses. As theinterviews at places of destinationwere required to be taken during floods season, time limitation compelled the study team to meet the hazard victims in their places of origin.

CHAPTER 2

Migration and Displacement Nexus

new complexity to the nexus. Movement in response to environmental and climate change is a normal human adaptation strategy. Every year, millions of people are forced to move due to extreme weather situations where climate change is expected to result in more extreme and frequent events, increasing people's vulnerability (Gahre, 2011). However to assess the trends and impacts of population displacement due to the impacts of disasters and climate change, it is indeed necessary to have a sound understanding on certain concepts such as displacement, migration and natural disasters. Thus, this chapter will provide a brief and clear idea about these concepts based on the review of different literatures.

2.1 Concept of internal displacement and migration

Despite numerous attempts and proposals, no internationally agreed definition has emerged, and this void has led to great confusion over the terms used to describe people displaced by environmental events. "Environmental refugees," "ecological migrants," "climate refugees," and "environmentally displaced people" are all terms frequently used by both scholars and the media to describe what they assume is a common reality. The definitional issue is directly linked to the conceptualisation and typologies of environmental migration, its estimates and forecasts, and the policy responses aimed at addressing the same. Furthermore, the debate is marked by confusion over different concepts, and environmental migration has eventually become a catch phrase for different migration dynamics that often have little in common. One of the main reasons for the lack of definition is linked to the difficulty of isolating environmental factors from other drivers of migration. Most authors stress the multi-causality of migration and the intermingling of factors (ADB, 2011).

2.1.1 Internal displacement

The term '**displacement**' is a kind of forcible movement and applies both to those forced to leave their countries and those forced to leave their communities but who remain within the borders of their country (internally displaced persons or IDPs).

According to the UN Commission on Human Rights Guiding Principles on Internal Displacement, internally displaced persons are-

> "Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalised violence, violations of human rights or **natural or human-made disasters**, and who have not crossed an internationally recognised State border" (Walsham, 2010).

In addition, there is growing awareness of **natural disaster-induced displacement (NDID).** The term 'natural disaster' can be defined as 'a disaster caused by natural hazards.' A disaster is a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. While the terms sudden-onset and slow-onset disasters are widely used to contrast, for example, the occurrence of an earthquake (which occurs in a matter of minutes) and drought (which may develop over years), there is no accepted dividing line between sudden and slow-onset disasters (Ferris, 2011).

Displacement due to climate change is likely to manifest itself in essentially six primary ways. These are temporary displacement, permanent local displacement, permanent internal displacement, permanent regional

displacement, permanent intercontinental displacement, and temporary regional or international displacement. However, movements due to environmental change can be classified according to the extent of movement and the possibility of return. Broadly, people are displaced either within or across borders. While most of the movements are temporary, sometimes they become permanent. Based on this trend, displacements can be classified in four categories: temporary internal displacement, permanent internal displacement, temporary international displacement, and permanent-cross border displacement (Naser, 2011).

2.1.2 Migration

The term **forced migration** is a "general term that refers to the movements of refugees and internally displaced people as well as people displaced by natural or environmental disasters, chemical or nuclear disasters, famine, or development projects."(Ferris 2011)

According to a report of the ADB, migration patterns depend not only upon the type of environmental disruption, but also upon other social, economic, and political factors as well as individual characteristics (ADB 2011).

In the absence of an internationally agreed definition, the IOM developed a working definition in 2007 which defines "environmental migrants" as follows:

> "Environmental migrants are persons or groups of persons who, for compelling reasons of sudden or progressive change in the environment that adversely affects their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad" (Laczko & Aghazarm, 2009).

In 2009, the IOM captured the complexity of migratory patterns under the following headings:

- Voluntary-forced: migration is often described as a continuum ranging from totally voluntary migration to totally forced migration - a non-voluntary movement of persons in order to escape violation of rights or natural or man-made disasters.
- Temporary-permanent: there is no common understanding of what constitutes 'temporary' or 'permanent' migration. Definitions range from six months away from the place of origin with no plans to return for 'permanent' migration, to movement from the usual place of residence to another country for a period of at least three months but less than a year for 'short-term migration'.
- Internal-international: displacement post-disaster is presumed to be not only internal but also local, to the nearest safe destination. There is strong consensus that those displaced by natural disasters remain within their national borders. The number of people who cross national borders because of natural disasters seems to be much lower than those displaced internally.
- Vulnerability-resilience: Natural disasters as geophysical events do not solely generate risk; rather, it is the state of human development that shapes vulnerability to natural hazards and exacerbates their effects and consequences. (Laczko & Aghazarm 2009)

It is obvious now that the "decision" to move or to stay is highly complex and depends on availableresources, social networks and the perceived alternatives to migration. Therefore, environment is only one among many factors that drive migration and migration is also only one among many possible responses to environmental change. Environmentally induced migration therefore ranges from clear cases of forced to clear cases of voluntary movement, with a large grey zone in between. Here, migration can help to reduce risks to lives, livelihoods and ecosystems, and contribute to income diversification and enhance overall capacity of households and communities to cope with the adverse effects of environmental degradation and change (Walsham, 2010). In this context, migration is likely to be temporary, circular or seasonal in nature. However, when environmental degradation becomes severe or irreversible, for instance, due to sea-level rise, migration can become permanent and may require relocation of affected populations, either internally or in another country (IOM, 2009).

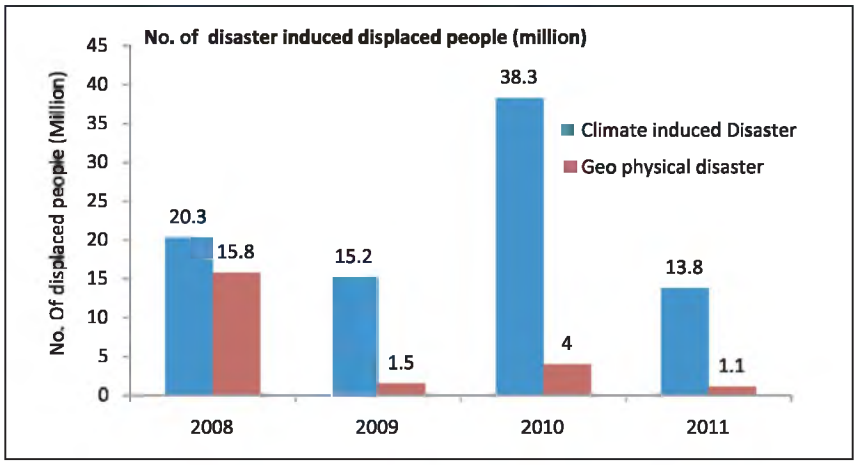
2.2 Global Internal displacement

2.2.1 Existing trend of internal displacement

Recent studies confirm that the number of environmental migrants has increased significantly in recent years. It is estimated that there are currently twenty-five million people worldwide who have been displaced for environmental reasons, making environmental refugees the single largest migrant group in the world. In 2009, theUnited Nations High Commissioner for Refugees noted that a staggering thirty-six million people were displaced by natural disasters in 2008; and more than twenty million were forced to move by climate-related factors (Naser, 2011). Yet, these sudden, large-scale movements are often temporary and localised, with cross-border movement occurring if there are no other escape routes. In most cases, return might be possible, especially if adequate support is offered (IOM, 2009)

According to a report from the Norwegian Refugee Council's Internal Displacement Monitoring Centre, at least 42.3 million people were newly displaced by sudden-onset disasters caused by natural hazard events in 2010 (CICERO, Norwegian Ministry of Environment and Norwegian Ministry of Foreign Affairs &NRC 2011). The figure 2.1 shows the displacement due to both geo physical and climate related disasters from 2008-2011. Climate related disasters - primarily floods and storms and geo physical disasters mean earthquakes, volcanic eruptions etc. Over these four years, climate-induced disasters caused major displacement in number. Except for 2008, more than 90% people were displaced in three other years due to climate induced disasters (Yonetani 2012).

Figure 2.1: Number of displaced people due to climate induced and geo physical disasters in the world



Source: Yonetani, 2012

The following table (Table 2.1) shows the number of displaced persons due to different disasters in 2011. Floods caused the largest displacement in 2011.

Table 2.1: Displacement due to different disasters in 2011

Category	Type of disasters	No. of events	Displaced
Hydrological	Floods	80	10,236,722
	Landslides	3	403,000
Metrological	Storms	30	3,071,769
Climatological	Wildfire	2	4,300
	Extreme Temperature	1	87 ,800
Geo physical	Earthquake	16	1,132,278
	Volcanic Eruptions	3	11,347
Total		135	14,947, 216

Source: Yonetani, 2012

2.2.2 Prediction of internal displacement

The available estimates of environmental displacement mainly vary because of different time frames researchers provide for their predictions. While some researchers predict current numbers of displacement, others provide displacement estimates through 2050 or 2100. In 1990, the Fifth Assessment Report of the IPCC estimated that by 2050, 150 million people could be displaced by climate change-related phenomena, such as floods, storms, desertification, and increasing water scarcity. To put this estimate in perspective, environmental refugees could comprise more than 1.5% of the predicted global population of nine billion people in 2050.

Perhaps the best-known estimate for future migration forced by climate change was made by Professor Norman Myers of Oxford University. He predicted the existence of more than twenty-five million environmental refugees (ten million recognised, fifteen million unrecognised) in 2002, which was greater than the eighteen million then officially recognised refugees (political, religious, and ethnic). Looking ahead to 2050, he argued that when global warming takes hold there could be as many as 200 million people displaced

Sir Nicholas Stern, in his authoritative review of climate change, maintained that Myers and Kent's earlier estimate of 150-200 million has not been rigorously tested" and the estimate of 200 million is "problematic" and "conservative". However, echoing the concern that climate change will lead to hundreds of millions of climate change migrants, the Stern Review estimated that the scale of migration will reach 200 million by 2050.

Other estimates vary dramatically in terms of "numbers, time frame and causes." Friends of the Earth, an international non-governmental organisation based in Australia, predicts 150 million climate refugees worldwide, including 1 million from small island states, by 2050. Offering the highest estimate, Christian Aid estimates that one billion people will be forcibly displaced by 2050, principally arising from climate change-induced natural disasters. In another estimate, Nicholls suggests that between 50 and 200 million people could be displaced as a result of climate change by 2080. However, most of the availablepredictions in general figure about 200-250 million environmental migrants by the middle of the century (Naser, 2011).

However, the predicted amount of future environmental migrants is a "daunting figure". The prediction of the scale and extent of environmentally induced displacements is probably the most debatable issue in existing literature. Migration and environment research tends to fall into two broad and extreme categories: the "minimalists," who consider that the environment plays a relative and nominal role in migration decisions; and the "maximalists," who propose that environment can be a distinct factor that causes people to be forced to leave their homes (Naser, 2011).

The availablepredictions vary significantly because no measurable definition exists. Critics argue that there is "no evidence that environmental change leads directly to mass refugee flows, especially flows to developed countries." They also argue that such estimates have a large margin of error and mostly depend on faulty assumptions about population growth, economic development, temperature increase, or the degree and timing of climate change. Black has criticized estimates of "environmental refugees" by numerous authors as being "without independent verification of [their] accuracy." There is strong advocacy from scholars for recognition of the multi-causality of environmental displacement. They criticize the uncritical acceptance of a direct causal link between environmental stress and human displacement (Naser2011).

2.3 Internal displacement in Bangladesh

Bangladesh is one of the most climate vulnerable countries on earth due to its unique geographic position. Bangladesh suffers from frequent natural hazards and its vulnerability to natural hazards also leads to climate displacement. The primary causes of climate displacement in Bangladesh are tidal height increases in the coastal areas (leading to tidal flooding) and riverbank erosion in the mainland areas. The key secondary causes of displacement are tropical cyclones and storm surges in the coastal regions and river flooding in the mainland. The primary sites of displacement have been in the coastal regions and in the river delta regions in the mainland. Of Bangladesh's 64 districts, 24 coastal and mainland districts are already producing climate displaced people (Displacement Solution 2012)

Crisscrossed by seven major rivers and over two hundred minor ones, the country is flooded every year during the

monsoon period. A large number of people living along the riverbanks are thus vulnerable to floods, droughts and tropical storms. It is projected that about 50% of the land would be flooded if the sea level were to rise by 1 meter. According to the Department of Disaster Management (DDM), riverbank erosion, which is caused by the continuous shifting of channels, the three major rivers the Jamuna, the Padma and the Meghna alone displaces an estimated 500,000 people annually. Salt water intrusion from sea level rise in low-lying agricultural plains, along with other hazards, could lead to 40% decrease in food grain production and will force migration to urban slum areas. Estimates show that just a 1 to 2 degree increase in temperature would force physical dislocation of more than 35 million people in Bangladesh. Besides, more than 40 million people live in the coastal region of Bangladesh, many of whom are dependent on the weather and natural resources. In November 2009, a climate poverty hearing panel in the coastal region of Bangladesh heard from 'climate witnesses' that thousands of people are forced to migrate in nearby cities and in the neighboring countries illegally (Hodgkinson et. al, 2010).

Nearly 55% of the coastal population lives within the 100 Km of 710 Km long coastal belt, and most of them are poor and landless. The coastal area of Bangladesh is particularly vulnerable to sea level rise as 12 out of its 19 districts are directly exposed to the sea. Therefore, any natural disaster is followed by large-scale displacement of people. From 1970 to 2009, the total number of major cyclones striking Bangladesh was 26, where the number of occurrences increased significantly since 1990. It should also be noted that the highest number of affected people has been recorded after 1990. The cyclone SIDR that hit in 2007, affected 30 districts out of 64 districts, impacting nearly 8.7 million people. The coastal areas are particularly vulnerable to tropical cyclones and associated storm surges. The cyclones that occurred in 1970, 1985, 1991, 1997, 2007 and 2009 caused huge losses and displaced millions of people in the coastal areas (Akter 2009).

In 2007, the country was ravaged by Cyclone SIDR, which displaced 650,000 people and killed 3,447 (official record). In the year 2009, two cyclones hit the country (cyclone BIJLI, April 2009, and cyclone AILA, May 2009). About 200,000 people were displaced by cyclone BIJLI. In May 2009, cyclone AILAsmashed the coastal area and nearly 4.82 million people were affected. The International Organisation for Migration (IOM) has reported that a number of 11,118 families in Dacope upazila and 5,533 families in Koyra upazila were displaced in November 2009 as a direct consequence of the cyclone. According to the assessment of the European Commission's Humanitarian Aid Office (ECHO) partners, about 40,000 people migrated from Koyra upazila (sub-district) of Khulna district in Bangladesh due to the cyclone AILA(Roy 2011).

In addition, a survey conducted in the cyclone AILA affected district of Khulna revealed that coastal water logging resulted in a huge population movement to nearby safer elevated places. Approximately 106,000 people were displaced from water logging in the area to nearby safer, dry places and other distant districts and in some cases, even to India (Kushol et. al, 2009). The risks of environmental degradation for the north and the south of Bangladesh can be characterised by droughts and salinity intrusions. Past data reveal that approximately 3% of the population was affected in each drought event. On average, the country is hit by one drought event every two years. In the future, more drought prone areas are expected to be found towards the south-western part of Bangladesh in addition to the existing north-western part due to its proclivity to increased salinity intrusion. Therefore, on average 2% (3 million) in cyclone, 25% (39 million) in flood, 0.1% (50,000) in riverbank erosion and 3% (5 million) in drought respectively are displaced over the years. It is evident that flood is the major natural threat that induces huge population displacement, followed by droughts, cyclones and riverbank erosion. In the future, environmental displacement might be very upsetting for Bangladesh because of high population growth and the effects of frequent exposure to severe disasters. Such insights into future incidents provide guidance to formulate policies and action plans (Akter, 2009).

There is no doubt that disaster induced displacement is associated with a number of socio-economic issues that intensify the plight of the displaced. Most of such internally displaced people (IDPs), particularly women and children, become victims of human rights abuses. They are forced to re-settle in char land or in the main land. In later cases, people usually go to the places where their friends and relatives have already been settled. Therefore the IDPs have to adjust with a new way of life mostly characterised by alienation and marginalisation. They also become the prime targets of human traffickers and a number of women are forced to engage in prostitution for survival. Displaced people also become indebted as they move to new places. Many of them have no place to go as they lack the required money to travel to urban areas. Even when they find a place in the slums of major cities, they are at constant risk of eviction by the authority. They are not even recognised as 'especially affected groups'

and thus deprived of governmental benefits. The response of the government in dealing with floods and riverbank erosion is frustratingly limited only to engineering solutions such as building embankments, dams or dykes. A more holistic approach to flood and riverbank erosion is thus needed to take socio-cultural, demographic, economic as well as ecological considerations into account (Rahman).

In addition, Bangladesh is expected to have massive environmental displacement, which is calculated to be about 49 million, 63 million and 78 million in 2010, 2015 and 2020 respectively. The growth in environmental displacement is found to be 42% of the total populations in 2020, a startling fact indeed (Akter, 2009). On the other hand, according to the Displacement Solutions, heavier and more erratic rainfall in the Ganges-Brahmaputra-Meghna system is likely to lead to further riverbank erosion. At present, river flooding is a secondary cause of displacement in mainland areas; however, as rainfall becomes higher and more erratic and as river flow change as a result of the melting of the Himalayan glaciers, it is likely that this could be a more significant cause of displacement across Bangladesh.

Furthermore, more erratic rainfall is likely to lead to increasing droughts, especially in the drier northern and western regions of Bangladesh which record significantly less rainfall. Droughts can lead to the destruction of crop yields and severe disruption to livelihoods. At present, droughts are not a major cause of displacement; however, as rainfall patterns change, it is likely that there will be increasingly frequent and severe droughts, which could become a more significant cause of displacement across Bangladesh (Displacement Solutions, 2012).

2.4 Existing Research methods for internal displacement

The research studies, so far carried out to explore the nexus between climate change and displacement or migration, deployed different types of research methods. This section reviews some similar research methods as well as some proposed methods.

a) In 2011, the United Nations High Commission for Refugees (UNHCR) carried out a study on environmental displacement. A comparative method was used in this study which included:

- A short country overview outlining the economic and political context, and a background to relevant environmental conditions;
- A context-setting outline of recent and current displacement and migration patterns and processes and relevant policies;
- A review and analysis of the current legal and normative protection and rights-based instruments and frameworks related to displacement, including procedural and institutional elements, and how these are implemented at national and local levels;
- A review and analysis of initiatives to strengthen current norms and legal instruments; and an assessment of 'protection gaps'. (Zetter, 2011)

b) In 2010, the Internal Displacement Monitoring Centre and Norwegian Refugee Council jointly carried out a study on displacement due to natural hazard-induced disasters. In this study, four steps were followed to develop global estimates:

- Identifying a base list of events: A base list of events was identified.
- Prioritising events to create a core dataset: Events were prioritised for further investigation in relation to displacement and the creation of a core dataset for research.
- Estimating displacement for each event: Individual events were cross-checked through investigating a variety of sources for quantitative data indicating displacement; an estimate of total displacement was then made for each event.
- Analysing findings: The core dataset was analysed by type and location of disasters and displacement. (Yonetani, 2011)

c) In 2008, IOM facilitated a study on climate change induced migration and a three-step methodology was used to estimate disaster-related displacement. These steps were:

- Firstly, all meteorological, hydrological, climatological and geophysical disasters were identified in the EM-DAT data set managed by the Centre for Research on the Epidemiology of Disasters (CRED).

- Secondly, a series of criteria were applied to identify which disasters were likely to have caused displacement and would therefore warrant detailed, case-by-case investigation.
- Thirdly, the identified disasters were individually researched using a variety of other sources to establish if they had resulted in forced displacement. (IDMC, 2009)

d) One of the most complex issues while addressing climate displacement is causality. Indeed, it may never be possible to assess definitively whether an individual is displaced exclusively because of climate change. However, what is clear is that natural hazards in Bangladesh are already leading to displacement across the country and that those same natural hazards are expected to increase in both severity and frequency as a result of climate change - almost inevitably leading to further displacement.

e) It is clear among scholars that there are no established methods of providing overall quantitative predictions concerning the additional human migration that might be caused by climate change, and that there is truly no such thing as a climate or environmental migrant in the narrow sense of a migrant exclusively moving for environmental reasons. Except in extreme cases, population displacements are always the result of a multi-causal relationship between environmental, political, economic, social, and cultural dimensions. In 2010, Etienne Piguet suggested a six-group typology of empirical studies and outlined the variables used to capture environmental change and migration.

- Type 1: Ecological inference based on area characteristics: The central idea of ecological inference is to reconstruct individual behaviour from group-level data. The word 'ecological' indicates that the unit of analysis is not an individual but a group of people, usually corresponding to a geographical area. The hypothesis here is that if the environment plays a role in migration decisions, the environmental characteristics of a specific geographic area should be correlated with the migratory characteristics of that same area during the same period of time (or after a certain time lag).
- Type 2: Individual sample surveys: This approach differs from the first precisely because it is aimed at considering processes at the level of individuals or households. Data on environmental pressure and socio-economic context are collected through relatively large surveys (from a few hundred to several thousand cases). The surveys either inquire about past migrations (reconstitution of biographies) or take the form of a panel in which households are contacted several times and questioned about the migration of one, or several, of their members during the intervals.
- Type 3, 4, and 5: Time series, multilevel analysis, and agent-based modeling: Time series, multilevel analysis, and Agent Based Modeling (ABM) are three very different approaches, yet all seek to bridge the gap between individual and ecological data or, in other words, to avoid both ecological and atomistic fallacies. Time series analyses substitute data on temporal evolutions in a given area for data on spatial units. Multilevel analysis combines ecological data (including, e.g., satellite imagery), individual data from household surveys and, in certain cases, time series. A solution to the complexity of climate-migration linkages is to use agent-based models to simulate the behavioral responses of individuals and households to climate signals, as well as relevant interactions between the social actors.
- Type 6: Qualitative/ethnographic methods: Qualitative methods have been by far the most widely used research design in recent years. These studies use either interviews or small sample questionnaires among inhabitants of threatened areas, contacts with privileged informants, or, in some cases, literature sources on historical analogs (Piguet, 2010).

2.5 Institutional experience on internal displacement

2.5.1 International Organization for Migration (IOM)

The International Organisation for Migration (IOM), as the leading intergovernmental organisation in the field of migration, is dedicated to promoting human and orderly migration for the benefit of migrants and societies. The IOM is convinced that ensuring human security in today's world requires addressing the complex interaction between migration, the environment and climate change. Through its work, it is making the case that migration in the context of climate change does not necessarily have to be a worst-case scenario. On the contrary, migration can also be understood as an adaptation strategy to the impact of climate change under some circumstances, particularly in the early stages of environmental degradation. Yet, for migration to become a viable alternative - an

adaptation strategy that increases the resilience of vulnerable populations - environmental migration needs to be managed, in particular with a view to enhancing positive and sustainable developmental outcomes.

It is one of IOM's primary objectives to ensure that migration can be a choice and to prevent forced migration. Migration reduces reliance on the environment for livelihoods, by allowing income diversification through remittances. Migration can help reduce risk to lives, livelihoods and ecosystems, and enhance the overall capacity of households and communities to cope with the adverse effects of environmental and climate change. The contributions of migrants through the transfer of knowledge and skills upon their return can significantly strengthen the livelihoods of families and communities facing environmental challenges. As the IOM looks at climate change and environmental degradation from a human mobility point of view, its roles, responsibilities and experiences are structured around the following issues:

a) **Preventing forced migration and making migration work for adaptation:** In areas prone to natural disasters as well as in areas severely affected by the effects of climate change, the foremost objective is to reduce unmanaged migration pressure, preventing forced migration while also ensuring that migration that takes place is managed.
b) **Preparing for potential migration, displacement and relocation:** Despite investment in prevention measures, some displacement still occurs, exposing populations to risk of severe hazards. Displacement is often a survival strategy: if not possible, it can lead to significant human loss and should therefore be prepared for in order to minimise human suffering and the loss of livelihoods. In the context of environmental degradation, such as sea-level rise or desertification, which can render some areas uninhabitable, it also means preparing for relocation.
c) **Managing (mass) migration:** When displacement occurs, it is important to intervene quickly and decisively to manage it and address urgent humanitarian needs (especially the need for shelter, food and health), as well as to ensure effective protection. In general, environmental migration, as much as any form of migration, should be managed to the extent possible.
d) **Mitigating the impact of (forced) migration:** Mass migration, including displacement, can have negative consequences on the environment and on livelihoods in receiving communities. Tackling these issues requires mitigating the impact of migration on the communities of destination.
e) **Addressing (forced) migration through durable solutions:** Finally, if forced migration occurs, it needs to be addressed to avoid protracted situations. Looking for durable solutions in most cases of displacement induced by natural disasters or environmental degradation means ensuring sustainable return. If return is not possible or not wanted, local integration or relocation should be considered. (IOM, 2009)

2.5.2 The Internal Displacement Monitoring Centre (IDMC)

The Internal Displacement Monitoring Centre (IDMC), established in 1998 by the Norwegian Refugee Council (NRC), is the leading international body monitoring internal displacement worldwide. Through its work, the Centre contributes to improving national and international capacities to protect and assist the millions of people around the globe who have been displaced within their own country as a result of conflicts, human rights violations or natural hazards. The key roles[1] of the IDMC are as follows:

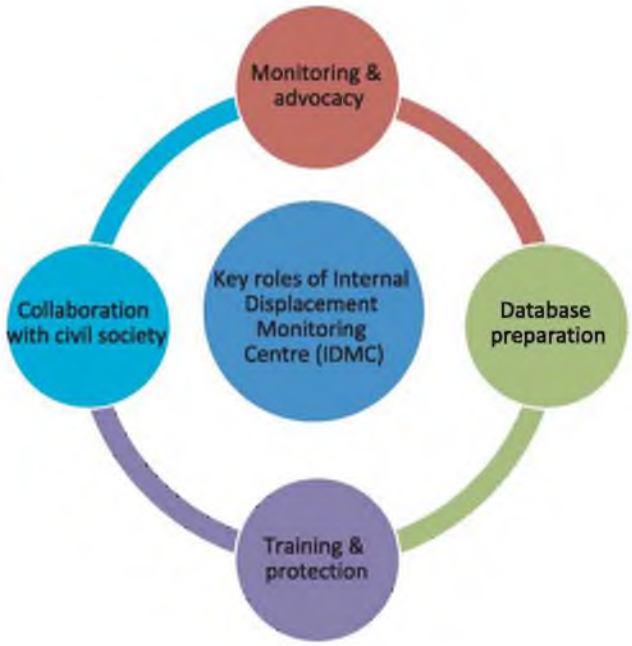
a) **Monitoring & advocacy:** Active advocacy for the rights of IDPs is an integral part of the IDMC's work. Based on information included in the database and collected during fact-finding missions, the Centre raises awareness of the plight of internally displaced people, points to gaps in national and international responses and promotes solutions reflecting international standards and best practices.
b) **Database preparation:** The Centre's IDP database provides frequently updated information and analysis on displacement around the globe. It is unique in being the only provider of comprehensive information on all situations of internal displacement worldwide.

1. http://www.internal-displacement.org

c) **Training and protection:** The IDMC organises training workshops to strengthen the capacity of relevant national and international actors to address the protection and assistance needs of IDPs in line with international standards.

d) **Collaboration with civil society:** The Civil Society Project of the IDMC is aimed at supporting civil society initiatives and strengthening the Centre's link with IDP communities and NGOs in its ongoing monitoring, advocacy and training work.

Figure 2.2: Key roles of IDMC



2.5.3 United Nations Office for the Coordination of Humanitarian Affairs (OCHA)

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) aims to support effective and principled humanitarian action, saving lives and reducing suffering. It also underpins the role of the principal advisor to the Secretary-General on humanitarian issues.

- OCHA sets an evidence-based and forward-looking humanitarian policy agenda to identify emerging trends and develop common or harmonised policy and advocacy positions among relief organisations. This is based on humanitarian principles, human rights and public international law.
- OCHA provides policy guidance and clarity on pressing issues to humanitarian practitioners and policy-makers, to help strengthen effective and timely response.
- OCHA identifies best practices and lessons learned through the evaluation of humanitarian action to enhance effectiveness and the accountability of those involved.

The major areas of activities of OCHA are as follows:

Figure 2.3: Major activities of OCHA

Displacement is one of the important thematic areas OCHA is dealing with. In raising awareness to the plight of IDPs, OCHA works in close partnership with Security Council bodies, the UNHCR, the Special Rapporteur on the Human Rights of IDPs to the Human Rights Council, protection-related IASC agencies and UN Secretariat organisations to promote the development of national legal frameworks and policies on internal displacement.

At the institutional level, rather than creating a new agency for the internally displaced or assigning responsibility to an existing agency, the international community opted instead for a collaborative approach to internal displacement which would draw upon the mandates and expertise of the UN's humanitarian and development agencies and other organisations in responding to the protection and assistance needs of the internally displaced. Concerns as to the effectiveness of this approach led to the creation in July 2000 of the Senior Inter-Agency Network on Internal Displacement charged with identifying ways in which the collaborative approach could be made to work more effectively. Among its recommendations was the establishment of the Internal Displacement Unit within OCHA.

The Unit's aim is to ensure a predictable and concerted response among all concerned actors to the problem of internal displacement. Taking into account the variety of needs of IDPs, the Unit identifies and highlights gaps in the humanitarian response to displacement situations. Within this mandate there is a broad range of activities required to address IDPs' assistance and protection needs. In 2003, the Unit undertook two studies which sought to analyse, both qualitatively and quantitatively, the effectiveness of the international response to the IDP problem.[2]

2.5.4 Initiatives of Displacement Solutions (DS)

The Climate Change and Displacement Initiative of Displacement Solutions is an ongoing initiative instigated in 2009 designed to find practical and viable housing, land and property solutions for climate displaced persons. Through rights-based and innovative policy and strategy development, targeted workshops, network building, awareness raising, publications, original research and other activities, the Initiative seeks both to inform the world of the massive scale of displacement which will affect forced climate migrants in the years and decades to come, and to advocate for rights-based solutions to this form of displacement, both within the nations affected and through regional and international resettlement initiatives.

Initiatives in Bangladesh

Displacement Solutions has recently published a ground-breaking new report on climate displacement in Bangladesh. This report comprehensively examines the scope and causes of climate displacement across Bangladesh. Drawing on extensive

[2] http://www.fmreview.org/sites/fmr/files/FMRdownloads/en/FMRpdfs/FMR20/FMR2021.pdf

Initiatives in Bangladesh

Displacement Solutions has recently published a ground-breaking new report on climate displacement in Bangladesh. This report comprehensively examines the scope and causes of climate displacement across Bangladesh. Drawing on extensive fieldwork, the report highlights that climate displacement is not just a phenomenon to be addressed at some point in the future; it is a crisis that is unfolding across Bangladesh now. Sea-level rise and tropical cyclones in coastal areas, as well as flooding and riverbank erosion in mainland areas, are already resulting in the loss of homes, land and property and leading to mass displacement. Furthermore, all of the natural hazards that are causing displacement are expected to increase in both frequency and intensity as a result of climate change - almost inevitably leading to the displacement of many millions more across Bangladesh (Displacement Solutions 2012)

Brookings-LSE Project on internal displacement

The Project on Internal Displacement was established at the Brookings Institution in 1994 to support the mandate of the Representative of the United Nations Secretary-General (RSG)on Internally Displaced Persons in order to increase its capacity to uphold the rights of millions of IDPs around the world.

Unlike refugees who cross national borders and benefit from an established system of international protection and assistance, those forcibly uprooted within their own countries by armed conflict, large-scale development projects, systematic violation of human rights, or natural disasters, lack predictable structures of support. There are more than 26.4 million IDPs in more than 50 countries. Internal displacement has become one of the more pressing humanitarian, human rights and security problems confronting affected countries and the international community at large. The Project promotes more effective national, regional and international responses to this global problem and monitors displacement problems worldwide. It also promotes the dissemination and application of the United Nations Guiding Principles on Internal Displacement, convenes international seminars on internal displacement, and publishes major studies, articles and reports (Brooking Institution).

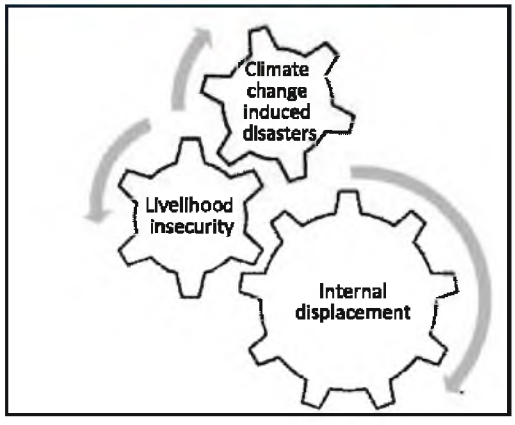
CHAPTER 3

Approach and Methodology

3.1 Study Approach

In this era of globalisation, climate change is not only considered as an environmental hazard but also a development challenge. Scientific evidences show that climate change is likely to impact adversely on many human endeavours, individually, socially, economically and politically. One of the alarming outputs of these impacts is 'internal displacement'. In general, internal displacement due to climatic stress is connected with the incidence of weather-related natural disasters. Due to climate change, the frequency and severity of extreme climatic events will increase in the future and more people are expected to be vulnerable to these hazards[3]. Estimates of the likely number of future climate-change induced migrants may vary from 150 to 200 million[4] to one billion[5] by 2050. Despite the uncertainty over the exact number of people likely to migrate or become displaced, there is agreement among scholars that the phenomenon of 'environmental migration' will become worse in the coming years, owing to climate change[6]. For example, a study conducted by the Institute of Water Modelling (IWM) and the Center for Environmental and Geographic Information Services (CEGIS) shows that 44% of the coastal population in Bangladesh will be exposed to more flooding by the 2080s[7].

Figure 3.1: Linkage between climate change, livelihood and internal displacement



Greenhouse gas concentration at the atmosphere has crossed 400 ppm mark and absence of effective global mitigation measures to contain temperature rise within 2°C by 2100, worries countries like Bangladesh for future climate change impacts. The current study is expected to observe mostly wider weather variations in terms of temperature, heat stress, and precipitation changes and their likely physical consequences on inundation, riverbank erosion, salinity intrusion and water logging in different areas of Bangladesh.

The adjustments to climate change stresses may take various forms depending on the sector, the availability of technology and information about them, as well as community, household and individual circumstances. Internal

3. CEGIS. 2011. The Second National Communication Project of Bangladesh, Activity 4: Programmes Containing Measures to Facilitate Adaptation to Climate Change, Department of Environment, Ministry of Environment and Forest, Government of Bangladesh, Dhaka, Bangladesh.
4. Stern, N. 2007. The Economics of Climate Change: The Stern Review, Cambridge, UK: Cambridge University Press
5. Christian Aid, Human Tide: The Real Migration Crisis - A Christian Aid Report, London, Christian Aid, 2007, as reported in Development Research Centre on Migration, Globalisation and Poverty, Migration and Climate Change: How Will Climate Shifts Affect Migration Trends? Briefing No. 12, September, 2008.
6. Warner, K., T. Afifi, O. Dun, M. Stal, S. Schmidl, and J. Bogardi. 2008. 'Human security, climate change and environmentally induced migration', In Climate Change: Addressing the Impact on Human Security, Policy papers. Athens, Greece: Hellenic Foundation for European and Foreign Policy (ELIAMEP) and Hellenic Ministry of Foreign Affairs.
7. Institute of Water Modelling (IWM) and Center for Environmental and Geographic Information Services (CEGIS). 2007. Investigating the Impact of Relative Sea-Level Rise on Coastal Communities and their Livelihoods in Bangladesh, IWM/CEGIS/GoB/UK Department for Environment Food and Rural Affairs, Dhaka, Bangladesh.

displacement is only one such adaptation mechanisms. Myers (2002) shows that more than 26 million people in Bangladesh (almost 16% of the total population of the country) are likely to migrate due to their failure to cope with extreme events[8]. Availableliterature suggests that there is no single factor that causes migration and thus a multi-level approach is needed to explain and understand the internal displacement and migration, its causes and consequences[9]. If the present pattern, trend, extent and impact of internal displacement could be better understood, the State may rephrase and adapt the policies, strategies and action plans accordingly. Hence, this study has developed and practically validated a method for assessing the trend and impact of internal displacement particularly due to climate change induced disasters; e.g. inundation, riverbank erosion, salinity and water logging. This study has also aimed at identifying and reviewing the related existing national and sub-national policy frameworks in terms of pro-active and re-active mechanisms with a view to explore viable options to increase the staying power of people in the face of climate change stresses.

Some guiding points

- How far climatic stresses are tolerated or neutralised depends on access to (livelihood) resources, natural, physical, financial, human and social assets.
- When stresses develop slowly or are of small magnitude, people may somewhat adjust to them with ease. However, even if small stresses develop and occur more frequently or become much larger than before, people may try to find more permanent solutions for them and may decide to migrate sooner than later.
- The trend and impact of internal displacement according to their characteristics under climate change at various levels.
- The stresses in the natural and physical world that have developed or are developing over time.
- The staying power of households and individuals in the face of climatic stresses.

3.1.1 Periodic steps of study

The study adopted a mix of quantitative and qualitative methods and tools. The present situation, parameters and scenarios of climate change and disasters were assessed through review of availableliterature. The indictors of displacement were selected in consultation with the CDMP. Existing government documents, survey reports, and miscellaneous research reports provided the historical trends of internal displacement. To explore the vulnerabilities and the decision making process behind the displacement, a detailed household survey was conducted following the designed methodology. The results from this survey are the push and pull factors of internal displacement. The study then facilitated some focus group discussions, case studies and sharing and brainstorming sessions at local, regional and national levels. The major aims behind these sessions were to validate and finalise the methodology through disclosure of findings from the displaced community and to provide some policy directives for the state to address the livelihoods of internally displaced people.

3.2 Theoretical Issues in Internal Displacement due to Climate Change

Migration has a long history in human evolution and so does the attempt to explain it. Very briefly, there are pull and push factors and there are factors that facilitate migration or displacement, be it temporary or permanent. The pull factors are of course generally better economic opportunities for those for future betterment (e.g., education). For women in traditional societies, often the change of residence is by and large due to marriage i.e., socio-cultural reasons. There are also push factors as opposed to pull factors. An occurrence of natural hazards and subsequent losses of property, employment and income, in one word worsening of livelihood prospects prompt people to decide to migrate. Despite the push and pull factors, whether a person or a household actually migrates depends on various other factors. One major factor is social network. For example, if there are already people from an area have a history of migration to certain other areas, new potential migrants often do try to go that destination. Thus brothers or relatives usually bring brothers or relatives or persons from the area of origin to their place of work in a place where the early migrants have gone to.

8. Myers, N. (2002) 'Environmental refugees: a growing phenomenon of the 21st century', Philosophical Transactions of the Royal Society B. 357: 609_/13
9. Bilsborrow, R. E. (ed.) Migration, Urbanization, and Development: New Directions and Issues, Dordrecht, UNFPA and Kluwer Academic Publishers, 1993.

How different is migration or displacement in case of climate change impact from the above generic theoretical view of migration. As the analyses are done later climate change impacts often destabilise the society and its capacity to withstand the losses that may occur to property, home and hearth, employment and income particularly when there are sudden changes or even slow onset events when it goes on for a long period. Hence there is a kind of threshold operating in deciding to migrate given the value of the factors.

3.3 Conceptual Framework

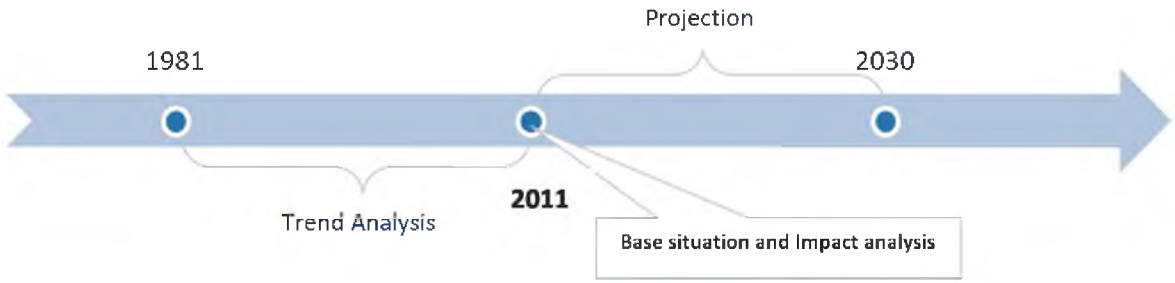
The use of conceptual models proved to be an appropriate method for this purpose. Conceptual models can offer an overall picture of the relevant processes and are also able to treat the connection between climate change and internal displacement on an intermediate level, between the 'common sense' approach and the case studies. The models are tools for communication across disciplines helping to formulate questions, clarify system boundaries and identify gaps in existing data.

According to the framework, several climate change hotspots based on designated hazards were selected on the basis of ground level information and modeling. A survey among displaced households was facilitated with special attention to the internal displacement. Eight FGDs - both at origin and destination of displacement by selective disaster - were facilitated to understand the local and community decision-making, livelihood status along with analysis of the socio-economic, environmental and other impacts of four hazards (inundation, riverbank erosion, salinity intrusion and water logging) in the area.

The conceptual framework was separated into four different parts:

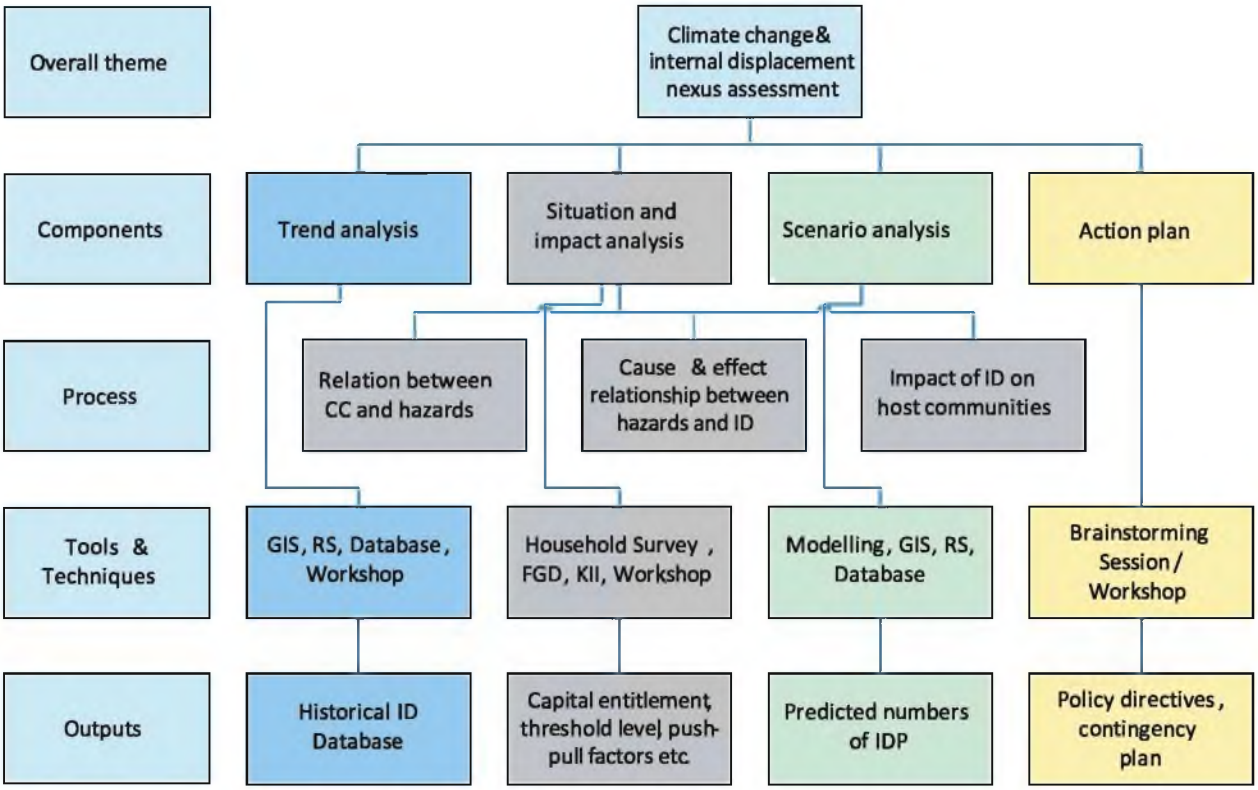
1. Trend analysis- the individual process of the trend analysis for internal displacement for ensuing hazards was discussed.
2. Situation and impact analysis- various impacts of social, economic, environmental, and others due to internal displacement on the directly affected population and the hosting communities were analysed through this part.
3. Scenario analysis- Climate inconsistency analysed using secondary data and forecast for the future flows of internal displacement were discussed in this part.
4. Policy directives- The overall findings of the study have enabled to come up with recommendations for institutional/strategic/contingency plans for internal displacement and the potential for generating a local level trust fund and pilot demonstration on adaptive social protection for internally displaced people.

Figure 3.2: Past and future time scale for the trend, impact and projection of internal displacement



An overall picture of the conceptual framework is given below:

Figure 3.3 Overall conceptual framework



3.3.1 Trend Analysis

Estimates and predictions of people displaced by environmental change have been highly instrumental in encouraging the ever-increasing attention to environmental migration/displacement. People in figures ranging from tens of millions to a billion are found not only in the headlines of the mainstream press, but also in official communications and research reports[10]. The current interest in the topic is not only due to the specific nature of these displacement/migration flows, but also due to their potential magnitude.

Saline intrusion
Salinity refers to the salt content of environmental media. (OECD definition-http://stats.oecd.org/glossary/search.asp)

Water Logging
"Water logging" is defined as the state of land in which the subsoil water table is located at or near the surface with the result that the yield of crops commonly grown on it is reduced well below for the land, or, if the land is not cultivated, it cannot be put to its normal use because of the high subsoil water table.
(FAO definition-http://www.fao.org/nr/water/topics_qual_waterlogging.html)

10. Gemenne, François. "Why the numbers don't add up: A review of estimates and predictions of people displaced by environmental changes." Global Environmental Change (2011).

Floods
River floods-caused by bank overflow (river flooding) and local rainfall (rainfall flooding) which causes flooding as drainage is impeded by high water levels in the rivers.

(Information for Flood Management in Bangladesh, Volume 1: Main Report, Riverside Technology, inc. USA and EGIS, Bangladesh, December, 2010)

Riverbank erosion

The erosion of material from the side of a river channel, not only by fluvial processes, but also by frost heave, groundwater sapping, surface wash, and slope failure. Rates of erosion vary with bank composition and moisture content, bank vegetation, and speed of flow; rates are highest on the outer bank of meander bends or where bars in the channel have diverted the thawed. Bank form reflects the nature of materials: fine, cohesive materials tend to fail through slipping, banks of coarse material are steep, and may have talus slopes at the base, and where a cohesive layer overlies coarser material, undercutting may form overhangs, which collapse periodically. In the short term, these collapsed blocks may protect the base of the bank.
(Oxford Dictionary of Geography)

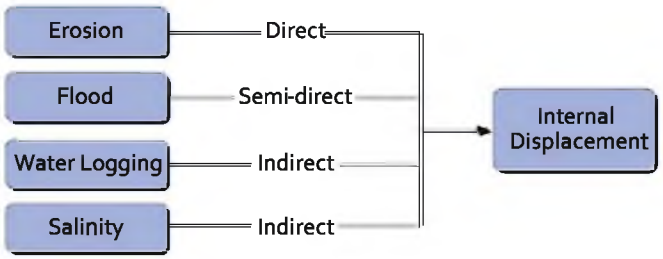
As there are no direct data on internal displacement availablein Bangladesh, it is evident that the required data need to be produced from some other existing database on hazards or disasters. To do so, proxy indicators most often are useful for providing estimates in lieu of exact numbers.

The following two objectives of this particular study provide the scope for predicting the past (trend) and future (projection) flows of internal displacement.

- A database/information on the internally displaced people, disaggregated by gender, age and other relevant characteristics, due to riverbank and coastal erosion, salinity intrusion, inundation, and water logging over the designated period of time (1981 - 2011).
- Trend of the population displacement in terms of occurrence, incidence, and the options for durable solutions (up to 2030 or beyond).

The definitions of hazards that are followed for the trend and impact analysis of internal displacement are given below:

Figure 3.4: Form of hazards and displacement relationship

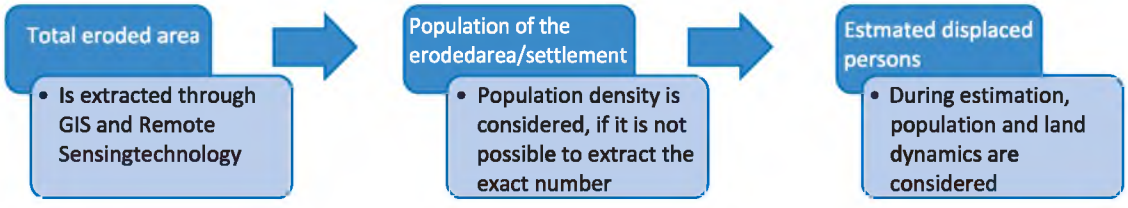


In terms of past trend analysis, population change of hazard affected areas is given prior focus for estimating the possible displaced persons of those areas. The population and land dynamics are considered regarding the observed population and area change. During survey, these patterns of movement of the displaced people were validated with the survey tools and techniques.

Riverbank erosion

The primary cause of displacement in the mainland regions is riverbank erosion (CEGIS, 2006). The government estimates that annually, a thousand hectares of floodplain are lost due to riverbank erosion and this leads to thousands of people becoming landless and homeless every year (BWDB)[11].

Figure 3.5 Process of trend analysis of erosion induced displacement

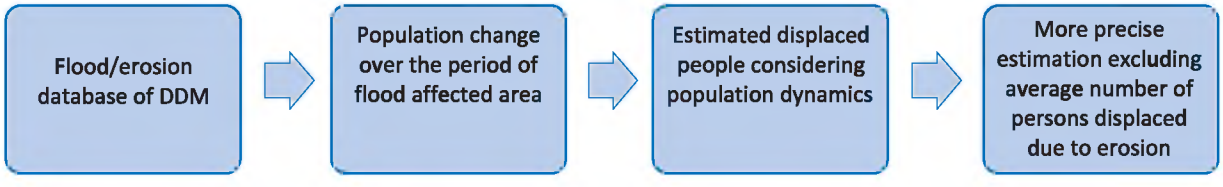


To conduct a trend analysis for people displaced due to erosion (from the period 1981- to 2011), the morphology and bank erosion processes of the major rivers of Bangladesh were studied using GIS and RS technology to figure out the total eroded area from 1981. Changes of population over the year were also observed with specific attention given to population and land dynamics of the particular area. The population change of the area was considered as displaced population and weighed for trend analysis.

Floods

In terms of floods, normal flood was considered for the trend analysis (2 years return period), in other cases (5, 10, 25, 50 years return period), case study was conducted for understanding the effect of the trend of that specific kind of disasteron displacement. The Department of Disaster Management (DDM) of Bangladesh has a comprehensive database on floods and riverbank erosion. As no other database can provide such amount of data on floods and erosion, the DDM database is considered as the only source that can be relied on. The process of trend analysis of internal displacement due to erosion, which has already been explained, was used to derive the number of displaced people. So, the number of displaced people due to flood has been predicted by eliminating the numbers (displaced people due to erosion) from the overall affected people recorded in the DDM database. The flow chart below presents the whole process is given below.

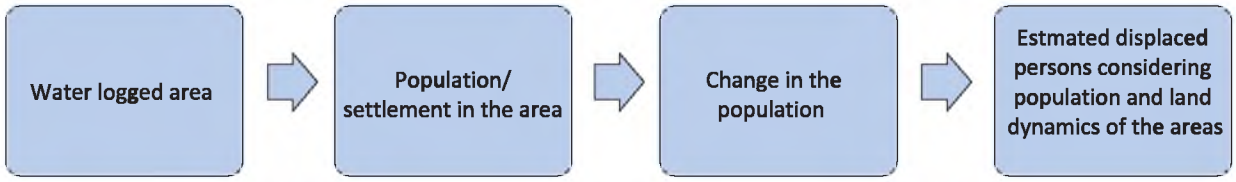
Figure 3.6 Process of trend analysis of floods induced displacement



Water logging

Water logging is another complicated type of natural hazard that requires special attention to its consequences like internal displacement. Existing data on water logging are so rare that it is difficult to consider it as a factor of internal displacement. Remote sensing technology was used for investigating population change in water logged areas. The process followed was similar to that followed for other hazards described earlier, and population changes over the hazard period were observed with attention given to population and land use dynamics. Finally, an estimated number was generated for trend analysis in contrast with the population change in the area over the hazard period.

Figure 3.7 Process of trend analysis of water logging induced displacement



Salinity intrusion

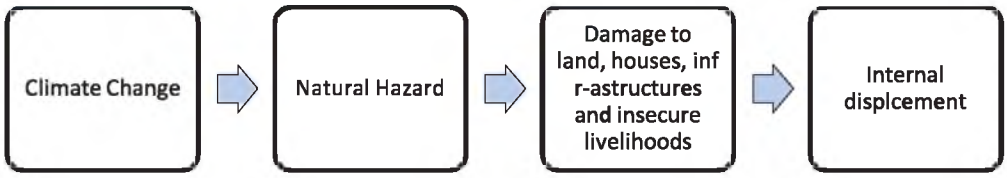
Different levels of salinity data (area coverage of 1ppt, 5ppt and 10 ppt isohaline line) from the BWDB and from CEGIS' own database were used to delineate past salinity intrusion area coverage. Like previous hazards, population changes of the area were observed with proper attention given to the population and land dynamics of the areas. After that, an estimated number of internal displacements were worked out.

Figure 3.8 Process of trend analysis of salinity intrusion induced displacement

3.3.2 Situation and Impact analysis

Hazards are assumed to cause internal displacement or migration- a natural hazard displaces people by destroying their lands, houses, infrastructures and other tangible goods and assets and by also hampering their livelihoods"[12] and this is the basic approach that is followed for the core model for internal displacement base and impact (figure 3.9).The detailed direct and stimulated indirect effects are explained appropriately during the survey and participatory sessions.

Figure 3.9: Basic approach for impact analysis of internal displacement

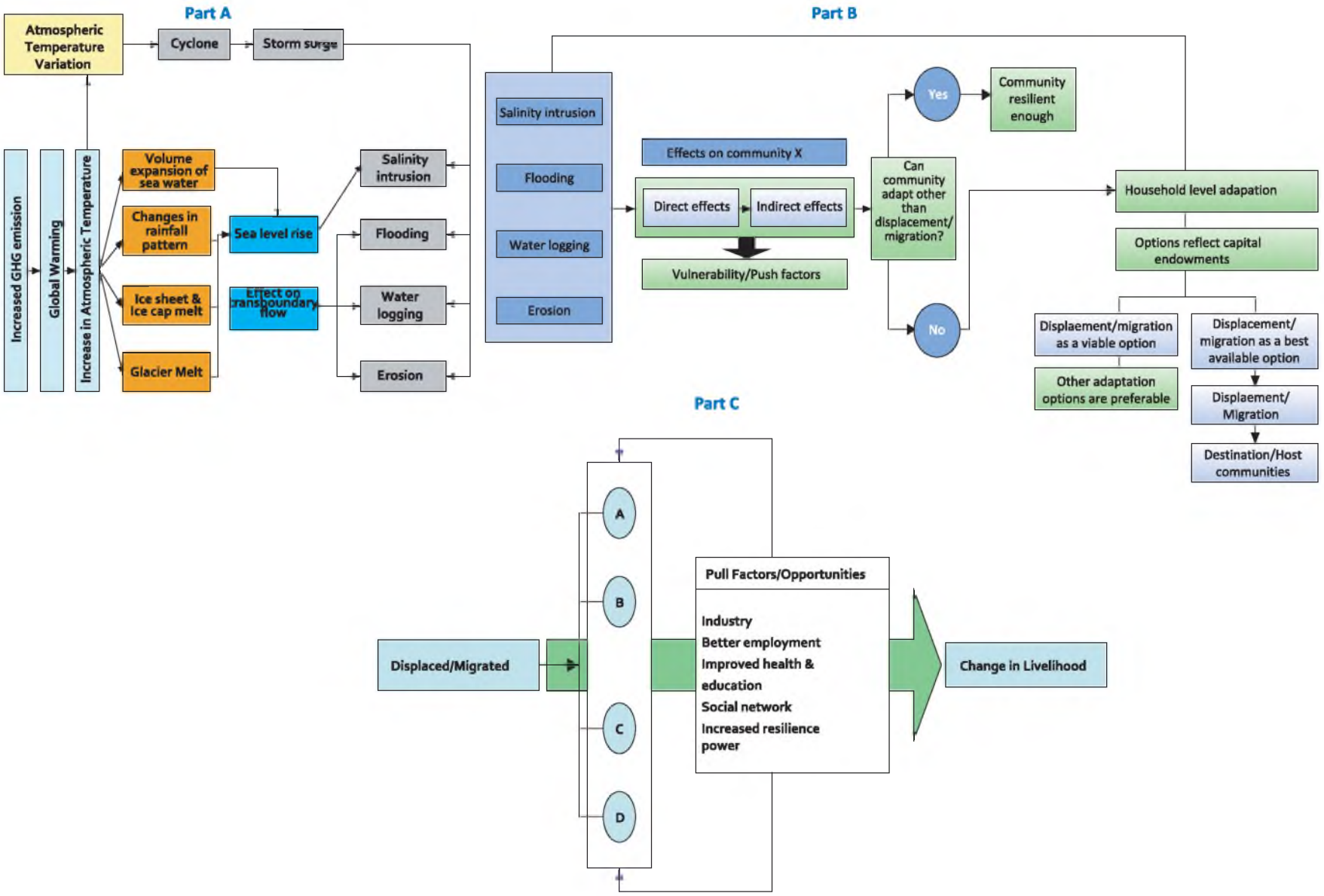


The type of conceptual model chosen in this study is a simple form of box-and-arrow, boxes representing relevant factors, arrows representing influences. It is important to note that an arrow contains no information about the strength of the influence. It can reflect a strong effect up to causation or, in contrast, can stand for a weak influence amongst many others.

The situation and impact analysis framework is divided into three different parts (A, B and C). The first part shows the linkages between climate change and hazards, the second part outlines the cause and effect relationship between the hazards and internal displacement (situation analysis) and the final part focuses on the impact (social, economic, environmental and demographic) of internal displacement on destination/host communities.

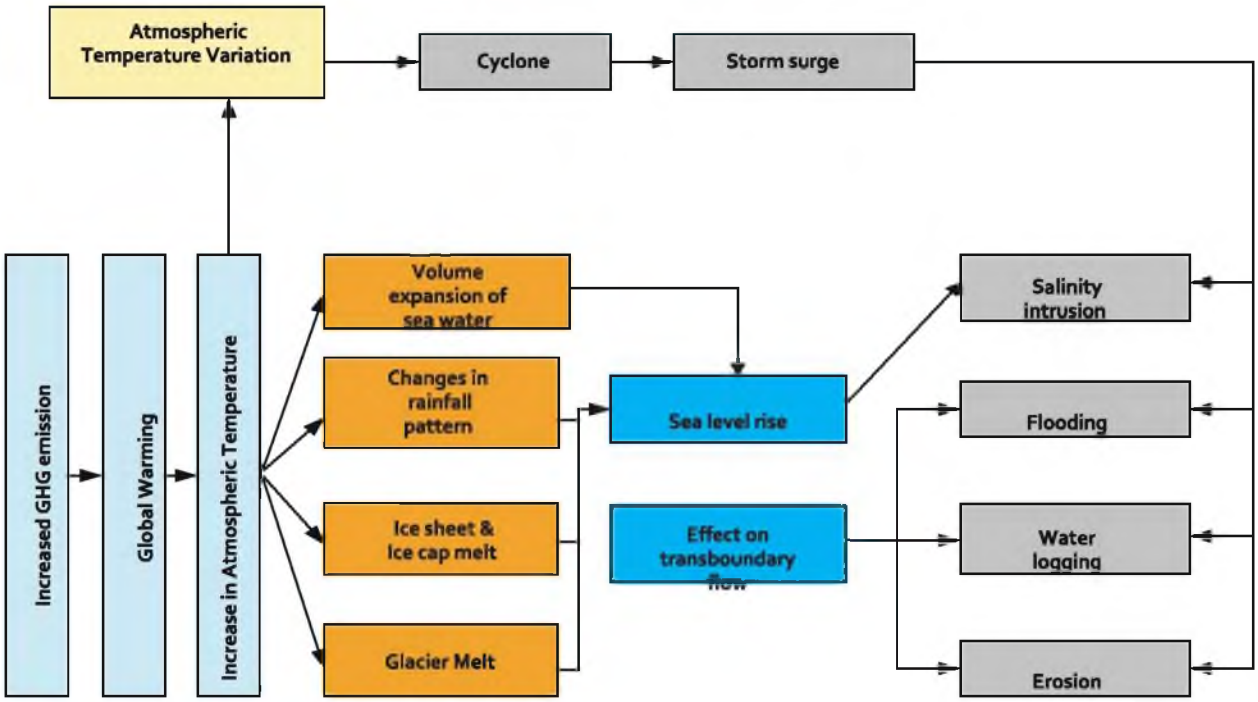
12. Haque CE (1997) Hazards in a fickle environment: Bangladesh. Kluwer, Dordrecht, p XV, 380

Figure 3.10: Schematic illustration of the integrated framework for situation and impact analysis of internal displacement



Part A: Linking up climate change with selected natural hazards

Figure 3.11: Schematic linkage between climate change and natural hazards



Riverbank erosion

In the last few hundreds of years, the routes of the major rivers have changed a lot. Moreover, observations by CEGIS, based on analyses of a 30-year time-series of satellite images, reveal that the Jamuna and Padma rivers have extended more than three kilometres. During the last three decades, these rivers have destroyed about 130,000 ha of floodplain. Recent research such as of Sarker and Thorne (2006) and Sarker (2009) have addressed the reasons for such huge widening of the rivers and developed models for explaining related morphological processes. These models are also suitable for assessing the impact of parameters induced by climate change on the morphology of those rivers.

CEGIS has attempted to find out the impact of river morphology for different climate change scenarios. It has mainly used the different available analytical, empirical and conceptual models such as that of Klaassen (1995), Schumm (1969), Sarker and Thorne (2006) and Sarker (2009) to assess the impact on morphology by climate change.

Analysis using availabledata shows that 10% increase in maximum discharge makes around 25% increases in riverbank erosion of the Jamuna River. For the Padma River, 10% increase in maximum discharge makes around 9% increase in riverbank erosion.

Flooding

Floods caused by excessive rainfall in the upstream, melting of ice cap, glacier and ice sheet caused by climate change also influence people to migrate who inhabited the inundated land. The continued termination of glacier ice will result in a short-term increase, followed by a long-term decrease in glacial melt water flowing into rivers and streams. NASA, in conjunction with Scientists from United States Geological Survey (USGS) and the National Snow and Ice Data Center (NSIDC), is developing a global inventory of all the world's glaciers to help researchers track each glacier's history. According to them, the Gangotri glacier, currently 30.2 km long and 0.5 to 2.5 km wide, is one of the largest in the Himalayas. This glacier has been constantly receding since measurements began in

1780. Glacier melting would result in sea level rise and consequent coastal floods along with riverine flooding by increased discharge flow through the rivers.

In Bangladesh, monsoon brings heavy torrential rainfall throughout the season. About four-fifths of the mean annual rainfall occurs during monsoon. Increase in the seasonal rainfall is expected to be caused by the climate variability mainly for increase in the seasonal temperature.

In a recent study by CEGIS it is found out that Monsoon (JJA) rainfall increases in 18 out of 32 meteorological stations and increase in the Pre-monsoon (MAM) seasonal rainfall is also evident in 30 out of 32 stations of BMD. Post-monsoon (SON) rainfall is also observed to have increased in 24 out of 32 meteorological stations.

In recent years, the total number of non-rainy days in a year is also decreasing. A total of 22 out of 32 rainfall stations of BMD are showing a decreasing trend in the total number of non-rainy days in a year. In recent years, the intensity of daily rainfall is also increasing which is evident from 25 out of 32 rainfall stations of BMD. While increases in air temperature are projected with confidence there is much lower confidence in projections of change to other meteorological parameters such as precipitation.

Despite of the research debate, evidence from climate models and hydrological studies suggest that flood frequencies are likely to increase with global warming, though the amount of increase is very uncertain and for a given change in climate, will vary considerably between catchments (Arnell et al., 1996) and at finer resolutions (Kattenberg et al., 1996; IPCC, 2007).

Mirza (2001) identified that future changes in the precipitation regime have four distinct implications:

- Change in the timing of flood due to possible changes in the seasonality;
- Increase in the magnitude, frequency, depth, extent and duration of floods;
- Change in the timing of peaking and change in the likelihood of synchronization of flood peaks of the major rivers; and
- Dramatic change in the land-use patterns in Bangladesh.

He also showed that a 20-yr return period flood event in the Ganges, Brahmaputra and Meghna River will be changed to 13-yr, 15-yr and 5.5-yr return period floods due to a possible increase in temperature by 2?C; which means the catastrophic flood (Range of flooded area 50,000-57,000 sq. km and range of % inundation 34%-38.5%, as classified by Mirza (2001)) events. For extreme level rise in temperature by 6?C, return period of the same frequency catastrophic flood event will reduce by 3.4 times, 2.3 times and 8.5 times for the Ganges, Brahmaputra and Meghna rivers respectively.

Water logging

Water logging is a result of a combination of factors that include: excessive monsoon rains; inadequate drainage system; mismanagement and lack of maintenance of embankments; increased sediment and siltation of rivers; restricted river flows due to embankments; and the release of water from barrages at the upstream (modified from report of Oxfam Public Health Assessment, August 2011). Bangladesh experienced heavy rainfall in July and August 2011 (413.8 mm against the monthly average of 332.1). Although it did not cause flooding in other parts of country, massive water-logging was created in the three coastal districts namely Satkhira, Jessore and Khulna. Satkhira being the most affected district was inundated by 5-7 feet of water that caused massive displacement in the population and severe destruction of houses, standing crops, homestead-based livelihoods and the local market (UNDP, 2011).

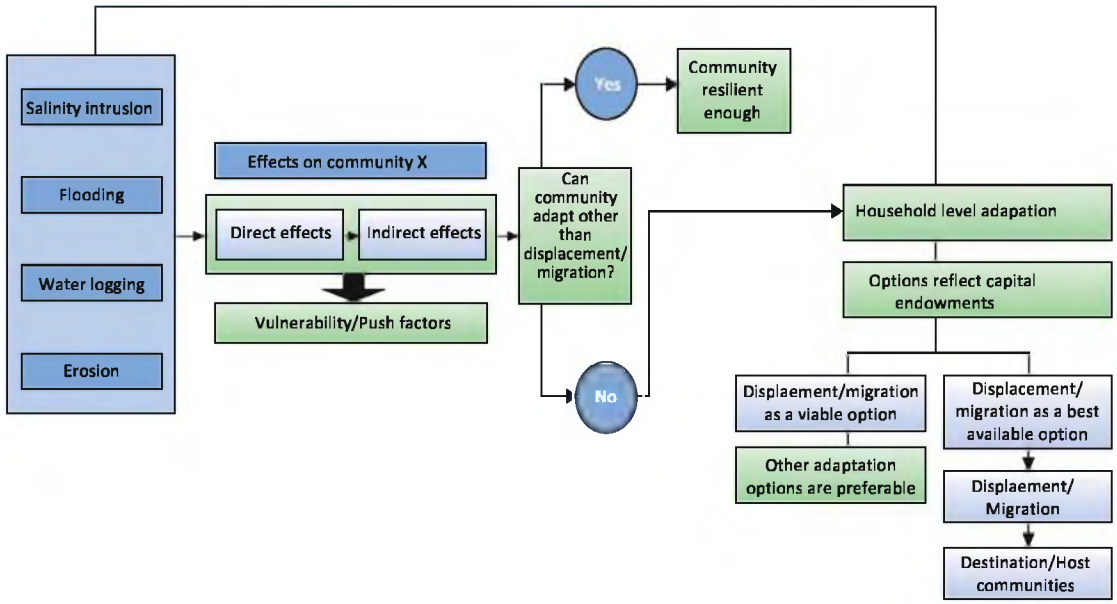
Salinity Intrusion

A joint study of Institute of Water Modelling (IWM) and CEGIS suggests that, sea level rise would increase the extent of saline water intrusion by pushing the saline water front landwards. During monsoon, it is found that 1 ppt salinity line moves towards upstream by 10 km to 20 km mainly in the central part (through Baleswar-Buriwar rivers) due to 27cm SLR and 62 cm SLR respectively. In Hatia and Manpura island in the Meghna Estuary, maximum salinity level will be increased to 3-5ppt for 27cm and 62cm sea level rise respectively. However, for 62 cm sea level rise, the freshwater pocket in the Tentulia river is affected remarkably due to saline water intrusion during

dry season. The Sundarbans, which is already experiencing high salinity, will be affected more by salinity water intrusion due to increased sea level both in dry and monsoon season.

It is revealed that during dry season, 2050 and 2080, for 27cm (A2) and 62cm (A2) sea level rise, brackish water area will be increased by 6% and 9% respectively. In monsoon, increase of brackish area will be 2% and 6% for 27cm and 62cm sea level rise.

Part B: Cause and effect relationship between hazards and internal displacement



The impacts will be assessed first at the community level and then at household level. It is important to examine whether the community is resilient enough for coping with its vulnerability to the hazards and disasters. If not, it is then to inquire on the number of households which are in a vulnerable situation and the level of vulnerability which compels them to take decision to migrate or become internally displaced.

Part B shows the step in conceptualizing how displacement/migration patterns may be influenced by climate change. It is a 'partial' model that focuses on differentiating the adaptive responses of individual households from those of community or higher-level institutions. It begins with the assumption that climate change stimulates some form of change in the environmental and/or socio-economic conditions of a given community (x). The question is then posed whether the community's institutions are able to make necessary adjustments so that the well-being of community members is not especially altered. If community institutions can do so successfully, it is not anticipated that significant changes would occur in migration patterns out of the given community as a consequence of the climate change at that time.

If the community's institutions are unable to cope with the changed environment, individual households remain vulnerable and may be obliged to implement their own adaptive strategies. For some households, displacement or migration of one or more members away from the community may be an option. The households displaced away from the community, would alter community membership, which in turn may alter the nature of community institutions. The community in question is not assumed to exist in isolation, and so it may attract migrants/displaced people from other communities who could not cope with environmental changes there. As a result, the model suggests a feedback cycle in that, as migration patterns begin to change in the given community, community membership and community coping capacity change as well.

This model provides only a very basic framework for the climate-displacement/migration process. It focuses on how migration/displacement decisions are made as private adaptations at the household level.

While the model focuses on migration or displacement as a private adaptation process, it does not specify whether migration or displacement is an adaptive response immediately availableto all community members. The use of the term possible in the model suggests that not all those who have the option of migrating or displacement will do so. To investigate how migration or displacement decisions are made and the circumstances under which they occur, incorporation of theoretical explanations of migration behavior into the model is warranted.

Linkages between the hazar` ds (e.g. floods) and their subsequent effects (direct and indirect) on the community exemplify below.

Flooding ⟶ damage to/loss of housing, infrastructure, crop and livestock

Houses and infrastructure can be damaged and destroyed by the debris-carrying water masses, accompanying landslides or river bank erosion. In urban areas this physical damage is often the main cause of tangible loss (Smith 2001). In rural areas, standing crops, livestock and the agricultural infrastructure can be damaged by the same processes (Kayastha and Yadava 1985; Smith 2001).

Stagnant water & sewage spread ⟶ diseases

Besides directly affecting human health through injuries, flooding can indirectly take a heavy toll on human health by bringing about a sharp increase in diseases. Drinking water contaminated with sewage spread can lead to cholera and dysentery; malaria and yellow fever might break out due to the multiplication of insect vectors in stagnant water (Blaikie et al. 1994). Such diseases often increase the overall number of fatalities (Blaikie et al. 1994; Smith 2001).

Injuries/diseases/loss of crop & livestock ⟶ less work opportunities and reduced income

Injuries and diseases can render people unable to work long after the floods have subsided. In addition, large landowners whose crops have been damaged no longer need labourer in their fields, which can result in wide-spread redundancy. For a family dependent on agricultural products, the loss of standing crops means a serious decline in family income. The inability to work (be it due to injury or redundancy) has the same effect on families that rely on employment.

Capital Endowment

Part B incorporates capital endowments as a means of distinguishing different potential adaptive responses. The influence of household capital endowments on adaptation has given a lens shape in the revised model, symbolizing their potential to distinguish those who migrate as an adaptive response to climate change from those who do not. A similar lens could also be situated at the community level, to suggest that adaptation at levels higher than the household can also be influenced by community endowments of capital. Alternatively, capital could be represented in a more dynamic fashion than simply a lens, to show how it is not static. Here we keep the model as simple as possible, and focus on individual household responses to climate change. Migration or displacement is no longer portrayed simply as a binary phenomenon; rather, multiple possible outcomes exist, with capital endowments being influential. For the sake of simplicity, the migration or displacement outcomes are kept to a small number of possibilities. For example, two households in the same community exposed to adverse climatic conditions might enjoy similarly rich endowments of social capital, such as good relations with extended family elsewhere, but one might own economic capital in the form of land while the other does not. In such a case, the land-owning household may have the option of displacing elsewhere, but might be less inclined or have less need to do so than the other. These different possible outcomes are illustrated in the model by different paths that follow from the capital endowment lens.

Climate change induced natural hazards have physical, social, economic and environmental impacts. More specifically, it has significant effects on sectors like water resources, agriculture, fisheries, health, livelihoods, food security and habitat security. The sectoral impacts will eventually have effect on people's life and livelihood. Livelihood vulnerability will vary depending upon the type, intensity and extent of hazard.

Each year with the looming climate change threats the possibility of displacement of people and communities is increasing due to disasters like erosion, flooding, sea level rise etc. It has been estimated that sea level rise will result in displacement of 25 million people[13].

13. Climate Change and Bangladesh, 2007, CDMP, DoE

The survey findings, historical data trend analysis and climatic projections helped in determining the population on the verge of getting displaced due to climate change induced hazards. This is resulted in the identification of the occurrence and incidence of displacement followed by analysis of impacts on the affected population or the receiving communities. Analysis pertains assessment of social, economic and environmental impacts. Indicators for the social, economic and environmental factors were selected for impact analysis. Impact analysis helped in identification of the possible adaptation measures at local level. To illustrate the level of capital endowment the DFID livelihood framework were used for understanding the base situation and the threshold position of the household which is ultimately the basis for taking the decision of displacement.

Livelihood asset model

Background: A livelihood consists of the capabilities, assets and activities required for a means of living. A livelihood will be sustainable when it can cope with and recover from stresses and shocks[14]. Access to water is now recognized as a precondition for poverty reduction, but in nowadays complex and changing world, competition for water from many different sectors can divert attention from its role in the improvement of human livelihoods. 75% of the world's poorest people are living in rural areas across the world, and for them, water access can exactly mean the difference between life and death[15]. The people living in the study area are also very dependent on the water resources for their livelihood. The Sustainable Livelihood Index (SLI) attempts to assess some of the more fundamental components of the society which influence rural livelihoods, and which can support rural poverty reduction. On the basis of same parameters, the impact of internal displacement is assessed. Thus the overall impact assessment encompass two broad situations: base situation or situation before displacement took place and post-displacement situation. In this way it can help decision makers to provide necessary action plan to build resistance to prevent the displacement.

Conceptually based on the Sustainable Livelihoods Approach of DFID[16] and Human Development Index (HDI), the SLI is designed to employ existing data to calculate values for five capitals of rural livelihoods, namely:

1. Human capital: Human capital represents the skills, knowledge, ability to labor and good health that together enable people to pursue different livelihood strategies and achieve their livelihood objectives.
2. Social capital: In the context of the sustainable livelihoods framework it is taken to mean the social resources upon which people draw in pursuit of their livelihood objectives.
3. Natural capital: Natural capital is the term used for the natural resource stocks from which resource flows and services useful for livelihoods are derived.
4. Physical capital: Physical capital comprises the basic infrastructure and producer goods - e.g. affordable transport, secure shelter and buildings, adequate water supply and sanitation, clean/affordable energy and access to information - needed to support livelihoods.
5. Financial capital: Financial capital designates the financial resources that people use to achieve their livelihood objectives.

The sustainable Livelihood Index (SLI) is calculated on the basis of indicator values representing each of the five livelihood capitals. The resulting composite index reflects the values for these five capitals, and on this basis, judgments are made on how internal displacement impacts to the social and livelihood components.

Objective: The purpose of the SLI is to provide project planners an overview of where the livelihood situation of the study area stands and what could be the possible impacts of the proposed project in terms of livelihood. This in turn will hopefully allow for better targeted policy directives and action plans. Through the measurement of these capitals, it will be possible to assess which of the five capitals are most likely to benefit or vulnerable due to the displacement process and where to trigger first for the policy options.

Structure and computation of the SLI: The SLI includes five major components: human capital, natural capital, physical capital, social capital and financial capital. Each of those comprises several indicators those were selected directly from household survey. Detailed methodology of SLI computation is given in Annex-D.

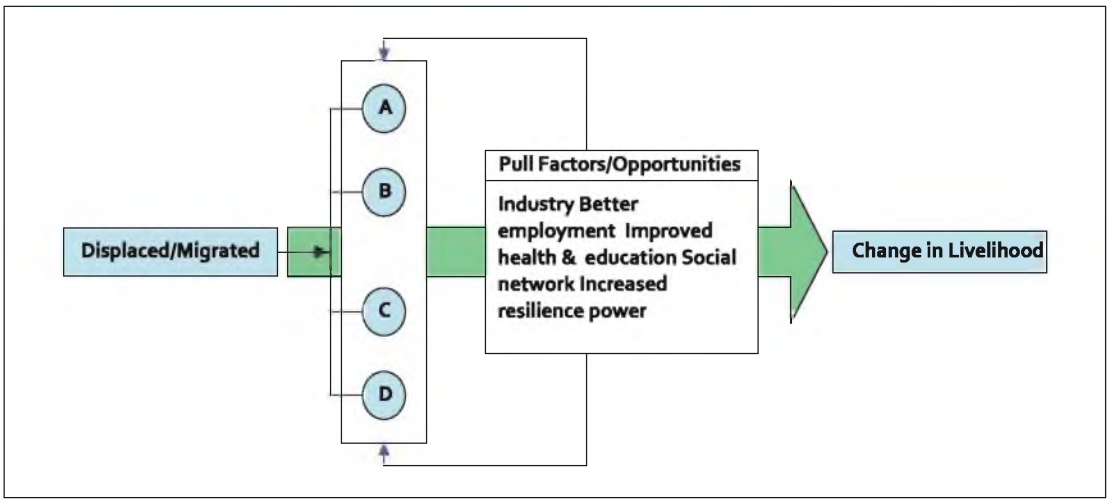
14. Chambers and Conway (1991). Sustainable Rural Livelihood: practical concepts for the 21st century. IDS Discussion Paper 296.
15. FAO. The Rural Water Livelihoods Index: working paper.
16. DFID.Sustainable Livelihoods Guidance Sheets.

The link to displacement

Finally various effects of hazards do not lead directly to migration or displacement but rather to a variety of adaptations. This section examines migration or displacement behavior (from survey and case studies) in order to determine the hazard effects which have been shown to contribute to migration or displacement. Also, the extent of migration or displacement following hazards is looked at and migration or displacement destinations are touched upon as this aspect of the migration decision is of a range of interests. As case studies on displacement after hazards is rare, other sources of knowledge were sought to fill this gap. Because natural hazards with a sudden onset are generally expected to have similar patterns of response and can thus be used as analogues, case studies from such hazards will be included in the analysis.

Part C Impact of Internal Displacement on destination/host communities

Figure 3.13: Schematic scenario of impact of internal displacement on host communities



Part C of the framework clearly shows the impact on host communities with attention to the factors that make the displaced persons to choose certain areas for displacement. A study of displacement induced by riverbank erosion in Bangladesh concluded that people do not move very far (Haque & Zaman, 1989): Interviews in one of the worst affected upazilas showed that 60%of the contestants had been displaced at least once in their lifetime and out of these, 97.8% had moved to a distance less than five miles. However, these results must be interpreted with caution. Interviewing people only in the hazardous area about previous displacement the sample will only contain people who are still vulnerable to the hazard but not the people who have fled the hazard for instance by migrating to far-away cities. The supposition of an upward bias in this study is supported by surveys in Bangladeshi urban slums (reported by Mahmood, 1995): up to 50%of the dwellers stated that they had come to the cities due to riverbank erosion.

Being extraordinarily prone to natural disasters (riverine flooding, drought as well as tropical cyclones) Bangladesh seems a suitable country to investigate the extent and the destinations of disaster-induced displacement/migration. Mahmood (1995) investigated migration in Bangladesh over the last decades. He found that next to prospects for better economic, social and educational opportunities at the destination, flooding, riverbank erosion, drought and tropical cyclones indeed played a vital role in internal migration.

The examples from India, Bangladesh and the USA suggest that of those who do migrate, the majority moves to very short distances and that only some move medium distances (Burton et al., 1993).

Reasons behind displacement

Having established that certain migration or displacement occurs after natural disasters, the interest turns to the reasons and direct causes for the migration. By determining the main reasons for migration or displacement, the link "backwards" to the indirect effects of the natural hazards can be made.

The above part on migration or displacement destinations also provides some ideas and reasons on migration or displacement. The only example where migration has taken place to a very large extent is the case of riverbank erosion in Bangladesh. Out of the people still living in the heavily affected upazila 60% had been displaced at least once, at the same time many city squatters attribute their migration to the cities due to riverbank erosion (Haque & Zaman, 1989; Mahmood, 1995).

A new type of migrants related to a natural disaster was identified in the Guatemalan case (Belcher & Bates, 1983). Poor and landless people from the unaffected rural areas moved to the cities, searching for potential disaster aid, housing and/or employment in the reconstruction building boom. For which, the motivation ofmigration is not a push factor but clearly for having the economic opportunity.

To summarize, the primary reasons for initially movement are the structural damage and the loss of utilities. However, it is not clear what factors determine the decision to migrate permanently. Surprisingly, the extent of damage does not appear to be very relevant. Factors that are assumed to influence the decision are

(i) The extent to which opportunities to generate income have been affected; and
(ii) The initial situation of the individual or household (wealth, power, prior investment into the home etc.).

3.3.3 Scenario analysis

The IPCC predicts that global temperatures will rise between 1.8^0 C and 4.0^0 C in the last decade of the 21st century. The 4th IPCC Report predicts that monsoon rainfall will increase in South Asia, resulting in huge flows during monsoon season through the rivers of Bangladesh coming from India, Nepal, Bhutan and China. Theflows are likely to further increase in the medium term due to the melting of the Himalayan glaciers. The IPCC also forecasts that global warming will result in sea level rise of between 0.18 and 0.79 meters, which could increase coastal flooding and saline intrusion into the aquifers and rivers across a wide belt in the southern part of the country, although most of the area is protected by polders[17] .

Rainfall is predicted to become both heavier and more erratic, and the frequency and intensity of droughts are likely to increase, especially in drier northern and western parts of the country. Bangladesh is widely recognized as one of the most climate vulnerable countries in the world. It experiences frequent natural disasters, causing loss of life, damage to infrastructure and economic assets, and impacts adversely on lives and livelihoods, especially of poor people (ibid).

Analyses of trends and patterns of hazards and climate variability are necessary to predict the impact of climate change on the different sectors. The observed decadal rainfall and temperature trends are assessed and validated with findings of latest studies and compared to observe the variations, if any. Correlations of disasters with the patterns of climate variability have been established, based on availabledata on all type of disasters. Climate variability is analysed using meteorological data dating back near about 30 years. Multiple hazard analysis are also been made for floods, riverbank erosion (river and coastal), water logging and salinity intrusion. The vulnerability due to different hazards is assessed using the state of the art GIS and RS techniques along with the analysis of historical data of extreme events. Case specific data and maps are generated for the selected hotspot areas.

To identify the impacts of climate change on hazards, first of all, the climate change scenarios for the different time variables are needed. Since climate change is expected to enhance the hazards, the propensity of hazard due to climate change has been projected till the year 2030. The scenarios have been developed based on the IPCC and NAPA predictions with support from model derived outputs in some cases.

17. MoEF, 2008.Bangladesh Climate Change Strategy and Action Plan 2008.Ministry of Environment and Forests, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.xvi + 68 pp.

Different Global Climate Models (GCM) and Regional Climate Models (RCM) are availablesuch as PRECIS, Model for the Assessment of Greenhouse-gas Induced Climate Change' (MAGICC) and the 'SCENarioGENerator' (SCENGEN) etc. From these availableclimate model results the change in future climate and possible physical changes along with its possible impacts on internal displacement have identified for each of the selected areas.

3.3.4 Action plan and policy directives

The plight of IDPs for many years remained largely ignored by both national authorities and international organizations. However, the appointment of a Representative of the Secretary General on Internally Displaced Persons in 1992, Francis Deng, marked the commencement of sustainable attention for developing solutions to the challenge of internal displacement. Among that many activities pursued by Deng and his successor, Walter Kälin, has developed international standards for IDPs - the Guiding Principles on Internal Displacement (Guiding Principles)[18] - and their incorporation in the domestic legal and policy frameworks.

An analysis[19] of existing laws and policies on internal displacement reveals that there are four principal models: 1) a brief instrument adopting the Guiding Principles; 2) a law or policy developed to address a specific cause or stage of displacement; 3) a law or policy developed to protect a specific right of the internally displaced people; and 4) a comprehensive law or policy addressing all causes and stages of internal displacement. Most of these models however do not address natural hazards properly as factor of internal displacement which might be a gap filling process with the current study.

To meet one of the prime objectives of this study, existing national plans and policies related to climate change like the National Plan for Disaster Management, the National Adaptation Programme of Action (NAPA), the Bangladesh Climate Change Strategy and Action Plan (BCCSAP), the National Plan for Disaster Management (2010 - 2015) and different sectoral policies such as, the national food policy, the national agriculture policy, the national disaster management policy as well as the activities and investments under certain large projects such as the CDMP etc. have been reviewed.Theavailableregional policies related to climate change and internal displacement, have been also reviewed and the gaps and constraints of existing legal, policy and institutional frameworks have been identified. The key institutions related to climate change and internal displacement issues in Bangladesh have been identified as well and their roles and responsibilitieshave beenreviewed. Consultations were held at regional and national levels with officials of respective public agencies, Community Based Organisations (CBOs), academics and community leaders to assess the effectiveness of existing national policies in dealing with climate induced displacement. The needs of the community andthe measures they recommended during group discussion for improvement of livelihoods to prevent internal displacement,havebeen also discussed with policy level stakeholders and policy implementers.

Finally, issue-based policy briefs have been prepared for the government incorporating the proposed changes, recommendations and additional needs for developing appropriate policies and strategies for climate related displacement. This includes both adaptation options for livelihoods as well as the government policy addressing measures to reduce climate change induced displacement.

3.4 Selection of internal displacement parameters

According to the IDMC, the internally displaced people are defined as: "Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict situations or generalised violence, violations of human rights or natural or human made disasters, and who have not crossed an internationally recognised State border"[20]. In this study internal displacement will include -

1. Households that are displaced temporarily during the onset of disasters;
2. Households that are displaced and unable to return to their original habitat that have been ravaged by disasters; and
3. Households that are migrated in distant locations with little or no intention to return[21] .

18 Francis M. Deng, Guiding Principles on Internal Displacement: Report of the Representative of the Secretary-General, U.N. Doc. E/CN.4/1998/53, (Feb. 11, 1998).
19 Wyndham, J. (2006). A developing trend: Laws and policies on internal displacement. Hum. Rts. Br., 14, 7-70.
20. http://www.internal-displacement.org
21 As defined in the Terms of Reference.

3.5 Operational Definitions of Terms

In line with the internal displacement parameters selected, the study defines some terms for using in the study. The operational definitions of terms that are used in the study are presented below.

Push factor: Push factors are factors or causes with which people tend to be pushed away or repelled from certain locations due to selected natural disasters.

Pull factors: Pull factors are those conditions that attract people to a particular location. These factors may be due to economic, environmental, religious and even political conditions present in the locationsconcerned.

Never displaced: The never displaced category includes those households located in hazard-prone areas, frequently encountering distress situations but are never pushed to be displaced. Instead, they adapt/cope with the situation and are more resilient than the other types of households.

Temporarily displaced: The temporarily displaced category includes those households that tendto be displaced during the onset of disasters. These households are displaced temporarily to neighbors' and relatives' houses, adjacent elevated roads preferably on embankments, nearby shelters and other sustained structures, and return to their original habitat when the situation improves. The maximum staying duration of this category is 6 months in a year.

Permanently displaced: The permanently displaced category includes those households that are permanently displaced to distant locations presumably safe from the selected disasters.These households have little or no chance of becoming displaced further.

In-between temporarily and permanently displaced: The category in-between temporarily and permanently displaced includes those households that were displaced to adjacent areas but are not settled permanently; rather they tend to be displaced again and again.

3.6 Selection of study area

The study areas were selected on the basis of the intensity of natural hazards occurring in the area (in terms of area coverage). In order to select the area, screening survey was done in 48 unions of 24 upazilas under 8 districts considering hazards and their intensity. Based on the survey findings, 29 unions of 17 upazilas under 8 districts were selected for the study. The natural hazards as per the Terms of References (ToR) are riverbank erosion, salinity intrusion, floodsand water logging.

3.6.1 Domains of the study

The domains of the study areas were considered on the basis of the area coverage and intensity of hazards over the year in different parts of the country. Nine districts were considered as the domains of the study area. The hazard prone areas by each type of selected hazards were selected from each of the domains. Here, the calculation of the sample size took into consideration each of the target hazard affected populations. As such, multiple target populations were selected from the study area for the household survey with respect to the measurement objectives of the survey. Thus, the sampling frame was designed to cover the total hazard affected populations of the study area.

Figure: 3.14: Areas vulnerable to monsoon floods

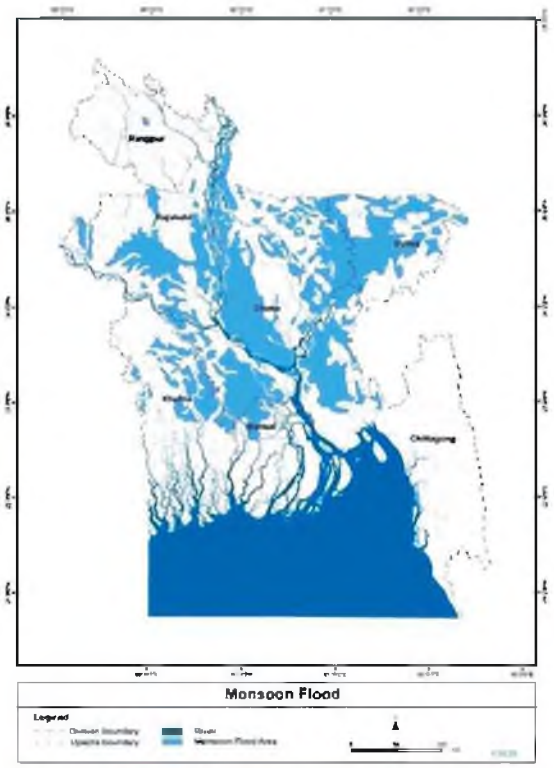


Figure: 3.15: Areas vulnerable to riverbank erosion

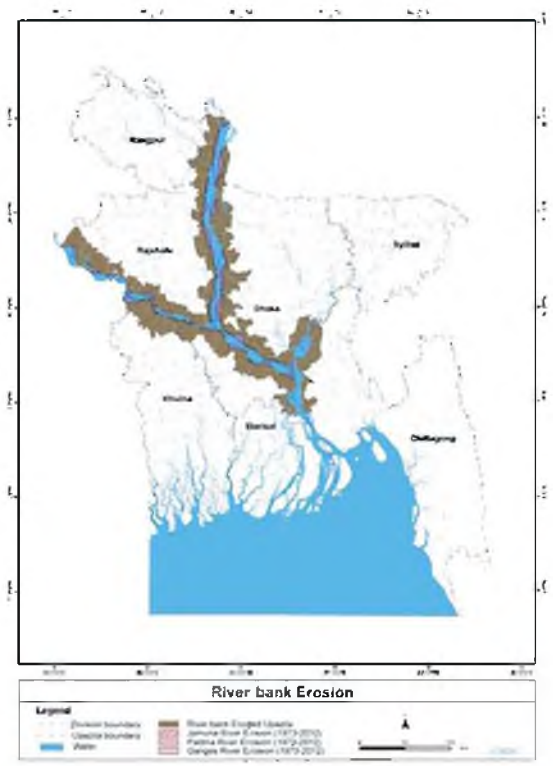


Figure: 3.16: Areas vulnerable to salinity intrusion

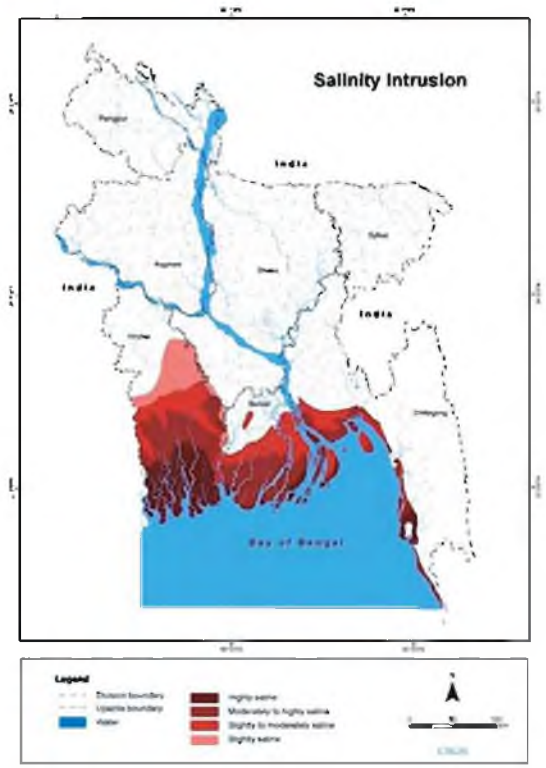
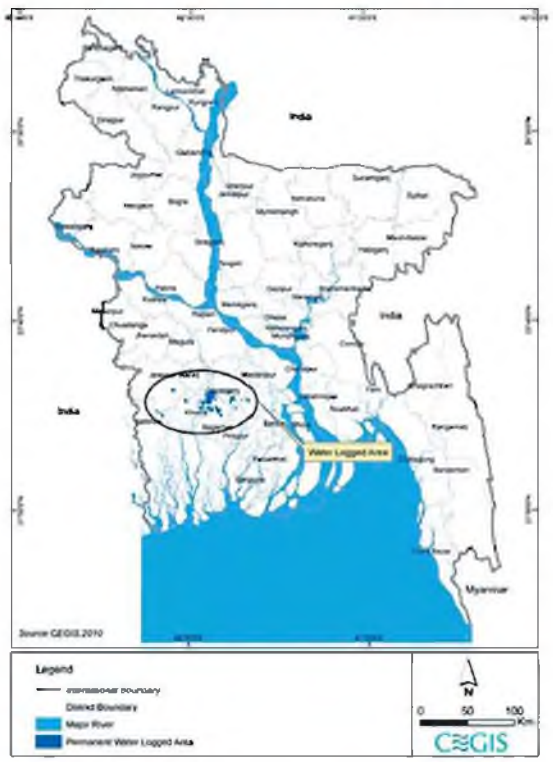


Figure: 3.17: Areas vulnerable to water logging



3.7 Sampling design

The Multi-stage Random Sampling technique was selected for conducting the study. The stages included the selected severely hazard prone districts, respective upazilas, unions, villages and the ultimate target households. One upazila from each of the selected districts and subsequently one union from the respective upazilas were selected based on set criteria. The number of villages under the selected unions was one or more depending on the availability of the required number of sample households for conducting the study.

The Simple Random Sampling was followed for identifying the sample respondent households (never displaced, temporarily displaced, in-between temporarily and permanently displaced) from the selected villages (the place of origin). The permanently displaced households were identified using the Snowball Sampling[22] from the place of destination. Male and female respondents were selected from the sample households proportionately following the male and female ratio of the country. Only one respondent, either male or female, was interviewed from each of the sample households from the place of origin and the place of destination.

Determination of sample size

The sample size in any sample survey is an important factor, which needs careful consideration along with various other determinants. Among them, the principal ones are the variability of the population characteristics being studied, tolerance limits of the margin of error, cost of study per sample unit and also time. Thus, in determining the size of the sample, the variability of the population characteristics and the error margin one is willing to tolerate are the principal determining factors in these types of study where the cost and time are predetermined by the study initiators. Accordingly, only the variability of the population characteristics, as measured by the variance and standard deviation, and the error margin are considered. It has been found that the variance of proportion is less sensitive, particularly in the range of 0.30 to 0.70, than other statistics, such as, the common measures of central tendencies (mean, etc.) and dispersions (Variance, Standard Deviations, etc.). For example, the variance and standard error of proportion P changes relatively lower when P lies anywhere between 0.30 and 0.70. It is assumed that for n (sample size) greater than 60, P is distributed normally. The approximate relationship between the sample size, n, and the proportion P is given by the following formula when finite population correction (fpc) is ignored and the Simple Random Sampling (SRS) design is assumed.[23]

$$n_o = t^2\, pq/d^2$$

and with fpc

$$n = n_o/[1+ (n_0 /N)]$$

where n_o = Approximate sample size ignoring fpc

n = Sample size with fpc

p = Sample estimate of population proportion P

q = 1-p

t = Normal deviate corresponding to 95% confidence interval(two tail test which is equivalent to 97.5% confidence interval for one tail test).

d = Level of accuracy or error margin one is willing to tolerate. It is generally 5 to 10 percent.

N = Size of population

It is further known that the variance pq is maximum, 0.25 when the proportion p=0.5 and thus for t=1.645 for 5% level of significance (one tail) and d=10% margin of error.

$$n_o = (1.645^2 x 0.5 x 0.5)/(0.1)^2 = 67.6$$

For the sake of simplicity and without sacrificing much of accuracy, the samplesize 68 was selected for each subproject of the study.

22. In Snowball Sampling, a technique of Non-probability sampling, one or more key individuals are located and they are asked to name others who would be likely candidates for the study. Snowball Sampling is an effective way to build an exhaustive sampling frame of displaced populations.
23. See Cochran, W.G.: Sampling Techniques; John Willy &Sons, Inc. New York, London, pp 53, 74-75

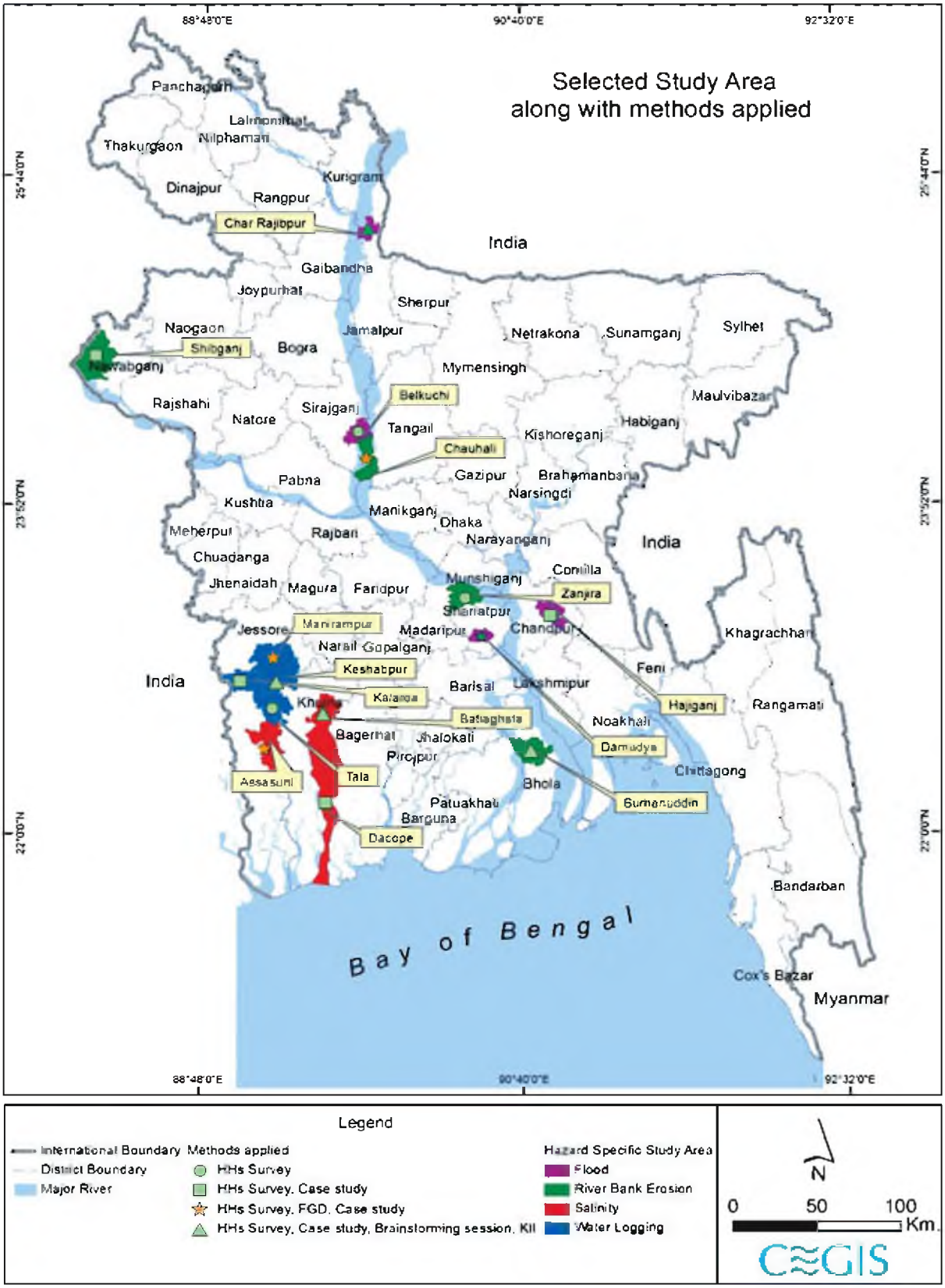
Sample distribution

The sample size, according to the above statements, for the household survey in the place of origin was 816 HHs in nine districts. The sample size for the place of destination in the same 9 districtswas 25% of that for the place of origin (i.e. 204). Location of the permanently displaced households were collected from the place of origin, as they were not available there. For identifying the households in place of origin 14 unions were covered and 27 unions for permanently displaced HHs at the place of destination. The distribution of sample per domain and selected disaster is shown in Table 3.1 below.

Table 3.1: Distribution of sample size by district and disaster

Sl. No	District Name	Sample HHs by type of Disaster of Origin				Sample HHs of Destination	Grand Total
		River bank erosion	Flood	Salinity Intrudad	Water Logging		
1	Sirajganj	68	68	-	-	34	170
2	Nawabganj	68	-	-	-	17	85
3	Shariatpur	68	68	-	-	34	170
4	Bhola	68		-	-	17	85
5	Chandpur	-	68	-	-	17	85
6	Kurigram	-	68	-	-	17	85
7	Khulna	-	-	68	-	17	170
8	Satkhira	-	-	68	68	34	85
9	Jessore	-	-	-	68	17	85
		272	272	136	136	204	1020
Total sampled HHs					816	204	1020

Figure 3.18: Hazard-specific study locations along with methods applied



3.8 Stakeholder selection

In the study area, different stakeholders were selected in connection with the objectives of the study. All of the stakeholders selected were interviewed/discussed for different purposes. Some of them were selected for household survey, some for Focus Group Discussion (FGD) and/or case study. Local government representatives, local elites, local people including women and different occupational groups were the participants of FGD. Brainstorming/consultative workshops were also facilitated to prepare strategic plan for the internally displaced people.

3.9 Tools and techniques

Both quantitative and qualitative data were collected for the study. Quantitative data was collected through conducting household survey and reviewing literatures (secondary data). Face-to-face interviews were conducted using structured pre-tested questionnaires. Qualitative data was collected through conducting FGDs, brainstorming/consultative workshops andcase studies. Household survey and FGDs were conducted in the places of origin and destination, and case studies only in the places of destination.

3.10 Data collection

Desk review

The CDMP project documents, IPCC assessment reports, BCCSAP and other miscellaneous updated literatures as well as secondary reports, documents and papers were reviewed comprehensively. This helped to understand the research and studies that have been conducted so far on internal displacement which contributed in the development of the study methodology.

Household survey

This is the key stage of the data collection and analysis. The households were surveyed through questionnaire/schedule to get the essence of the trends and impacts of internal displacement at household level. The push and pull factors were revealed in addition to the framing of decision-making for internal displacement/migration. Structured interviews through questionnaire were organised among the households in the places of origin and destination. On the basis of the sampling techniques mentioned above, a total of 1,020 households in nine districts were surveyed.

Case study

A total of 12 case studies were facilitated in all nine districts. The cases, selected from the areas of destination where the displaced households are presently residing, were collected at the household level through in-depth interviews, observations and discussions. The households and victims were selected on the basis of their vulnerability caused by internal displacement due to natural hazards. Their sufferings due to internal displacement as well as the decision-making process involved in the displacement/migration are demonstrated through case studies.

Focus group discussion

Totally eight FGDs were conducted in the hazard prone areas, two for each hazard. Among two FGDs, one was facilitated in the hazard prone area of original habitat and the other in the areas of destination where the displaced households are now residing. FGDs using checklist were carried out. FGDs were facilitated among different occupational group members, local elites, school teachers, local government representatives and women who are directly or indirectly affected by the hazards. Each group consisted of 12-14 participants. The FGD participants were selected on the basis of their availability and willingness to participate.

Brainstorming sessions/participatory planning

To supplement and complement the findings of the household survey and FGDs, some participatory learning and brainstorming workshops were facilitated at different levels. The development plan for the displaced people was also developed and finalised through these workshops. At different phases, these brainstorming sessions were represented by local people alone, focus groups of local people, local people and outsiders together, or outsiders alone.

Figure 3.19: Bottom-up steps of participatory brainstorming sessions

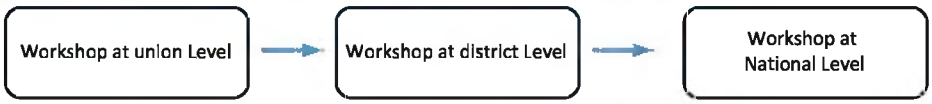


Table 3.2: Stakeholders and Process of participatory brainstorming sessions

Particulars	Union Level	Upazila Level	National Level
Stakeholders	Displaced households, personnel from local power structure, civil society, and members of Union Disaster Management Committee.	Displaced households, personnel from local power structure, political representatives, civil society, and service providers at district level.	Displaced households, scientific community, sectoral experts on displacement, civil society and key institutions as providing services to the displaced people.
Process	Knowledgeable persons were selected for participation in the household survey, FGDs, and invitedtounion level brainstorming sessions.	Knowledgeable persons were selected for participation in union level workshops. Upazila level service providers were also selected as participants.	Participants were selected through consultation with the CDMP.

CHAPTER 4

Baseline and Trend Analysis

Evidence indicates that people who are impacted by disasters try to take several measures for adapting to or coping with the adverse situations. If all such measures fail, they are compelled to move to another location as a last resort for survival. This situation is called displacement to which people are pushed.

However, the issue 'internal displacement' is not well-defined and it has no established methodology and database. In this study, the baseline situation of internal displacement has been compiled on the basis of spatial and temporal conditions of sampled households. On the other hand, trend analysis of internal displacement was attempted on the basis of history recalled by respective households. However, trend analysis in this context is not only difficult but also misleading since people can only remember the recent past. Additionally, segregation between factors contributing to displacement due to disaster and climate change and other drivers is not only difficult but also impractical. It requires intensive and long-term observation at micro scale. In spite of these drawbacks, some figures on internal displacement collected solely from field findings are presented here for providing a glimpse of the displacement situation.

4.1 Baseline situation of internal displacement

In reality, exploring the situation of internal displacement is not easy since there are multifarious factors behind it. Besides, the nature of displacement also varies considering time, space and distance. There is no conclusive category capturing the entire picture due to the diversities. The study has also found complexity in analysing the baseline situation. In spite of these drawbacks, it has been able to outline some categories, though not exhaustive, with a view to grasping the nature of internal displacement.

As per statistical obligation, a total of 1020 households (816 in place of origin and 204 in place of destination) needed to be surveyed. However, 94 households from places of destination were dropped since they could not be located. Thus, totally 926 households (816 in place of origin and 110 in place of destination) have been considered in this study.

The study has categorised the studied households into four segments such as, i) never displaced; ii) temporarily displaced; iii) in-between temporarily and permanently displaced; and finally iii) permanently displaced. The never displaced category includes households that are located in hazard-prone areas, frequently encountering distress situations but are never pushed to be displaced.Instead, they adapt/cope with the situation and are more resilient than the other types of households. The temporarily displaced category includes those households that tendto be displaced during the onset of disasters. These households are displaced temporarily to neighbors' and relatives' houses, adjacent elevated roads preferably on embankments, nearby shelters and other sustained structures, and return to their original habitat when the situation improves. The maximum staying duration of this category is 6 months in a year. The category in-between temporarily and permanently displaced includes those households that were displaced to adjacent areas but are not settled permanently; rather they tend to be displaced again and again. On the other hand, the permanently displaced category includes those households that are displaced permanently to distant locations presumably safe from the selected disasters. These households have little or no chance of becoming displaced further.

The following table (Table 4.1) shows the distribution of sampled households in terms of displacement by the selected disasters. By fitting the surveyed households into the mentioned designated categories, it is found from this table that about 13% belong to the never displaced category, about 46% belong to the temporarily displaced category, about 29% belong to the in-between temporary and permanent category and about 12% belong to the permanently displaced category. It is evident that the rate of either temporary or permanent displacement is comparatively higher than that of never displacement. It shows that people living in disaster-prone areas are somewhat more vulnerable and pushed to become displaced either temporarily or permanently.

Table 4.1: Distribution of sampled households in terms of type of displacement by selected disasters

Places	State of displacement	Households distribution in terms of selected disasters				Total HHs	% of HHs
		Floods	River bank erosion	Water logging	Salinity		
Origin	Never displaced	104 (38%)	2 (1%)	4 (3%)	7 (4%)	117	13
	Temporarily displaced	168 (62%)	-	132 (84%)	129 (82%)	429	46
	In between temporary and permanent	-	270 (79%)	-	-	270	29
	Subtotal of origin	272	272	136	136	816	-
Destination	Permanently displaced	1 (0.4%)	68 (20%)	20 (13%)	21 (14%)	110	12
Grand total		273	340	156	157	926	100

Source: Household Survey-2013, CEGIS

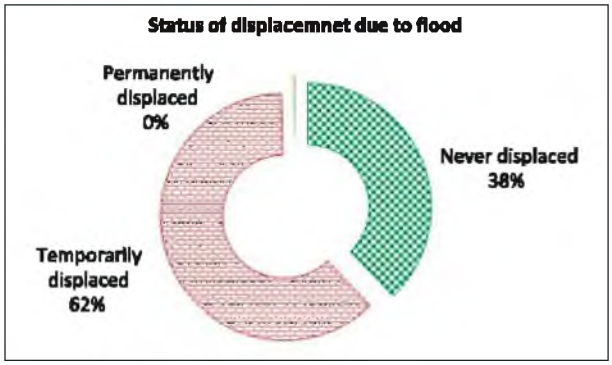
It is evident from field findings that households are not usually impacted by single disasters but by multiple disasters that coincide. River bank erosion and floods are found to occur simultaneously. Water logging is an effect of floods and heavy rainfall. It is found that about 42% of households in the study area have been displaced due to single disasters and about 48% due to more than one disaster. The baseline situation of internal displacement in terms of selected disasters is presented in the following.

Floods

Status of displacement: It has been found that about 62% of households in the study area were displaced temporarily and only 0.4% of households were displaced permanently due to floods. On the other hand, about 38% of households have no experience of displacement and have little or no intention to move. It is evident that permanent displacement is almost absent in this context and that temporary displacement is more apparent here. In flood prone areas, the affected people tended to be displaced to their neighbours' and relatives' houses, or nearby embankments, elevated roads, cyclone shelters and other sustained structures. Throughout the peak flow of flooding they stayed in these locations temporarily but returned to their houses as soon as the water level receded.

Characteristics of displaced populations: The characteristics include socio-economic factors such as age composition, education, occupation and income of the displaced population. It provides the state of displaced population and implies latent reasons behind displacement.

Figure 4.1: Current status of displacement due to floods

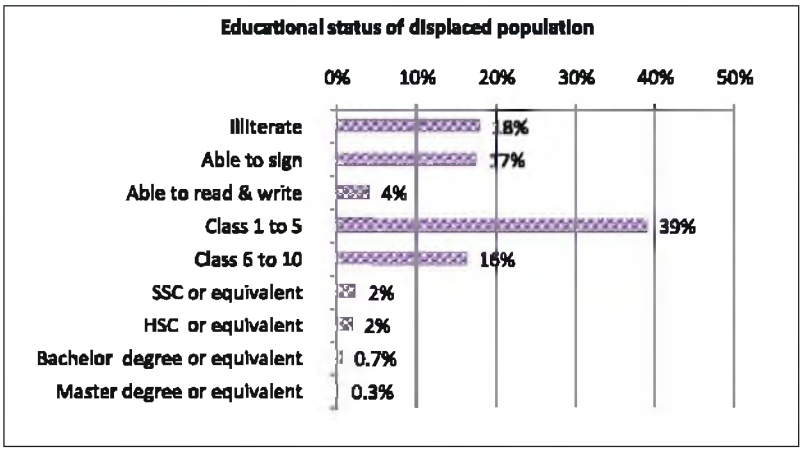


Source: Household Survey-2013, CEGIS

Fifty-two percent males and 48% females were displaced either temporarily or permanently due to floods and among them about 15% are children (age ranges up to 15 years), about 69% are adults (age ranges between 16 to 64 years) and about 2% are the elderly (age ranges over 65 years).

In educational distribution, it is found that about 18% of the flood affected displaced populations are illiterate, about 17% are able to sign, about 4% can read and write only, about 39% completed class one to five, 16% completed class six to ten, only 2% completed SSC and HSC and only one percent had graduated or had a higher degree. It is noticeable here that most of the people belong to the class one to five category. It may be concluded that the displaced population belongs to the poorer category in terms of educational status.

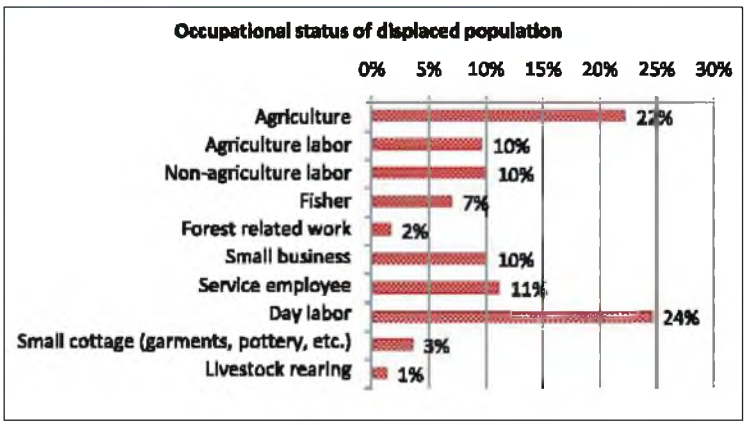
Figure 4.2: Educational status of flood affected displaced population



Source: Household Survey-2013, CEGIS

Among the various occupational groups, it is found that about 32% of flood affected displaced populations are directly or indirectly engaged with agriculture, and among them 10% are agricultural labourers. Besides, about 24% are day labourers and about 10% are non-agricultural labourers. Only 7% are engaged in fishing. It is evident that people work mostly as labourers here.

Figure 4.3: Occupational status of flood affected displaced population



Source: Household Survey-2013, CEGIS

Factors contributing to displacement: There are several factors behind decision-making for displacement. No pull[24] factor has contributed to the displacement due to floods since only one case of permanent displacement has been found here. During monsoon or severe flooding, the affected population tended to stay in safe locations to protect their lives and livelihoods.

24. Details of 'push' and 'pull' factors are described in the operational definitions given in Chapter-3, Approaches and Methodology

Locations of displacement: Destinations of displacement were explored through two ways of assessment. One assessment was conducted through interviewing households that have been displaced to areas near their places of origin. These households were considered in the sampling. Another assessment was carried out considering the responses of surveyed households. In this analysis, long distant destinations have been considered.

The following table (Table 4.2) shows the places of origin and destination. Here, places of origin were selected through sampling but places of destination were explored through the assessment of people's perceptions. Households in places of destination were not easily identifiable since the interviewed households stated that they had no idea about the exact locations of their current residence.

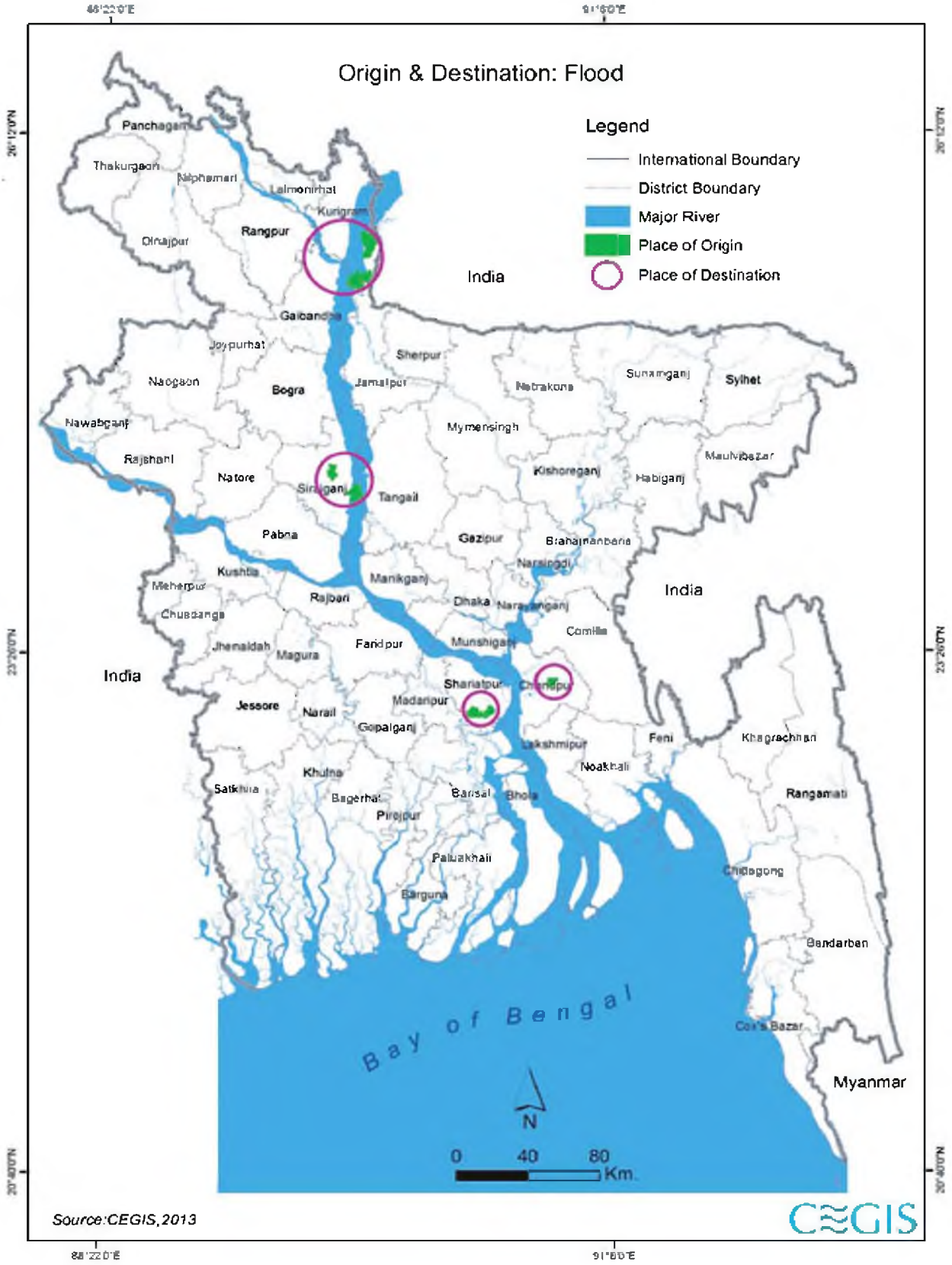
Table 4.2: Origin and destination in case of floods

Origin			Destination
District	Upazila	Union	Districts
Chandpur	Hajiganj	Dakshin Gandarbopur	Rajshahi, Nilphamari, Rangpur, Kurigram, Gaibandha, Naogaon, Sirajganj, Chuadanga, Dhaka, Faridpur, Shariatpur, Chandpur
		Dakshin Kalacho	
	Faridgong	Dakshin Gobindapur	
		Paschim Baluthoba	
Sariatpur	Bhederganj	Kachakata	
	Damudia	Purba Damudia	
		Shidhaul kura	
		Dhano Kathi	
Sirajganj	Belkuchi	Belhuchi	
	Kamadkhanda	Jamtail	
Kurigram	Rajibpur	Char Rajibpur	
	Raumari	Bondabar	
	Char Rajibpur	Mohanganj	
	Raumari	Datbhanga	

Source: Household Survey-2013, CEGIS

On the other hand, the following map delineates the spatial distribution of origin and destination. The green colour represents origin and the circle represents destination. Here, the places of destination are circled since displaced households are living in a scattered manner and cannot be identified within a definite administrative boundary.

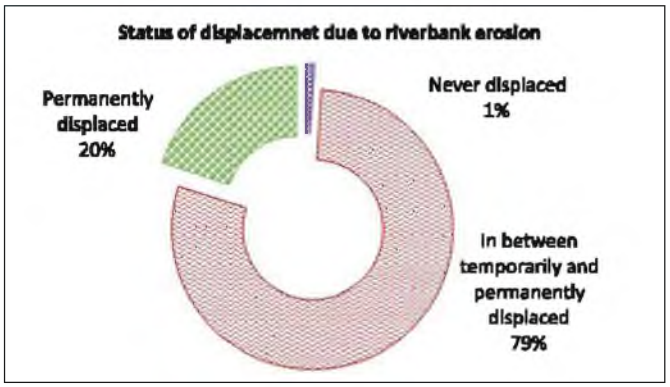
Figure 4.4: Spatial distribution of places of origin and destination



Riverbank erosion

Status of displacement: It was found in the study area that about 20% of households were displaced permanently and only 1% had no experience of displacement. However, a different type of displacement was found in the case of riverbank erosion i.e. about 79% of households belonged to the 'in-between' temporary and permanent displacement category. This category includes those households that were displaced in fear of riverbank erosion but whose homestead land still remains, those that were displaced to the closest erosion-prone areas but are still at risk of being displaced further, and those that were displaced to adjacent embankments but have no intention of becoming permanentlydisplaced. The figure shows that the highest percentage of households belongs to the in-between category. This implies that a significant portion of erosion victim households, in spite of losing assets and wealth, have greater ties to their origin, have no better options of being resettled permanently and /or their lives and livelihoods are somehow centred around rivers. Thus, they are living at the closest end of erosion prone areas.

Figure 4.5: Current status of displacement due to riverbank erosion

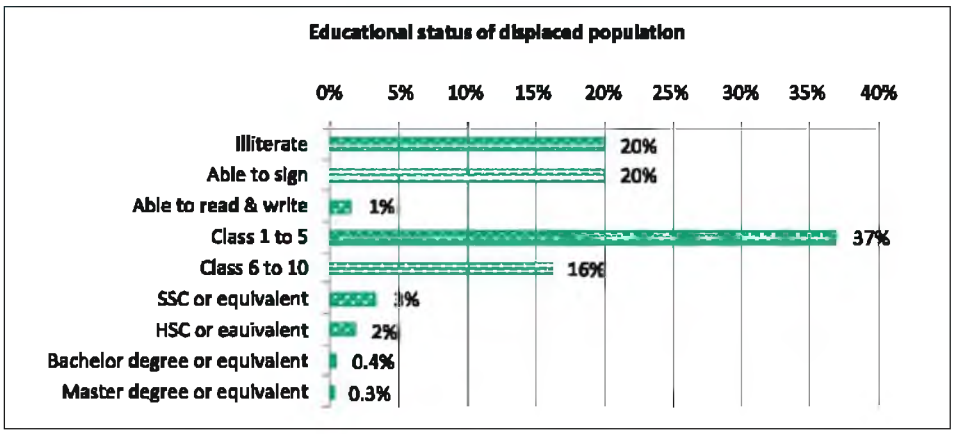


Source: Household Survey-2013, CEGIS

Characteristics of displaced population: Considering the socio-economic characteristics of displaced populations it is found that there were 54% males and 46% female who were displaced due to riverbank erosion, among whom about 27% were children (age ranges up to 15 years), about 70% were adults (age ranges between 16 to 64 years) and about 3% were the elderly (age ranges over 65 years).

In educational distribution, it is found that about 20% of riverbank erosion affected displaced populations are illiterate and able to sign, about 1% can read and write only, about 37% have completed class one to five, 16% have completed class six to ten, only 5% have completed SSC and HSC and only 0.7% have graduated or have a higher degree. It is noticeable here that most of the people belong to the class one to five category. It may be concluded that the displaced population belongs to the poorer category in terms of educational status.

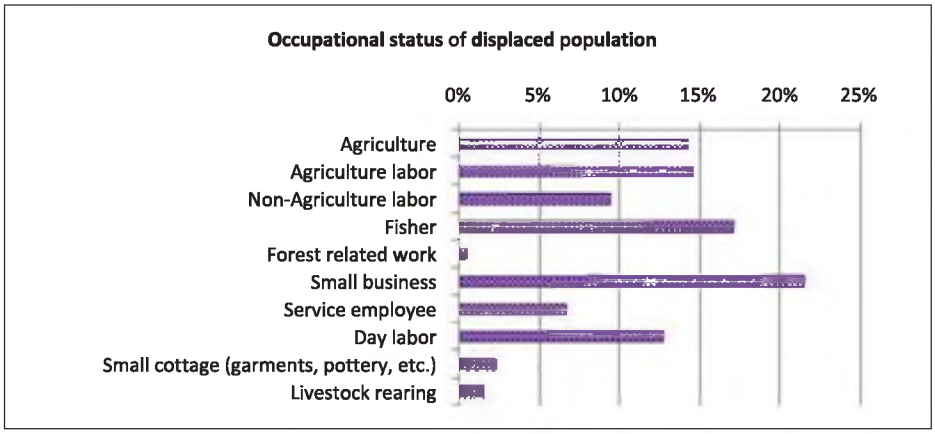
Figure 4.6: Educational status of riverbank erosion affected displaced population



Source: Household Survey-2013, CEGIS

Among the various occupational groups, it is found that about 29% of riverbank erosion affected displaced population are directly or indirectly engaged in agriculture, among whom 15% are agricultural labourers. Besides, there are about 13% day labourers, and about 9% non-agricultural labourers. A noticeable portion of the displaced population is engaged in small business (22%) and fishing (17%). Small business includes fish retailing, fish stocking, fish processing, agricultural input supplying, vegetable selling and so on. However, fish related small business is dominant in the studied locations. Considering the rate of fish related small businessmen and fishers, it is apparent that a major portion of various occupational groups is somehow engaged in fish related activities as their main means of livelihood. It thus implies that since fish related livelihood is closely connected with rivers, displaced households cannot be settled permanently at a distant location away from rivers. They rather prefer close interaction with rivers from which they earn their livelihoods and tend to live in 'in-between' locations.

Figure 4.7: Occupational status of riverbank erosion affected displaced population



Source: Household Survey-2013, CEGIS

Factors contributing to displacement: In the case of riverbank erosion, all households were displaced due to push factors i.e. riverbank erosion eroded homestead and agricultural lands and they have no alternative options other than migration to new areas within the vicinity or move to new places.

Locations of displacement: In the case of riverbank erosion, places of destinations were also explored through two types of assessment. One was through interviewing households that were displaced to the nearest areas of origin while another involved assessing their perception of those who have been displaced to distant locations. Analysing perceptions it is found that people were displaced in the district sadar of the respective districts and different city areas. Most of the destinations in this category are urbanin nature.

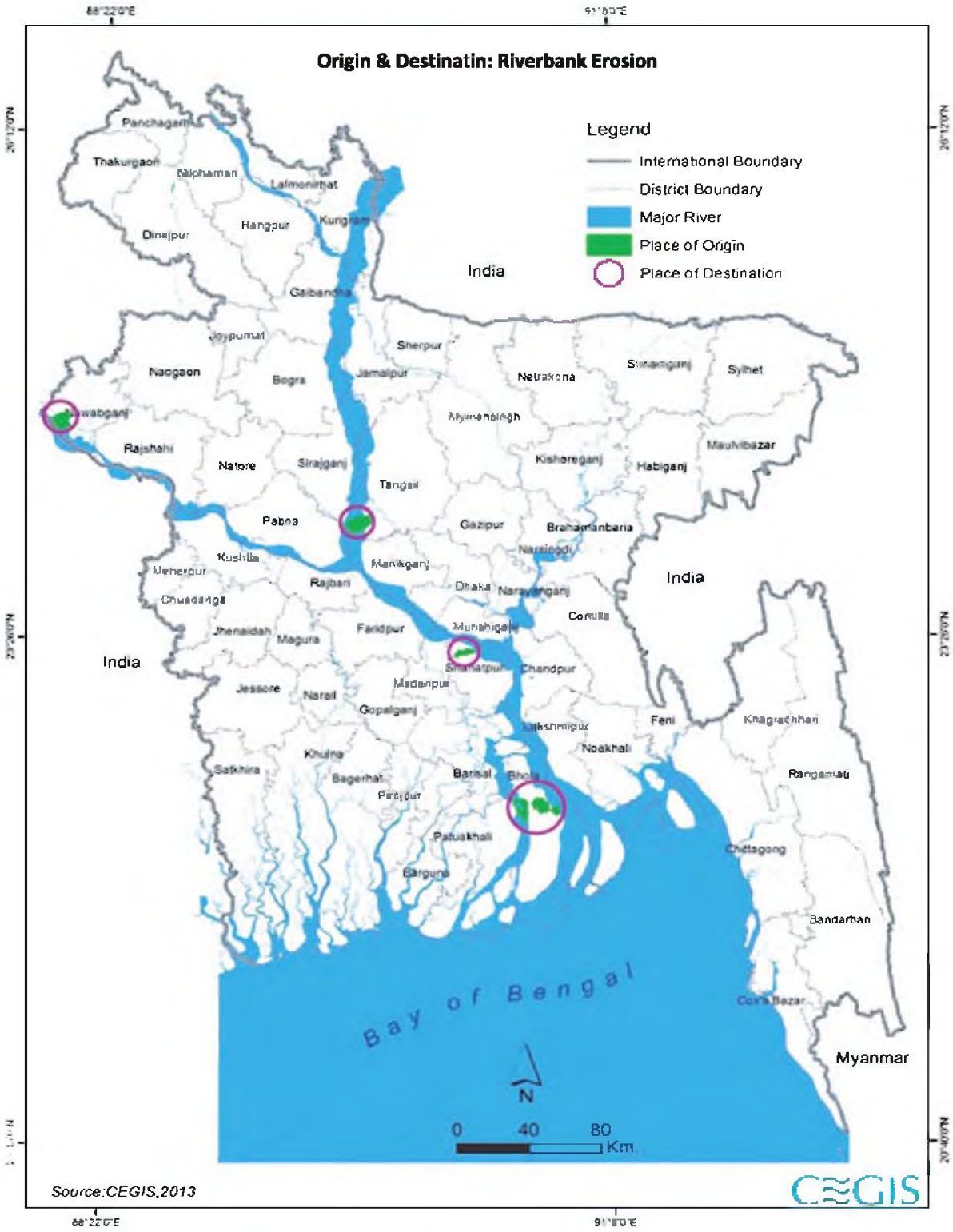
Table 4.3: Origin and destination in the case of riverbank erosion

Origin			Destination
District	Upazila	Union	Districts
Bhola	Borhanuddin	Boromanika	Bhola Sadar, Pabna, Sirajganj , Tangail, Naogaon, Dhaka, Chittagong, Faridpur, Chapainwabganj, Rajshahi
		Pakkia	
		Gongapur	
		Hasan Nagar	
Sirajganj	Chauhali	Omarpur	
		Baghutia	
		Chauhali sadar	
		Khaspukuria	
Shariatpur	Janjira	Boroikandi	
Nowabganj	Shibganj	Ujirp ur	
		Pakka	

Source: Household Survey-2013, CEGIS

On the other hand, the following map delineates the spatial distribution of places of origin and destination. The green colour represents origin and the circle represents destination. Here, places of destination are circled since displaced households are living in a scattered manner and cannot be identified within a definite administrative boundary.

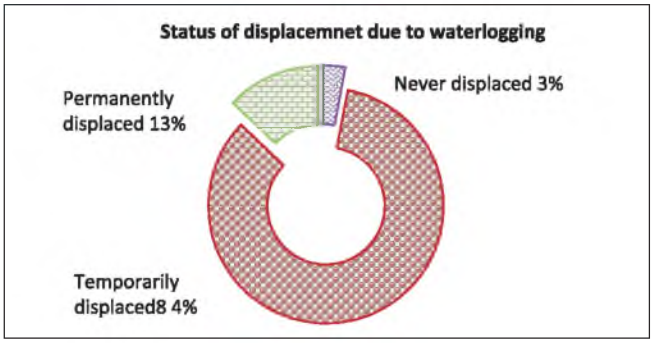
Figure 4.8: Spatial distribution of places of origin and destination



Salinity

Status of displacement: It is found in the study area that about 14% of households were permanently displaced, about 82% of households were temporarily displaced and about 4% of households, although living in salinity intruded areas had no experience of either permanent or temporary displacement. It is also found that in the study area permanently displaced households are not affected solely with salinity ingress but riverbank erosion has also had an impact that has left nothing for them. Besides, salinity intrusion decreased agricultural production leading to wide scale unemployment among those who were dependent solely on agricultural production. These groups of people were pushed to become displaced permanently to urban areas. On the other hand, temporarily displaced households comprised those who were displaced due to a very severe cyclonic storm (namely SIDR in 2007) and a severe storm surge (namely AILA in 2009). This group of displaced population has a higher probability of becoming displaced further if any sort of drastic natural events take place, as they are still living in vulnerable locations.

Figure 4.9: Current status of displacement due to salinity ingress

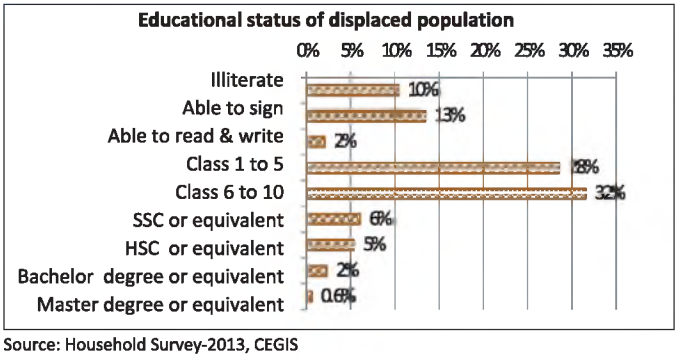


Source: Household Survey-2013, CEGIS

Characteristics of displaced populations: Considering the socio-economic characteristics of displaced populations it is found that 52% males and 48% female were displaced due to salinity ingress and among them about 23% are children (age ranges up to 15 years), about 73% are adults (age ranges between 16 to 64 years) and about 4% are the elderly (age ranges over 65 years).

In educational distribution, it is found that about 10% of salinity affected displaced populations are illiterate, about 13% are able to sign, about 2% can read and write only, about 28% have completed class one to five, 32% have completed class six to ten, only 11% have completed SSC and HSC and only 0.8% have graduated or have a higher degree. It is noticeable here that most of the people belong to the class six to class ten category. It is evident from the figure 4.9 that a significant portion of the affected population belong to the secondary and higher secondary category. This implies that the tendency of achieving education is increasing among displaced populations. The displaced people interviewed pointed out that since their scope of livelihood is decreasing day by day, they are experiencing the urgency of acquiring skills and knowledge in competitive urban areas to which they were displaced and their destinations provide ample opportunities for them to be educated; their enrolment in educational institutions is increasing. Although current enrollment in higher studies is not better than that of secondary and higher secondary levels, they are now determined to acquire a minimum level of education. In future, the rate of enrolment in higher studies may increase.

Figure 4.10: Educational status of salinity affected displaced population

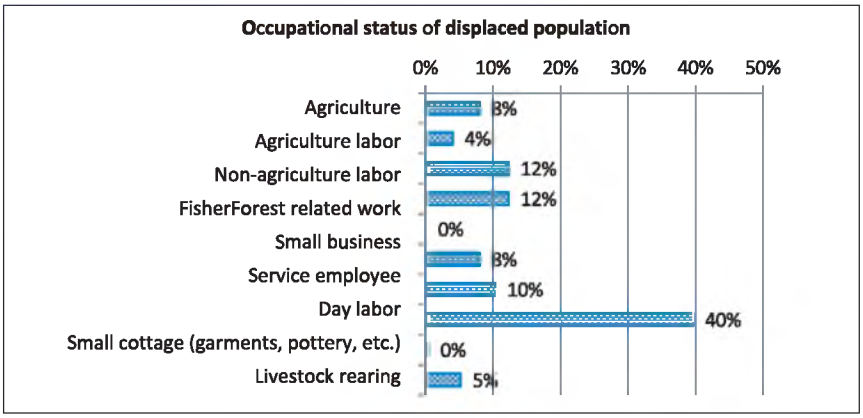


Source: Household Survey-2013, CEGIS

Among the various occupational groups, it is found that about 12% of salinity affected displaced populations are directly or indirectly engaged in agriculture among whom4% are agricultural labourers. Besides, there are about 40% day labourers, and about 12% non-agricultural labourers. About 12% are engaged in fishing and about 10% are service employees.

In salinity ingress areas, there is a chronological history of adopting diverse occupations. Before salinity ingress, agriculture was the dominant occupation in the study area. After introduction of brackish water shrimp culture and its associated handsome cash flow, some merchants in migrated to this area and started shrimp culture. Being attracted with the cash flow, agricultural lands were cultured with shrimp seasonally by the landowners themselves and by the merchants. In some cases, shrimp culturists grabbed cultivable land from small and marginal holders and converted them into shrimp farms. Overall agricultural production decreased as salinity deteriorated the texture and quality of soil in the area and eventually shrimp culture dominated in place of agricultural practices. Thus, a drastic occupational mobility had taken place and in some cases it led to wide scale unemployment. Agricultural labourers were compelled to take up day labour in fish farms and some of them tended to become displaced to the nearest peri-urban areas in search of better livelihood.

Figure 4.11: Occupational status of salinity affected displaced population



Source: Household Survey-2013, CEGIS

Factors contributing to displacement: In assessingthe factors behind decision-making related to displacement there emerged variations considering the nature of displacement. In the case of temporary displacement, all households were displaced due to push factors since they had no options better than permanent displacement. However, segregation between push and pull factors in the case of permanent displacement is much more difficult and impractical in a sense. This is because although they have emphasised on salinity factor as the main reason, several other factors such as health problems, unemployment, alternative livelihood options, poor communication system damaged by the salinity ingress, floods, riverbank erosion, cyclone etc. also play a role behind it. However, it is evident that the salinity factor has a latent role to play in all these other factors.

Locations of displacement: In the case of salinity, places of destinations were also explored through two ways of assessment. One means of assessment was interviewing of households that were displaced to nearest areas of origin and another involved finding out their perception about those displaced to distant locations. By analysing perceptions it is found that people were displaced to Dhaka city and Rangamati district. Most of the destinations in this category are urban in nature.

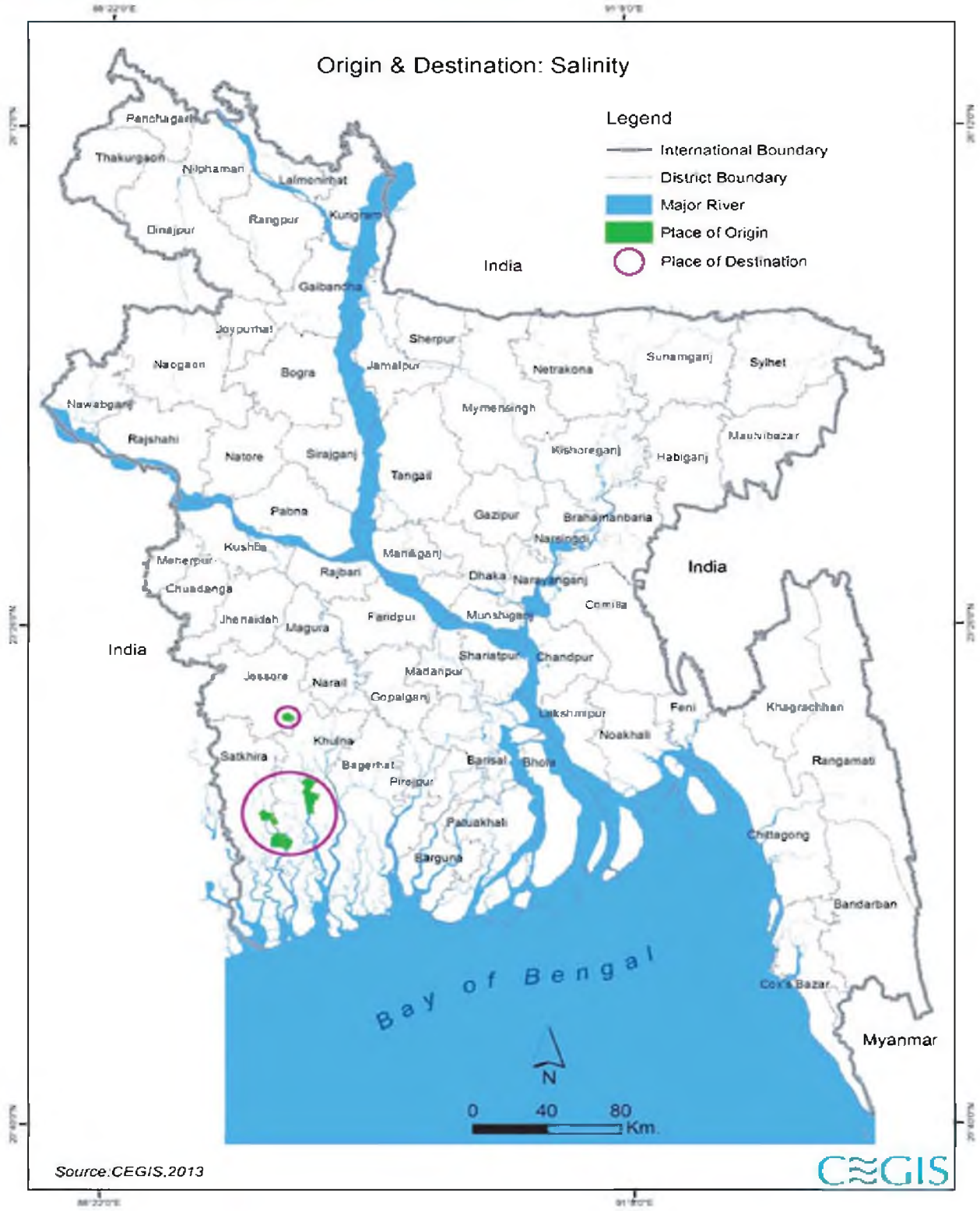
Table 4.4: Origin and destination in case of salinity

Origin			Destination
District	Upazila	Union	Districts
Satkhira	Shyamnagar	Gabura	Dhaka and Rangamati
	Assasuni	Pratapnagar	
Khulna	Koyra	Moharajpur	
		Dokshin Bedkasi	
	Dacope	Sutarkhali	
		Tildanga	

Source: Household Survey-2013, CEGIS

On the other hand, the following map delineates the spatial distribution of the places of origin and destination. The green colour represents origin and the circle represents destination. Here, places of destination are circled since displaced households are living in a scattered manner and cannot be identified within a definite administrative boundary.

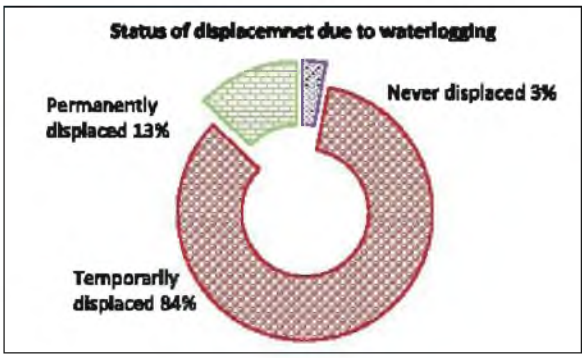
Figure 4.12: Spatial distribution of places of origin and destination



Waterlogging

Status of displacement: It is found in the study area that about 13% of households were displaced permanently, about 84% of households were displaced temporarily and about 3% of households, although living in waterlogged areas, have no experience of either permanent or temporary displacement. Waterlogging is a slow onset disaster. It is not considered as a single factor contributing to displacement but rather there are several other factors as well such as floods, tornado etc. Households being affected severely during monsoon usually tend to displace temporarily to elevated places and return to their original habitat after the water recedes. Looking at households that were displaced permanently, it is found that they have no better option for resettlement, their homesteads are permanently under water, and the scope of earning livelihoods is limited. All these impacts emerge with waterlogging that eventually push them to become displaced permanently.

Figure 4.13: Current status of displacement due to waterlogging

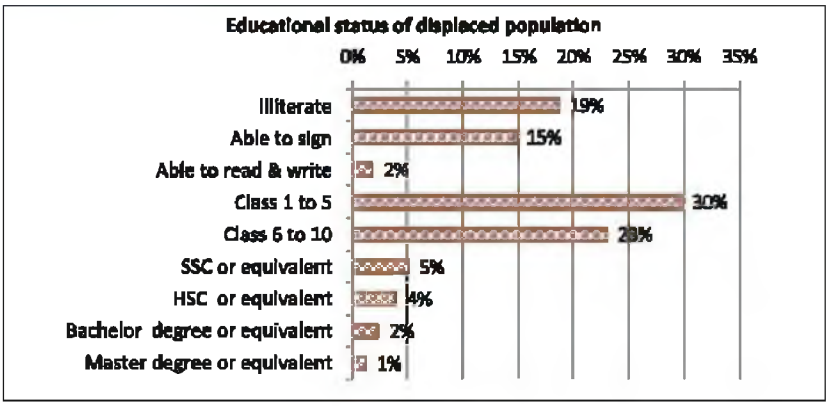


Source: Household Survey-2013, CEGIS

Characteristics of displaced populations: Considering the socio-economic characteristics of displaced populations it is found that 48% males and 52% female were displaced due to waterlogging among whom about 23% are children (age ranges up to 15 years), about 72% are adults (age ranges between 16 to 64 years) and about 5% are the elderly (age ranges over 65 years).

In educational distribution, it is found that about 19% of waterlogging affected displaced populations are illiterate, about 15% are able to sign, about 2% can read and write only, about 30% have completed class one to five, 23% have completed class six to ten, only 9% have completed SSC and HSC and only 3% have graduated or have a higher degree. It is noticeable here that most of the people belong to the class six to ten category. It is also evident from the figure (**Figure 4.14**) that a significant portion of the affected population belong to the secondary and higher secondary category. This implies that the tendency of achieving education is increasing among displaced populations.

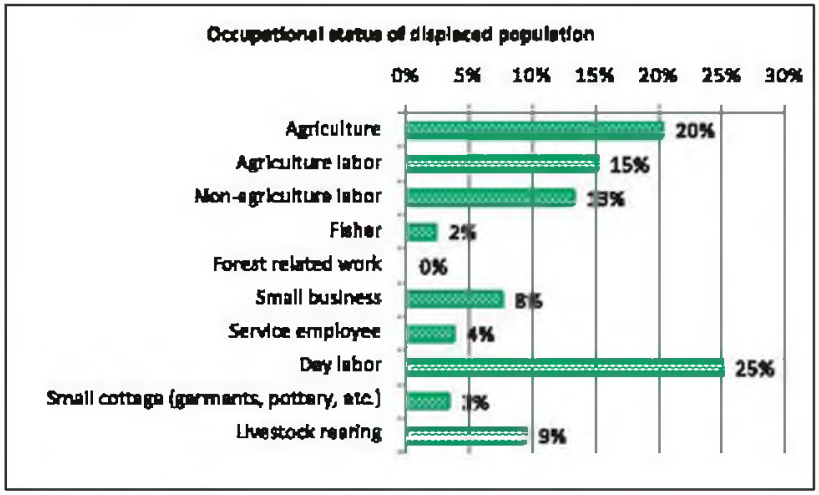
Figure 4.14: Educational status of waterlogging affected displaced population



Source: Household Survey-2013, CEGIS

Among the various occupational groups, it is found that about 35% of waterlogging affected displaced populations are directly or indirectly engaged in agriculture among whom 15% are agricultural labourers. Besides, there are about 25% day labourers, and about 13% non-agricultural labourers. About 8% are engaged in small business and about 9% are engaged in livestock rearing. It is evident that agriculture is the mainstay of their livelihood.

Figure 4.15: Occupational status of salinity affected displaced population



Source: Household Survey-2013, CEGIS

Factors contributing to displacement: While assessing factors contributing to decision-making regarding displacement there also emerged variations considering the nature of displacement. In the case of temporary displacement, all households were displaced due to push factors since they had no options better than permanent displacement. However, segregation between push and pull factors in the case of permanent displacement is much more difficult and impractical in a sense. It is also evident that the salinity factor has a latent role to play behind all these other factors.

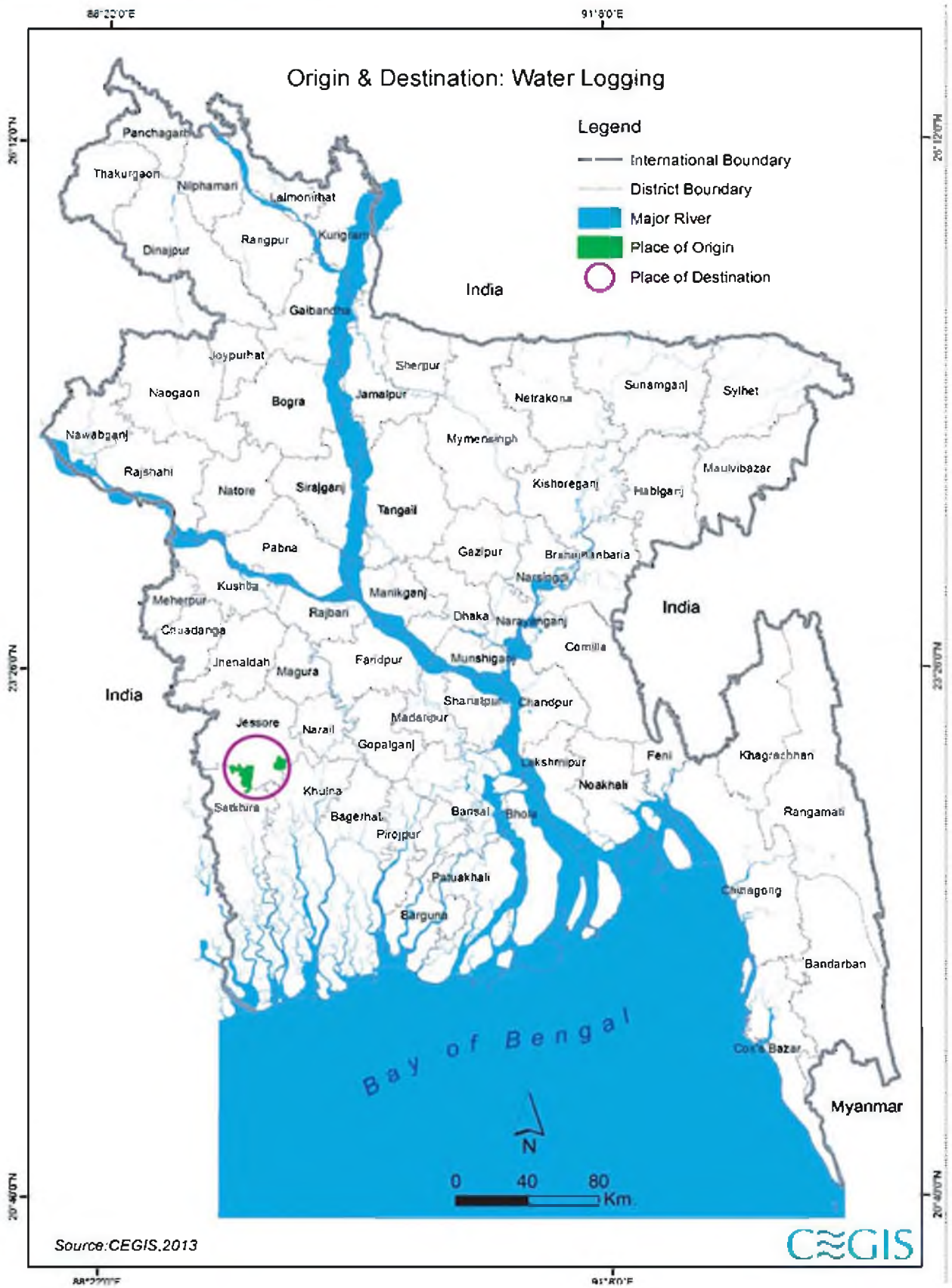
Locations of displacement: In the case of waterlogging, places of destinations were also explored through two ways of assessment. One was assessed through interviewing households that were displaced to the nearest areas of origin and another through assessing their perception about those who were displaced to distant locations. By analysing perceptions, it is found that people were displaced in different districts and city areas. Most of the destination in this category is urban in nature.

Table 4.5: Origin and destination in case of water logging

Origin			Destination
District	Upazila	Union	Districts
Satkhira	Kolaroya	Dlara	Barisal, Dhaka, Jessore, Khulna, Narail, Satkhira and Thakurgaon
Jessore	Monirampur	Nahalpur	
		Monoharpur	
	Keshobpur	Trimohoni	
		Sagardari	

Source: Household Survey-2013, CEGIS

Figure 4.16: Spatial distribution of origins and destinations



4.2 Trend analysis of internal displacement

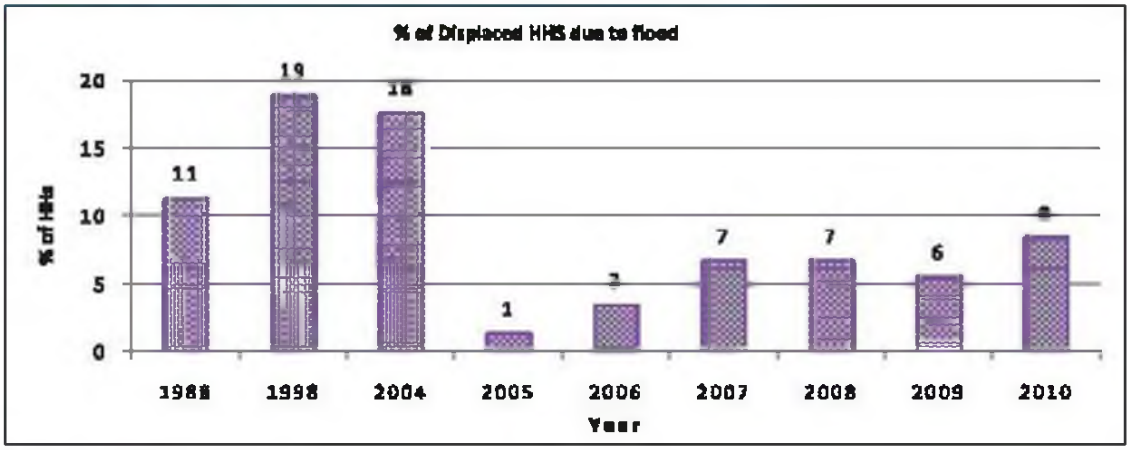
Trend analysis of internal displacement is very difficult since no data are available on this issue. In this section, some year-specific values have been considered estimating household responses in terms of experience of displacement in previous years. These distributions have been made among only households displaced either temporarily or permanently throughout their lifetime. This is nothing but a method of history recalling. It should be mentioned here that the interviewed people were able to recall several years from the earliest past but the study has considered only the recent past since it is easier for people to remember the recent past better than the earliest. Furthermore, the displacement rate of some years was estimated during which catastrophic natural events had taken place. This past trend has been assessed based on the memory of those events recalled in detail by victims.

Floods

Flood is a very common disaster in Bangladesh and the country has repeatedly faced severe devastating floods in the previous decades. Bangladesh is mostly a low-lying delta formed at the confluence of three large rivers: the Ganges, the Brahmaputra and the Meghna (GBM). Floods affect up to about 80% of land of the country. In a normal year, 20-25% of the country is inundated by river spills and drainage congestions (MoEF/UNDP, 2005). A noticeable portion of flood affected population, thus, tend to be displaced either temporarily or permanently.

It is found from the following figure (**Figure 4.17**) that out of the total displacement status about 11% were displaced in 1988, about 19% in 1998 and about 18% in 2004. In these years very severe floods had taken places. Almost all of the households were displaced temporarily while only one household was displaced permanently.

Figure 4.17: Distribution of displaced households due to floods along with years



Source: Household Survey-2013, CEGIS

Riverbank Erosion

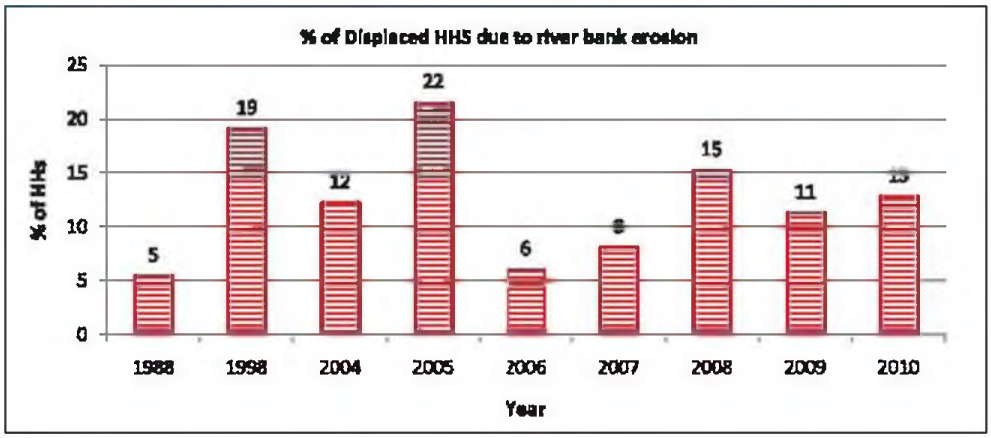
The Ganges and the Brahmaputra, coming from the Himalayas with their huge sediment loads and tectonics interact with each other to form the Bengal delta, which is the world's largest modern delta comprising 100,000 sq. km. of riverine floodplain and deltaic plain environment (Goodbred et al., 2003a) of Bangladesh and India. Most part of Bangladesh is thus formed by a low lying plain with a mild slope from the north to the south, where the country meets the Bay of Bengal at the entrance in the south (Elahi, 1991a).

The morphology of the rivers of Bangladesh is highly dynamic and riverbank erosion is also a regular phenomenon, particularly along the banks of the main rivers. According to a study by CEGIS (2009), the present rate of bank erosion of the Jamuna River is about 2500 ha per year while bank erosion by the Padma River is about 1500 ha per year. In 2008, erosion along the banks of the Jamuna was 530 ha, the Ganges around 880 ha, and the Padma 535 ha, of which about 85 ha, 75 ha, and about 100 ha respectively comprised settlements (DoE, 2012).

In this study, the selected districts for riverbank erosion are basically caused by the Mahananda, Ganges, Jamuna, Padma, Meghna, and Tetulia rivers. As these rivers are a part of the major river systems of the country, they damage assets and wealth and eventually push many households to become displaced permanently. Permanent displacement is the ultimate situation for riverbank erosion affected populations.

In anlysing trend, it is found from the following figure (Figure 4.18) that out of the total displacement status about 19% were displaced in 1998, about 22% in 2005, about 15% in 2008, about 11% in 2009 and about 13% in 2010.

Figure 4.18: Distribution of displaced households due to riverbank erosion along with years



Source: Household Survey-2013, CEGIS

It is evident that riverbank erosion is a disaster that pushes people toward rapid displacement. However in some cases, the situation was aggravated further with the coincidence of flooding which resulted in a comparatively higher rate of displacement in the years when severe floods occurred.

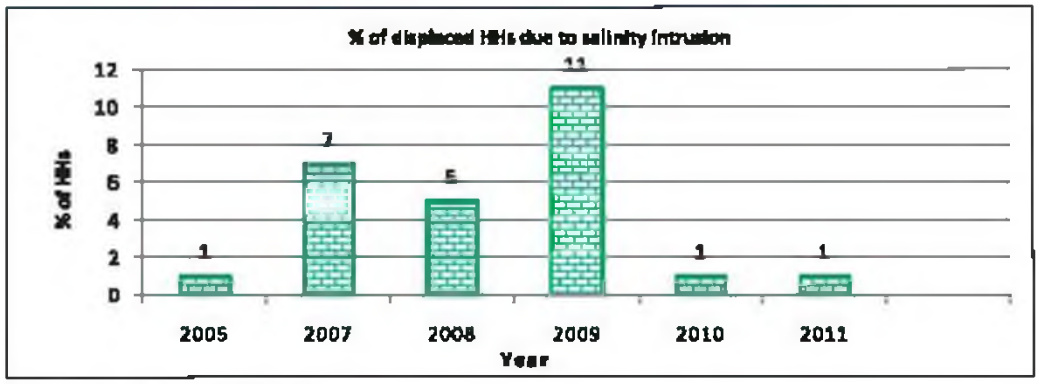
Salinity

Salinity intrusion in sweet water is a disaster for households if the contamination level of saline water is so high that it exceeds the tolerance limit of the drinking water standard. Moreover, saline water has very adverse impacts on the agriculture sector; major emphasis is therefore given to water quality, especially the quality of ground water. One (1) ppt. and higher salinity condition is considered as the threshold of salinity intrusion disaster.

Displacement due to salinity ingress does not occur frequently. It occurs when drastic natural events take place. People in the study area gave multiple reasons behind their displacement due to salinity ingress. The coastal embankments were severely damaged by cyclones and thunder storms and inundated homesteads with saline water. All these hazards take place very frequently in coastal areas and damage physical infrastructure which causes either permanent or temporary displacement of people.

In overall assessment, no trend of displacement is observed over the time period (Figure 4.19). It shows that displacement due to salinity intrusion was intensive in the years 2007 and 2009. Two terrible natural disasters (SIDR in 2007 and AILA in 2009) occurred in those years. Both disasters destroyed a large number of small and large infrastructures including embankments, road networks, institutions etc. and eventually pushed saline water into the main land. These also damaged crops, vegetation, livestock, poultry and homesteads and even caused a number of fatalities among the population. People opined that these disasters had pushed a huge number of people to become displaced in the consecutive years 2007, 2008 and 2009.

Figure 4.19: Distribution of displaced households due to salinity intrusion along with years



Source: Household Survey-2013, CEGIS

It is expected that due to sea level rise more area will come under tidal influence. The area under tidal range of less than 30 cm is considered to be a non-tidal zone. For different sea level rise scenarios, tidal penetration length has been estimated based on model results (IWM and CEGIS, 2007). These indicate that the tide will penetrate upstream by 10 km for 27 cm SLR and 20 km for 62 cm SLR compared to the base condition.

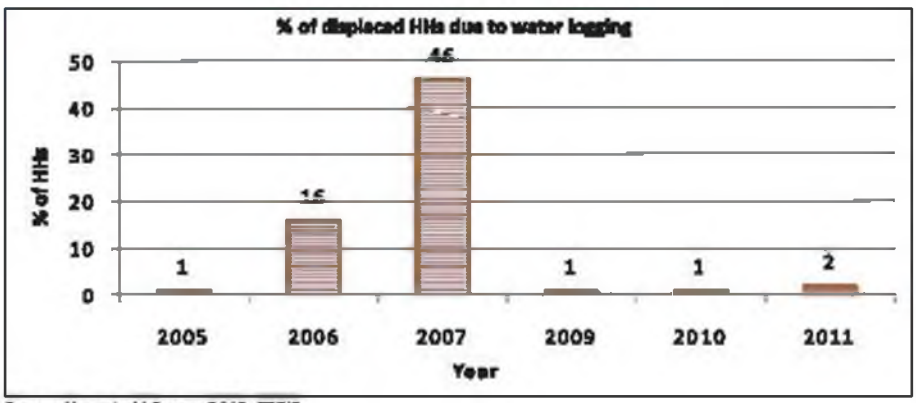
The study areas of Khulna and Satkhira districts will be affected by increase in salinity levels and intrusion. The areas are under high salinity influence (5 ppt) in base condition, while they will be under the influence of higher degrees of salinity (5 to 15 ppt) by 2050. So, the associated impacts on crops and living beings will be devastating.

Water Logging

Water logging is a result of a combination of factors that include: excessive monsoon rains; inadequate drainage; mismanagement and a lack of maintenance of embankments; increased sediment and siltation of rivers; restricted river flows due to embankments built for shrimp farming; and the release of water from barrages upstream (modified from the report of Oxfam Public Health Assessment, August 2011). Due to perpetual siltation in the rivers and as a consequence of unplanned development and interventions on the river system, long-lasting water-logging in human settlements has become a major issue for Bangladesh. Heavy rainfall in monsoon in the country may not cause floods but may be able to trigger a massive water logging problem in the coastal zone, especially for the 18 coastal districts of the country.

The country experienced heavy rainfall in July and August 2011 (413.8 mm against the monthly average of 332.1). Although it did not cause flooding in other parts of the country, massive waterlogging was created in the three coastal districts namely Satkhira, Jessore and Khulna. Satkhira being the most affected district was inundated by 5-7 feet of water that caused massive displacement in the population and severe destruction of houses, standing crops, homestead-based livelihoods and local markets.

Figure 4.20: Distribution of displaced households due to water logging along with years



Source: Household Survey-2013, CEGIS

In overall assessment no trend in displacement is found over the designated time period (**Figure 4.20**). However, it is found that water logging was rapid in the years 2006 and 2007. People stated that the cyclone AILA contributed a lot to the displacement in 2007. Water logging is a slow onset disaster. It is not considered as a single factor contributing to displacement rate, rather several other factors such as floods, tornado etc. play a major role in causing displacement. In the case of water logging, displacement takes place very slowly and temporarily but the duration of displacement is longer than for flood.

It is apparent from the analysis that although determining the push and pull factors is difficult in relation with the respective disasters, yet displacement, whatever the rate, occurs either drastically or minimally. It may be impacted further by unprecedented global warming and the associated climate change. In future, the situation may become worse. It is urgent to give special attention to this issue and mainstream it into the national and regional policy making.

CHAPTER 5

Situation and Impact Analysis

The chapter deals with the situational analysis of internal displacement and the impacts of displacement upon both displaced populations and host communities. The entire analysis is based on household survey (selected through sampling procedure), Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs).

The situational analysis is outlined following traditional socio-cultural indicators and the Sustainable Livelihood Approach (SLA) developed by DFID. Impact analysis has been done for both displaced households and host communities following several socio-economic indicators. In the analysis, a comparative situation is unveiled between never displaced and displaced households.

In analyzing situation, the entire households are categorised into two distinct segments for instance never displaced and displaced. In this categorisation, households that have no experience of any kind of displacement and presently have little or no intention to move elsewhere are termed as 'never displaced'. On the other hand, households that have experience of displacement either temporarily or permanently as well as those who are positioned in-between places but have no firm decision to be displaced permanently rather have chance to be returned to their original habitat are typified as 'displaced'. Thus, three categories such as temporarily displaced, in between permanently and temporarily displaced and permanently displaced households are taken together to be denoted as displaced.

5.1 Demographic Profile

Household and population

The 926 households in the study area had a total population of 4,483 of which 2,383 were male and 2,100 were female. The male population was found to be higher than the female population. The average male-female ratio was 117 of which there were 117 males per 100 females which was higher than the national figure of 100.3 (BBS 2011). The average household size was found to be 4.94, which was also higher than the national household size of 4.50 (HIES 2010 [25]).

The study also found 53% males of which 8% were never displaced, 25% were temporarily displaced, 14% in-between temporarily and permanently displaced, and about 6% were permanently displaced. On the other hand, 47% were found to be female of which about 6% were never displaced, 22% were displaced temporarily, 13% in-between temporarily and permanently displaced and 5% were displaced permanently.

Table 5.1: Distribution of households and population in terms of displacement category

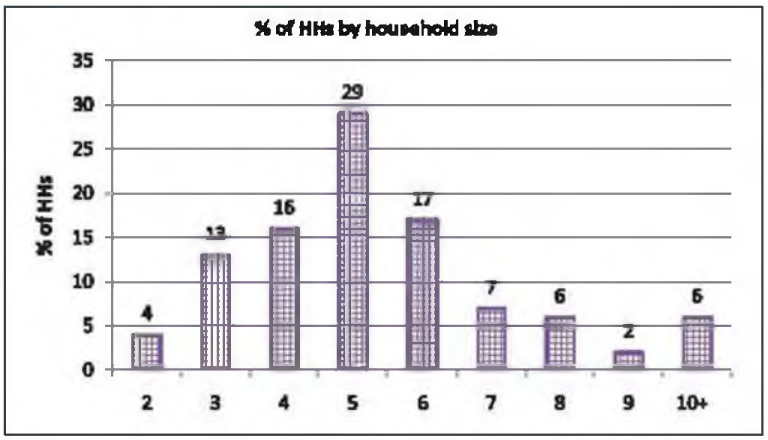
Types of displacement	HHs	Population						HH size	Sex ratio
		Male		Female		Total			
	No.	No.	%	No.	%	No.	%		
Never displaced	117	352	8	273	6	625	14	5.34	129
Temporarily displaced	429	1,112	25	994	22	2,106	47	4.91	112
In between permanently and temporarlly displaced	270	632	14	591	13	1,223	27	4.53	107
Permanently displaced	110	287	6	242	5	529	12	4.81	119
Total	926	2,383	53	2,100	47	4,483	100	4.94	117

Source: Household Survey-2013, CEGIS

25. HIES 2010 refers to Household Income and Expenditure Survey conducted by the Bangladesh Bureau of Statistics (BBS) in 2010.

The table also shows variation in average household size and sex ratio. It was found that the average household size was 4.94 while it was 5.34 among the never displaced, 4.91 among the temporarily displaced, 4.53 amongthe in-between temporarily and permanently displaced and 4.81 among the permanently displaced. Furthermore, there were 129 males per 100 females among the never displaced households, 112 males per 100 females among the temporarily displaced households, 107 males per hundred females among the in-between temporarily and permanently displaced and 119 males per 100 females among the permanently displaced households (Table 5.1).

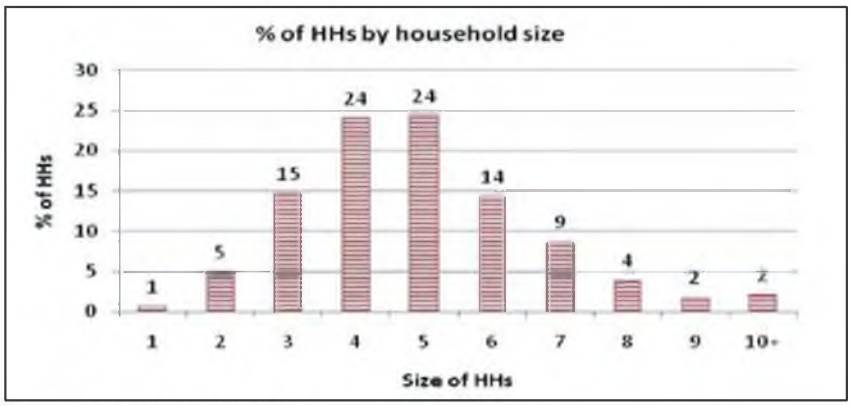
Figure 5.1: Distribution of never displaced households by household size



Source: Household Survey-2013, CEGIS

The above figure (Figure 5.1) shows the distribution of households by household size. It was found that about 29% of households comprised 5 persons, 17% comprised 6 persons and 16% comprised 4 persons in the case of never displaced households.

Figure 5.2: Distribution of displaced households by household size



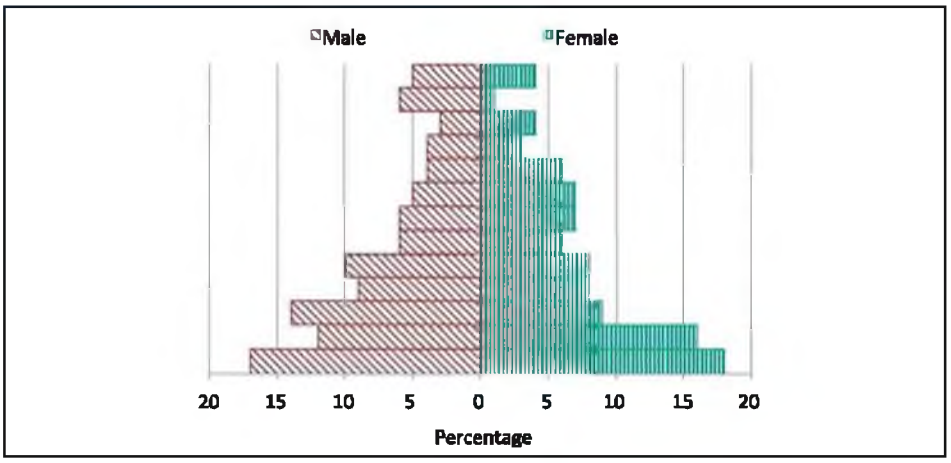
Source: Household Survey-2013, CEGIS

On the other hand, it is found in the figure (Figure 5.2) that 49% of households comprised 4 and 5 persons and 29% comprised 3 and 6 persons among displaced households. Only 2% of households comprised more than 10 persons.

Age composition

Considering age composition among the never displaced households, it was found that about 31% of the population belonged to age ranges between 0 and 9 years, 60% between 14 and 59 years and about 9% were in the above 60+ years categories. The percentage of male and female population between age ranges 15 and 59 was more or less equal (Figure 5.3).

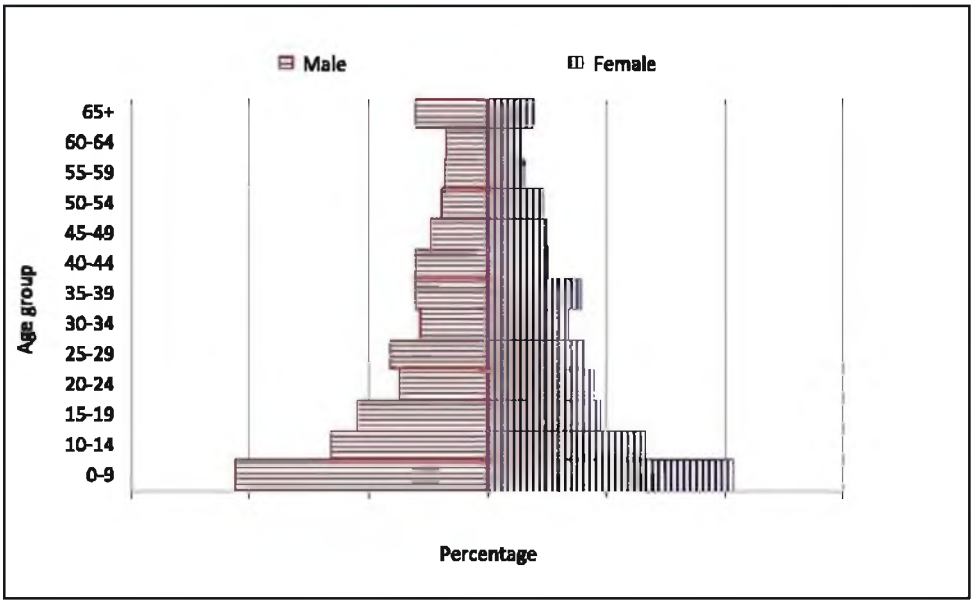
Figure 5.3: Population pyramid of never displaced population



Source: Household Survey-2013, CEGIS

On the other hand, in the case of displaced populations it was found that the percentage of both males and females was higher between age ranges of 0 and 9. The percentage of female population between age ranges 15 and 59 was higher (59%) than that of males (56%). On the other hand, the percentage of elderly male population (age ranges from 60 to 65+) was higher (9%) than that of elderly female population (7%) (Figure 5.4).

Figure 5.4: Population pyramid of displaced population



Source: Household Survey-2013, CEGIS

Education

The following table (Table 5.2) shows the education and literacy level distribution of the population of above 7 yearswho have never been displaced. It is found that about 36% of the population belongs to the category of class one to five and 22% belong to the category of class 6 to 10. About 13% of the population is totally illiterate and 16% can sign only.

Table 5.2: Educational status of 7+ year population

Education level	Never displaced		displaced	
	Male (%)	Female (%)	Male (%)	Female (%)
Illiterate	12	14	15.6	19.5
Able to sign	15	18	17.0	17.7
Able to read & write	1	3	2.0	2.6
Class 1 to 5	37	35	35.4	34.1
Class 6 to 10	23	21	19.3	20.6
SSC or equivalent	4	3	5.0	2.5
HSC or equivalent	4	4	3.4	2.0
Bachelor degree or equivalent	3	1	1.6	0.5
Master degree or equivalent	1	1	0.6	0.5
Grand total	100	100	100	100

Source: Household Survey-2013, CEGIS

On the other hand, educational status varies in term of displaced population. It is found that about 31% of the population belongs to the category of class one to five and 17% belong to the category of class 6 to 10. About 16% of the population is totally illiterate and can sign only. According to gender wise distribution, male-female literacy rate is almost equal. Although males are comparatively privileged than females in education from SSC/equivalent to higher studies, the difference between them is not significant at all.

Occupation

In terms of engagement in primary occupation, it is found that agriculture is the main source of livelihood earning among the never displaced households, about 11% of the populations is directly engaged in agricultural practices and about 6% are agricultural laborers. The percentage of day laborers is also noticeable as almost 10% of population is engaged in it. Besides, 34% of housewives and about 18% of the population are unemployed.

Considering gender-wise distribution, female participation in direct income generating activities is comparatively lower than that of males. About 79% of females are housewives and about 14% are unemployed. On the other hand, although unemployment of males is comparatively higher (21%) than females the rest of the males are directly engaged in income generating activities (Table 5.3).

Table 5.3: Distribution of populations by primary occupation

Types of occupation	Never displaced		Displaced	
	Male (%)	Female (%)	Male (%)	Female (%)
Agriculture	19.2	0.6	14.1	0.7
Agriculture labour	11.2	-	10.4	0.5
Non-agriculture labour	7.9	1.3	8.9	1.3
Fisher	1.4	-	10.7	0.3
For est related work	0.5	0.6	0.2	0.2
Small business	5.6	-	12.8	0.7
Service employee	11.7	1.3	6.6	0.8
Day labour	16.8	0.6	18.5	2.9
Small cottage (garments, pottery, etc.)	3.3	-	1.1	1.1
Housewife	-	78.8	-	77.8
Livestock rearing	0.9	2.5	0.4	2.9
Unemployed	21.5	14.4	16.3	10.7
Total	100	100	100	100

Source: Household Survey-2013, CEGIS

It is found among displaced households that agriculture is also the main source of livelihood earning, about 7% of the population is directly engaged in agricultural practices and about 5% are agricultural laborers. The percentage of day laborers is also noticeable as almost 10% of the population is engaged in it. Besides, 37% of housewives and about 13% of the population are unemployed.

Considering gender-wise distribution, female participation in direct income generating activities is comparatively lower than that of males. About 73% of females are housewives and about 11% are unemployed. On the other hand, although unemployment of males is comparatively higher (16%) than females,the rest of the males are directly engaged in income generating activities (Table 5.3).

5.2 Livelihoods Analysis

In analyzing the situation of livelihoods at household level, the Sustainable Livelihood Approach (SLA) initiated by DFID has been followed. Based on that model, five livelihood capitals were considered with equal importance. In doing so, two pentagons were drawn for the never displaced and displaced households. Data obtained from the household survey were the only source of information on which the SLA model was drawn. In the following table (Table 5.4) area-wise distribution of the sampled households along with their composite livelihood indices are presented. Detailed outlines of the livelihood index are given in Annex-D.

Table 5.4: Locations along with sampled HHs and composite livelihood indices

Types of displaced HHs	Sampled HHs	Composite livelihood index
Never displaced	117	0.53
Displaced	809	0.51

Source: Household Survey-2013, CEGIS

The following figures (Figure 5.5 & 5.6) show the situation of livelihood. Comparing the five capitals it is evident that social and natural capitals are in poorer condition than others. Human, physical and financial capitals are almost equal in both cases. However, generally it can be said that although there exists variation in achieving index value, households of both categories are having leading similar type of livelihood situation.

Figure 5.5: Livelihood Index of never displaced households

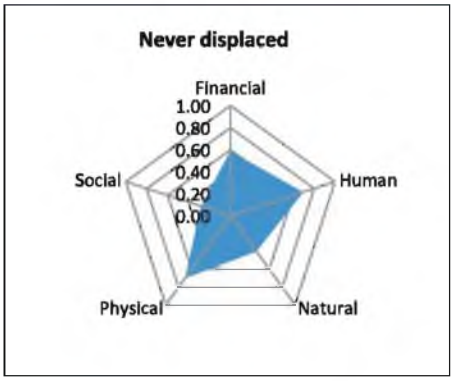
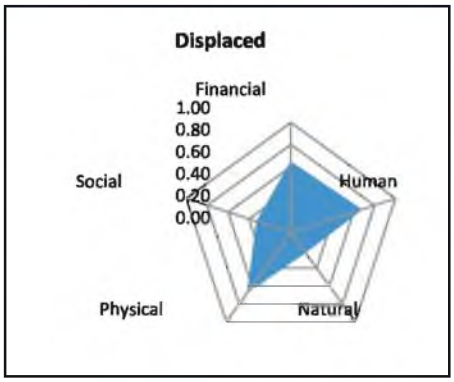


Figure 5.6: Livelihood Index of displaced households



5.2.1 Human Capital

Human capital is one of the main building blocks for pursuing livelihood outcomes. Being vulnerable to various climatic consequences, human capital is one of the most important capitals for improving the overall condition of livelihood so that households become more resistant to future shocks and vulnerabilities.

Health

Health is a significant indicator of human capital. Good health allows people to pursue different livelihood strategies and achieve their livelihood objectives. The health issue was examined in both places of origin and destination separately and variations were found.

Considering disease profile, three diseases e.g. fever/cold/cough, and diarrhea are commonly found in both places. Waterborne diseases are common in all four disaster prone (floods, riverbank erosion, salinity and water logging) areas (Table 5.5).

Table 5.5: Diseases profile in the study area

Name of diseases	Never displaced HHs (%)	Displaced HHs (%)
Fever/cold/cough	99	98
Malaria	11	3
Pox	15	13
Diabetes	3	5
Diarrhea	64	72
Tuberculosis	2	2
Arsenicosis	2	0.55
Others	12	21

Source: Household Survey-2013, CEGIS

In response to the question of suffering from critical diseases/disability, about 75% of the population of never displaced households and about 81% of the population of displaced households answered that they could report no cases of such illnesses. On the other hand, 25% of never displaced households and 19% of displaced households answered that their households suffered from such diseases/disability. It is seen that suffering from critical diseases/disability is higher among those never displaced compared to those who are displaced. It is assumed that people who were displaced have somehow adapted to their places of destination.

The following table (Table 5.6) shows the status of receiving health care services and facilities from different sources. It is noticeable that a significant portion of never displaced and displaced households usually go to untrained physicians of villages. Local people tend to go to these physicians for health care services since they are located close and no transportation cost is involved.

Nevertheless, it is found that a significant portion of local people also tend to go to the upazila health complex and union health centre. They responded that in critical cases, they go to these types of health centres on referral from rural physicians.

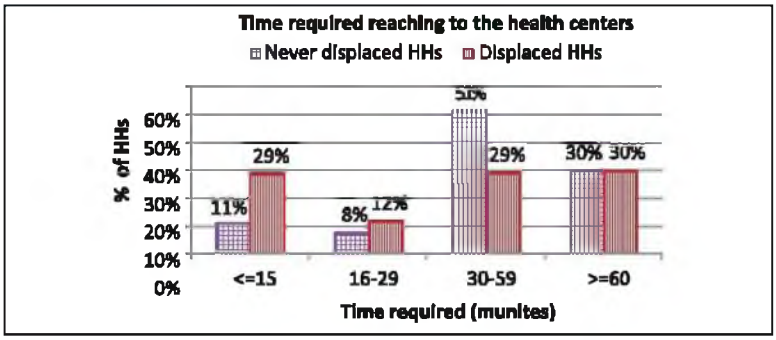
Table 5.6: Status of receiving health care services and facilities from different sources

Service for treatment	Never displaced HHs (%)	Displaced HHs (%)
Untrained village physicians	87	88
Private doctors	14	13
District government hospitals	25	13
Upazila health complexes (govt.)	32	50
Union health centres (govt.)	36	24
Private/NGO health centres	4	7
Community health clinics	25	23
Pharmacies	34	42
Others	2	2

Source: Household Survey-2013, CEGIS

The following figure (Figure 5.7) shows time required for reaching adjacent health centres. It shows variations in the time requirements. However, it is apparent from the overall scenario that people who are displaced are more privileged than the never displaced as 11% of the never displaced and 29% of the displaced households required less than or equal to 15 minutes to reach the adjacent health centres.

Figure 5.7: Time required reaching to the adjacent health centers



Source: Household Survey-2013, CEGIS

Knowledge and skill

The knowledge and skills of an individual contribute a lot in developing human capital. It helps an individual to pursue livelihood more effectively.

In response to the question of having mobile phones, radio and television at household level, about 68% of the never displaced and 75% of the displaced households responded that they had those assets. However, 56% of the never displaced households and 45% of the displaced households responded that they watched television and listened to the radio for entertainment as well as for getting weather related information.

In response to the question of receiving any sort of livelihood improvement trainings, about 6% of the never displaced and about 16% of the displaced households responded that they had received trainings. The trainings includedthose for improving livelihood mechanisms such as income generating and alternative income generating activities, technical/vocational, disaster management, livestock rearing and others. The trained households had usually availed those trainings equally both in places of origin and destination.

5.2.2 Financial Capital

Assets

The list of household asset comprises eight (8) specific types of assets and the rest of the assets fall in the 'others' category. It is estimated that each household of the never displaced and displaced categories owned about 24 and 18 assets respectively. Converting those assets into monetary value it is estimated that each of the never displaced households owned assets worth a total of Tk. 43,074 and each displaced household owned assets worth a total of Tk. 29,112.

Table 5.7: List of asset owned by displaced households along with valuation

Name of assets	Never displaced HHs				Displaced HHs			
	No./ amount of asset	No./ amount of asset per HH	Total value of assets (Million Tk.)	Valuation of asset per HH (Tk.)	No/ amount of asset	No/ amount of asset per HH	Total value of assets (Million Tk.)	Valuation of asset per HH (Tk.)
Cattle	161	1.38	1,867,500	15,962	1100	1.22	13,489,900	14,939
Poultry	728	6.22	155,450	1,329	3132	3.47	708,605	785
Farm equipment	91	0.78	346,980	2,966	802	0.89	230,080	255
Vehicles	11	0.09	307,000	2,624	148	0.16	1,450,300	1,606
Homestead forestry	1143	9.77	956,100	8,172	6740	7.46	2,588,670	2,867
Gardens	580	4.96	761,200	6,506	1405	1.56	1,303,856	1,444
Fishing nets	22	0.19	309,950	2,649	2393	2.65	1,653,750	1,831
Boats	13	0.11	211,500	1,808	69	0.08	3,882,000	4,299
Others	10	0.09	124,000	1,060	177	0.20	980,870	1,086
Total per HH	**2759**	**23.58**	**5,039,680**	**43,074**	**15966**	**17.68**	**26,288,031**	**29,112**

Source: Household Survey-2013, CEGIS

Household income

Household income is estimated for a recent round year (last year from the survey date). It comprises three different income sources e.g. agriculture, employment and wage; off-farm income (which includes land sale) (yearly), power tiller (yearly), irrigating water (yearly), cow/buffalo sale (yearly), goat/sheep sale (yearly), milk and lactic product sale (monthly), egg sale (monthly), fish sale (monthly), and hen/duck sale (monthly); and non-farm income (which includes house rent) (monthly), shop rent (monthly), petty business (monthly), and remittance (monthly). The total amount of income among never displaced households is estimated at about Tk. 19.9 million and each household earned the amount of Tk. 169,797 in a year. On the other hand, among displaced households total income amounted to only Tk. 42 million and each household earned Tk. 46,529 million (Table 5.8).

Table 5.8: Annual household income from different sources

Income sources	Never displaced HHs		Displaced HHs	
	Total amount (Million Tk.)	Amount per HH (Tk.)	Total amount (Million Tk.)	Amount per HH (Tk.)
Agriculture, employment & wage (last year)	14.1	120,633	0.2	197
Off-farm income (last year)	3.1	26,568	19.3	21,368
Non-farm income (last year)	2.6	22,597	22.5	24,964
Grand total	**19.9**	**169,797**	**42.0**	**46,529**

Source: Household Survey-2013, CEGIS

Household expenditure

Household expenditure is also estimated for a recent round year (last year from the survey date). It comprises five different sectors e.g. agriculture expenditure (which includes farm equipment and seeds, fertilizer, pesticide etc.) (yearly), farm equipment (irrigation, labor/wage etc.) (yearly), land purchase (yearly), land mortgage (yearly), sharecropping (yearly), lease (yearly), mortgage (yearly), rice processing activities (yearly), transportation (monthly), storage, cow/buffalo purchase (yearly), fodder for cow/buffalo (monthly), hen/duck purchase (yearly), and irrigation equipment (yearly); homestead building expenditure (which includes construction expenses) (yearly), maintenance, furniture (yearly), and utensils); family expenditure (which includes rice) (monthly), wheat (monthly), pulse (monthly), fish/dry fish (monthly), meat (monthly), vegetable (monthly), fruits (monthly), sugar (monthly), edible oil (monthly), tea (monthly), milk and lactic products (monthly), egg (monthly), and spice & salt (monthly); family expenditure (excluding food) (which includes soap (monthly), fuel (wood, cow dung etc.) (monthly), kerosene (monthly), electricity (monthly), clothes (monthly), education (monthly), medicine/treatment (monthly), transportation (monthly), jewellery (yearly), and radio/TV (yearly); and family non-farm expenditure (which includes cottage and petty industry (monthly), petty trade (monthly), pond fishery (monthly), and transportation (if any) (monthly).

It is estimated that the total amount of Tk. 16.95 million is expended out of which Tk. 0.14 million is expended by each never displaced household. On the other hand, a total of Tk. 110.40 million is expended out of which Tk. 0.12 million is expended by each displaced household (Table 5.9).

Table 5.9: Annual household expenditure in different sectors

Income sources	Never displaced HHs		D isplaced HHs	
	Total amount (Million Tk.)	Amount per HH (Million Tk.)	Total amount (Million Tk.)	Amount per HH (Million Tk.)
Agriculture expenditure (last year)	2.15	0.02	10.85	0.01
Homestead building expenditure (last year)	4.57	0.04	12.78	0.01
Family expenditure (last year)	6.14	0.05	56.24	0.06
Family expenditure (excluding food) (last year)	3.40	0.03	25.02	0.03
Family non-farm expenditure (last year)	0.68	0.01	5.50	0.01
Grand Total	**16.95**	**0.14**	**110.40**	**0.12**

Source: Household Survey-2013, CEGIS

Savings

The percentage of households having savings is higher among displaced households (51%) than among never displaced households (49%). The amount of savings per households also varies; for instance, in the case of never displaced households the average amount per household is Tk. 5,349 while in the case of displaced households the amount is only Tk. 128. However the tendency of saving money, whatever the amount, is gradually increasing.

5.2.3 Natural Capital

Land holdings

According to the land type distribution, it is found that among the never displaced households 38% have homestead lands, 27% have agricultural lands, 13% have gardens, 17% have ponds and 6% have other type of lands. Almost all households of the never displaced category belong to the small land holding category. Here about 80% households have less than 50 decimals, 8% have 51 to 100 decimals and 5% have more than 500 decimals of land (Figure 5.10).

Table 5.10: Distribution of land holdings of never displaced households by land type

Size of land holdings in decimal	Land type in percentage					
	Homestead	Agriculture land	Garden	Pond	Other	Total
<50	95	40	31	42	4	80
51-100	5	12	2	1	2	8
101-200	-	4	-	-	2	2
201-300	-	5	-	-	2	3
301-400	-	3	-	-	1	1
401-500	-	1	-	-	2	1
>500	-	7	1	2	3	5
Total (%)	**38**	**27**	**13**	**17**	**6**	**-**

Source: Household Survey-2013, CEGIS

On the other hand, it is found that among the displaced households 41% have homestead lands, 24% have agricultural lands, 12% have gardens, 14% have ponds and 10% have other type of lands. Additionally, about 67% of the households have less than 50 decimals, 6% have 51 to 100 decimals and 23% have more than 500 decimals of land (Figure 5.11).

Table 5.11: Distribution of land holdings of the displaced by land type

Size of land holdings in decimal	Land type in percentage					
	Homestead	Agriculture land	Garden	Pond	Other	Total
<50	97.0	24.3	11.4	15.8	10.2	66.8
51-100	0.7	10.0	0.3	0.4	3.2	6.2
101-200	-	5.2	0.1	0.1	0.6	2.5
201-300	-	2.4	-	-	0.6	1.3
301-400	-	0.9	-	-	0.3	0.5
401-500	-	0.3	-	-	-	0.1
>500	-	12.8	15.9	15.7	9.1	22.6
Total (%)	**41**	**24**	**12**	**14**	**10**	**-**

Source: Household Survey-2013, CEGIS

Fuel

In both cases, fuel crisis took an acute form. Nature is the main fuel provider in these regions as the people use wood, dry leaf, thatch, cow-dung, jute-stick etc. About 99% of the never displaced households used these types of fuel. In monsoon, this fuel crisis takes a more acute form since most of the households cannot restore fuel wood.

5.2.4 Social Capital

Social relations

It is very difficult to measure social capital of any household. In this case only responses of household heads are considered to measure it.

In response to the question of having social affiliation with large social institutions and local cooperative societies, local people responded that they have insignificant affiliation with those institutions. Only 8% never displaced and 15% displaced households acknowledged their relationships with large social institutions. On the contrary, 26% of both never displaced and displaced households acknowledged their affiliations with small scale local cooperatives/institutions (Figure 8&9). It is clear that people in both cases have comparatively more access to local institutions than large social institutions.

Figure 5.8: Households having affiliation with large social institutions

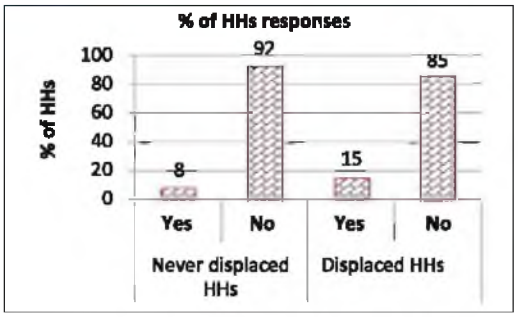
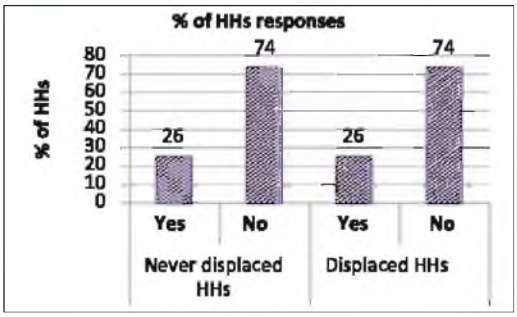


Figure 5.9: Households having affiliation with local cooperative societies/private institutions



Source: Household Survey-2013, CEGIS

However, the status of mutual social interrelationships in both cases is higher. About 41% of the never displaced and 70% of the displaced households responded that during natural disasters and hardships they usually received tangible and intangible assistance/help from their relatives and neighbors. On the other hand, about 50% of the never displaced and 25% of the displaced households responded that they have sought relief from local governments during post disaster periods (Figure 5.10 & 5.11).

Figure 5.10: Households receiving assistance from friends & relatives during natural disasters or hardships

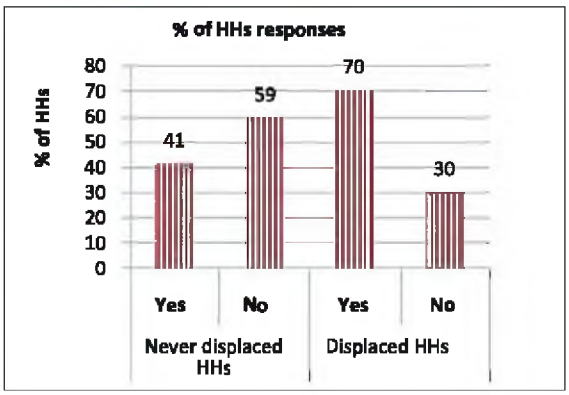
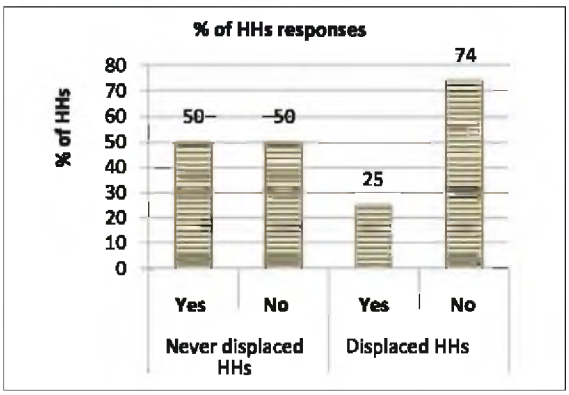


Figure 5.11: Households seeking relief from local government during disasters



Source: Household Survey-2013, CEGIS

It may be concluded that although they have little affiliation with large and small social organizations, they maintain mutual social relationships with relatives and neighbors. Social network is operating well in both cases.

5.2.5 Physical Capital

Housing

The following table (Table 5.12) represents the housing condition of both never displaced and displaced households. In both cases, the status of housing is more or less the same i.e. almost all houses are katcha, and made of C.I. sheet/wood/bamboo. The overall scenario of housing condition in both cases is poor.

Table 5.12: Type of residence

Type of HHs	Never displaced HHs (%)	Displaced HHs (%)
Katcha (made of bamboo, straw, earthen, Golpata etc.)	11	23
C.I. sheet/wood/bamboo	78	61
Paved wall & roof made of C.I sheet	6	11
Paved wall & paved roof	3	1
Others	2	5
Grand Total	100	100

Source: Household Survey-2013, CEGIS

However, considering the state of ownership it is observed that almost all houses are owned by the households themselves. Although there emerged other types of ownership, these are trivial in number compared to the rate of the self-ownership category (Table 5.13).

Table 5.13: Types of ownership of residence

Type of ownership	Never displaced HHs	Displaced HHs
Self	97	85
Rented	-	2
Relatives house	3	1
Others	-	12

Source: Household Survey-2013, CEGIS

Electricity

The following table (Table 5.14) shows the state of existing electricity facilities among both never displaced and displaced households. It is found that only 9% of never displaced and 26% of displaced households are covered by grid electricity facilities. The coverage is minimal compared to the national average (53%) (Economic Review 2012). The coverage of solar electricity is also noticeable in both cases as it covers almost 9% of the never displaced and 28% of displaced households. It is striking that about 64% of the never displaced and 42% of the displaced households have no electricity facilities. People stated that they cannot avail modern amenities of social life due to the scarce coverage of electricity.

Table 5.14: Status of existing electricity facilities

Type of electricity	Never displaced HHs (%)	Displaced HHs (%)
Grid	9	26
Solar	9	28
Generator	15	3
Without electricity	64	42
Others	2	2

Source: Household Survey-2013, CEGIS

Drinking water

The coverage of tube-wells is satisfactory for both never displaced and displaced households. Almost all households usually collect drinking water from tube-wells. Although a few households tend to collect water from taps/supply, river, pond and other sources but these are not significant in number compared to the coverage of tube-wells (Table 5.15).

Table 5.15: Distribution of households by source of drinking water

Sources of drinking water	Never displaced HHs (%)	Displaced HHs (%)
Tube -well	99	87
Tap/supply	1	0.2
River	-	0.7
Pond	4	5
Others	3	7

Source: Household Survey-2013, CEGIS

In response to the question of time requirement for fetching drinking water, about 93% of the never displaced and about 84% of the displaced households responded that they required less than or equal to 15 minutes (Table 5.16). This time requirement is counted for a single trip. However, it may be concluded that tube-wells are installed at the nearest locations of both never displaced and displaced households.

Table 5.16: Time required for fetching drinking water from source

Time required (minutes)	Never displaced HHs	Displaced HHs
<=15	93	84
16-29	4	7
30-59	3	7
60-89	-	1
>=90	-	0.4

Source: Household Survey-2013, CEGIS

Sanitation

Considering sanitation status in both cases, it is found that they lack hygienic sanitation facilities. Almost 32% of the never displaced and 42% of the displaced households tend to use either katcha or hanging latrines. About 57% of never displaced households and about 49% of displaced households tend to use ring slab latrines for sanitation purposes. A few households have paved sanitation facilities. In fact, 2% of displaced households have no arranged sanitation facilities (Table 5.17). In terms of sanitation status, households of both categories are in poor condition.

Table 5.17: Status of sanitation

Type of sanitation	Never displaced HHs	Displaced HHs
Paved (water-sealed)	9	4
Paved (not water-sealed)	2	2
Ring slab	57	49
Ka tcha	32	35
Hanging	-	7
No sanitation facilities	-	2
Grand Total	100	100

Source: Household Survey-2013, CEGIS

5.3 Impact Analysis

Impact analysis refers to various social, economic and other impacts associated with selected disasters upon both internally displaced populations in the place of origin and receiving/host communities in the place of destination.

There are numerous impacts of internal displacement that influence the life and livelihoods of both communities. Among those some major impacts are presented in this section, which are also verified by regression analysis that shows how the chances of temporary displacement of households is calculated on the basis of never displaced households in respective categories of independent variables.

5.3.1 Impact on both displaced and never displaced households

Both the households in the places of origin and destination are captured in this analysis. In impact analysis, the temporarily and permanently displaced households are merged as displaced households. Comparative analysis is done between the displaced and never displaced households. Education, health, occupation, income-expenditure, assets and social amenities i.e. access to social organizations, access to credit/loan etc. are identified as indicators for the impact analysis.

Education

Comparing the educational status of never displaced and displaced people, it is found that never displaced people have better educational status than that of the displaced people; and in some cases it is higher thanthat at the national level, except in SSC and HSC or equivalent level. Due to displacement, most of the children dropped-out from education at the outset of displacement and a number of them tried to become involved in income generating activities for their survival. At the end of critical moments of adaptation, some of those children, insignificant in number, continued their studies in some new institutions. On the other hand, the never displaced children continued their studies in the same institutions in the place of origin where those institutions provided some support to the vulnerable children for continuation of their education.

People, who permanently left their place of origin tried hard to adapt in a new community and to make their children as educated as the other children in their community. However, the temporary migrants faced much difficulty. They could not enroll their children in other institutions because they knew that they had to return to their place of origin and consequently, their children could not adapt in a new but temporary community.

Table 5.18: Education status bynature of displacement

Types of education	Educational status 7+ people (%)	
	Never displaced	Displaced
Not passed class I	31	33
Class I-V	36	31
Class VI-IX	22	18
SSC, HSC or equivalent	4	3
Bachelor degree & above	3	1

Source: Household Survey-2013, CEGIS

Health

Identifying the disease profile of the households, it was found that most of the people suffered from diarrhea (64% -72%), fever/cold/cough (98%-99%) compared to those at national level. The tendency of incidence of diseases among both never displaced and displaced people are more or less similar.

During disasters, especially during flood and water logging, people suffered from water borne diseases owing to the vulnerable sanitation system, which made the environment highly unhygienic. For the time being, if they were able to adjust themselves in those villages, some of those migrant households tried to live there permanently; especially households that had many children and elderly people.

Table 5.19: Diseases suffered by households

Name of diseases	Households suffering from diseases (%)		
	Never displaced	Displaced	National
Arsenicosis	2	0.55	-
Diabetes	3	5	5.4
Diarrhea	64	72	5.08
Fever/cold/cough	99	98	58.03
Malaria	11	3	-
Pox	15	13	0.17
Tuberculosis	2	2	0.18
Others	12	21	6.29

Source: Household Survey-2013, CEGIS

Occupation

In terms of occupational status, it has been observed that in disaster prone areas people lost interest in agricultural activities (farming) day by day and instead tried to become involved in production (small business) and transport related work and services. The displaced people were affected in terms of services and agricultural activities. Sometimes, the distance from their working place to the displaced area caused loss of service while in the new locations their skills related to agricultural activities were affected. In both the never displaced and displaced households, the old retired comprised the highest percentages, which means that the elderly people of those households were overwhelmed by the disasters and kept themselves away from physical work.

During disasters the affected places were unfavourable for employment especially for wage earners; and that is why this type of people tried to go elsewhere for employment. Sometimes they became permanently displaced in a new place to overcome financial crisis and provide family support and tried to adapt to the surroundings.

Table 5.20: People's involvement in different occupations by different types of displacement

Types of occupation	Involvement of occupants (%)	
	Never displaced	Displaced
Agriculture	20	20
Production & related workers and transport workers	20	23
Service workers	7	4
Old retired	35	38
Others	18	15

Source: Household Survey-2013, CEGIS

Income and expenditure

The average yearly income and expenditure of households and the resettlement cost of each household for respective disasters (if occurred) is given in the following table (Table 5.21). It was found that the erosion-affected households spent the highest amount on habitat repair and resettlement as most parts of their homesteads had been washed away by riverbank erosion. On the other hand, in salinity affected households this expense was lower compared to that for other hazards because in the salinity prone areas people had to make minor repairs on their habitats and sometimes lessen their agricultural production.

The figure (Figure 5.12) shows the percentages ofaverage resettlement cost of households with respect to the yearly expenditure of each household in different types of hazard. In this sense, riverbank erosion affected households spent almost twice (196%) their yearly expenditure amount for their resettlement after each occurrence of disaster. This scenario is especially created for riverbank eroded households as most of the time they have to rebuild their homes in a new place and for this reason they had to borrow money which became a burden in the long run. However, for other disasters the households have to repair their homes after the

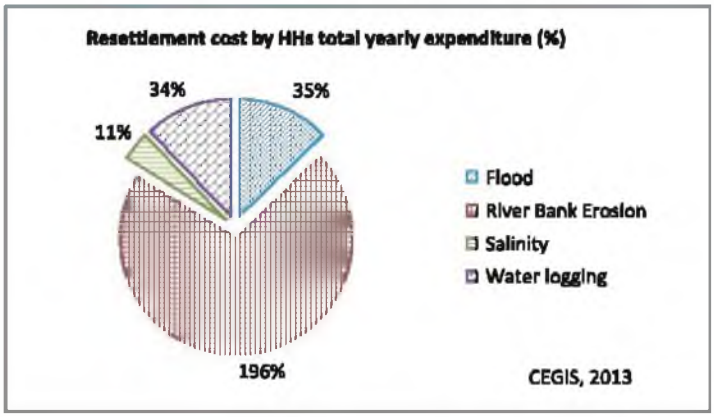
occurrence of disasters that is why their resettlement cost is much lower than that of the riverbank eroded households.

Table 5.21: Households average resettlement cost compared to yearly income and expenditure

Types of hazard	HHs avg. yearly income	HHs avg. yearly expenditure	Resettlement cost for each HHs
Flood	137539	114750	40570
River bank erosion	162411	150552	295132
Salinity	139793	124161	13795
Water logging	102122	108940	36784

Source: Household Survey-2013, CEGIS

Figure 5.12: Resettlement cost of HHs by total yearly expenditure for each hazard



Assets

In response to receiving any sort of additional livelihood opportunities, people of the study areas were very keen about gardening, poultry, livestock rearing etc. The never displaced households were much more involved in those additional livelihoods than the displaced households that faced problems in establishing networks on those issues as they were newcomers in those areas.

Assets like poultry, livestock and gardens were endangered by flood, water logging, river erosion etc. Most of the people had set up those assets by taking loans, so after losing those assets they had to spend most of their savings. To avoid this situation, the people tried to migrate to a secure area and settle down in a planned and tension-free life (See table 5.7).

Access to social amenities

Household involvement in social amenities reflects the social bondage within a community. About the involvement in social organisations, never displaced households represented a better scenario than the displaced households but this percentage was poor (only 15% of HHs). Most of the households which were unable to maintain social bonding could not access any shelter during disasters. So, they primarily tried to go to their relatives' or neighbours' houses. Some returned to the place of origin and others who lost most of their assets due to disasters tried to settle in new safe destinations.

On the other hand, never displaced households were less interested in accessing loans/credit compared to the displaced households as they faced a continuous curse of disasters. However, the people of displaced households tried to borrow money for their betterment. Displaced households migrated to the less disaster prone areas and that is why they did not worry about disasters or loans to start some income generating ventures. However, because they were newcomers in the area, the displaced households could not get the loan facilities that they deserved.

Figure 5.13: Household access to social organisations

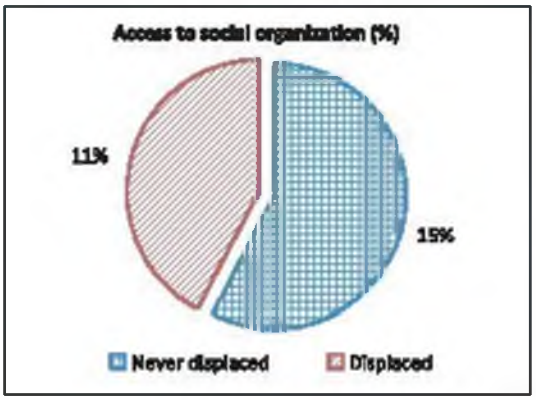
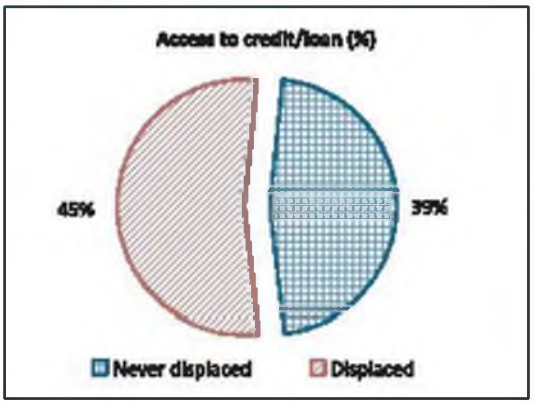


Figure 5.14: Household access to credit/loans



Source: Household Survey-2013, CEDIS

5.3.2 Statistical Analysis to Identify Impact on Demographic Indicators

The impact on the above demographic features is statistically verified by the dependency test of logistic regression. Here, the comparison or dependency is measured by two types of households i.e. never displaced and temporarily displaced households where never displaced households are used in reference category and both the two types of households are identified by probability sampling. The continuous data on different indicators are categorised in convenient ways (See Annex-E).

In the dependency test it has been observed that for land holding category, the level of displacement decreases with the increasing land holding size except for the marginal land holding households that are slightly more displaced compared to the small land holding households. Therefore, the large land holding households have the lowest chance of displacement with respect to the small land holding displaced households on Exp (B) = 0.265.

Considering the family size of households, it has been observed that the chances of household displacement decreases with the increasing family size. As a result, households with large families have the lowest chance of displacement compared to the other two types of households (medium and small). In terms of Exp (B), displacement is lowest (0.826) for the large family size households, the second lowest for the medium size households and the highest for the small family size households.

In view of the education status of household head, it has been perceived that the displacement chance of households decreases with increasing academic education of the household head. As a result, household heads having secondary or above education have less chance of displacement with the family compared to the household heads who are illiterate or have primary education. In terms of Exp (B), displacement is lower (0.737) for household heads having secondary or higher education than illiterate household heads.

Table 5.22: Results of logistic regression analysis

Dependent Variable	Independent Variable	Categories of independent variable	B [26]	Sig nificance [27]	Exp(B) [28]
Temporary displaced	Intercept	Intercept	3.162	0.000	
	Land Holding category	Marginal	0.075	0.871	1.078
		Large	-1.329	0.003	0.265
		Small	**Reference**		
	Family size	Medium	-0.003	0.993	0.997
		Large	-0.191	0.642	0.826
		Small	**Reference**		
	Education status of HHH	Primary	-0.243	0.425	0.785
		Secondary and over	-0.305	0.377	0.737
		Illiterate	**Reference**		
	Primary occupation of HHH	Labor	0.023	0.949	1.023
		Others	0.258	0.443	1.294
		Agriculture	**Reference**		
	Types of Hazard	Flood	-2.557	0 .000	0 .078
		River Bank Erosion	1.920	0 .019	6.822
		Salinity	0 .622	0 .338	1.862
		Water Logging	**Reference**		
Note: The ***reference*** *category is: Never displaced*					

On the other hand, it has been observed that the displacement chance of households headed by laborers or other have increased compared to the households headed by farmers. In terms of Exp (B), other classes of households have more chance of displacement with Exp (B) equal to 1.294 than displaced household headed by farmers and laborers.

Among four different types of disasters, displacement chance has increased for all disasters except flood and water logging. Displacement chance is the higher (Exp (B) at 5.466 for riverbank erosion affected households compared to the other displaced households affected by water logging.

26. coefficient of regression analysis
27. P value; probability of rejecting null hypothesis
28. Odds ratio; (Temporary displaced/Never displaced)

Case- 1: Miseries created by nature's vagaries

Sabura Khatun (27)
Sabujbagh, Char Razibpur, Kurigram
Affected by Riverbank erosion

I am the seventh of the 10 children of my parents. My father was a share cropper who was always struggling to maintain such a big family. He sometimes worked as an agricultural day laborer to supplement the little he earned from share cropping. In 2006, I was given in marriage to my now-divorced husband, Shafiqul. We both hailed from the same village of Modoner Char and like my family, his had also settled here after being displaced due to some natural disaster. A year after we married we were blessed with a son who brought great joy to our lives. However, later that year, our happiness was destroyed forever by riverbank erosion when it engulfed our house and that of my parents. That was the beginning of a very difficult time for us, as we did not have enough money to rebuild our home. My husband demanded that I ask my father to get him tin sheets to build the roof of a new house, but my father too was in financial crisis with no means of buying materials for their own home. He requested my husband to give him some time, but in the end he could not arrange the money.

Shafiqul berated me about it and it was not long before he beat me for failing to come up with the money. My situation became intolerable and then one day, he decided to divorce me. After separation, he went to Dhaka and I came back to my father's house. In our society, no woman can live with her parents after marriage, so it was really difficult for me to live in my father's house for long. I realised that there was nobody on earth who would stand beside me and that I had to do everything on my own for survival. I had to think of my son, as my only duty now was to help him become established in life. I managed to get a job here as a cook at the upazila dormitory. I earn 2000 taka per month and live in a small house that I rent. I earn very little and so there are periods when my son and I have only one or two meals a day. I cannot even buy new clothes for my son but have to wait for occasions such as Eid ul Fitr when poor people like me receive clothes in zakat. I am always afraid of what will happen to me and my son if I ever lose my job. It is the only support I have and without it there will be no one to give us shelter.

Case-2: Fighting adversity to build a better life!

Name: Monoranjan Mondal (49)
Education: H.S.C. Profession: Farmer
Affected by Water logging

I am the second son of my father Mr. Bipod Vonjan Mondal of Sujatpur village in 15 Kultia union of Monirampur upazila under Jessore district. In spite of being a small farmer, my father used to maintain our family very well. Natural disasters, however, snatched away the easy life we had. Water logging is the main form of hazard in our village, which struck first in the early 80s. Since then, the situation has deteriorated. The village has been surrounded by water continuously since the last 8 years. Sujatpur is mainly a rice cultivated area where water logging for 7-8 months hampers rice production and causes untold sufferings to nearly a 100 households. Crop production of marginal and small farmers is seriously hampered. Due to crop loss and no other alternative source of income, our family fell into serious financial crisis. I had 126 decimal of agriculture land which remained fallow due to water logging. Ten decimal of homestead land was also blocked by water all year round. Road communication became difficult as it was also disrupted by water logging. The wall around our house broke due to wave action during monsoon and every year I had to spend around 10000 taka to repair my house. Insufficient work opportunities and all other factors finally forced me to move to the village Sujatpur Uttar para of the same union in 2005. I preferred this area because it is more elevated than my previous village. Moreover, this village is near my old home and people of my religion live here. As this area is free from water logging, it is very easy to look after my land and homestead. I have been able to adjust easily with the host community because of my education, knowledge and attitude. After migrating to this area, I have been living a good life free from tension. I get more than 3 tons of food-grain every year from my land and so I am able to look after my family very well.

I have built a house on 3 decimal of land and started crop cultivation in a share cropping arrangement. I have also a seasonal business along with cow rearing and a small poultry rearing initiative. I had discontinued my studies in the early 90s to help my father by earning an income for our survival. It was my special desire to continue my education for getting a good job, but my dream did not come true because of what my family suffered due to natural disasters. However, I remained determined to fulfill my dream through my children. I have ensured that unlike me, my children have the opportunity for education. My eldest daughter is a college graduate and the younger one has obtained Masters of Arts (M.A) and is now working as a teacher. My only son is an Honors student in Dhaka College. I am waiting for the successful completion of his studies as it will be the fulfillment of all my dreams.

Case-3: I cannot bear the sorrw

Abul Hosen Dhali (58)
Affected by Flood

Abul Hosen Dhali (58 years old), a flood affected person of the village Haldarkandi in Dhanokathi union of Damuddya upazila under Shariatpur district. This village is located a bit far away from Padma River where flood is one of the main hazards that affects more than 140 households in the same village in each year. Mr. Dhali introduced with a devastating flood in 1988 at first time and temporary migrated among all other households of the village for 45 days. Since 1988 Mr. Dhali migrated in 1998, 2004 and last 2013 respectively for short time at Char Malgao Islamia Dhakil Madrasha of the village Haldarkandi and return to his origin. During the month of May-July he used to migrate to the destination and return to origin on early August.

Mr. Dhali is an agriculture wage labor who does not have any agriculture land or any other assets of his own. He lives in a house of around 2 decimal of land by inheritance. In 1999, he takes 40 decimal of agriculture land from his neighbor on share cropping arrangement and started crop farming. Due to flood, he could not harvest his crop properly while spent huge money for production cost. Mr. Dhali mentioned that he can work average 160 days per year and average wage Tk.190/day. With the small earning, he had to maintain a family of 5 members with a very tight economic condition.

Crop loss due to flood and insufficient scope of work force Mr. Dhali migrate to Dhaka in 2005. He engaged with construction work as labor since 2005-2012 and his earnings go up at that time. Due to improving financial condition, He took his family in Dhaka and put his children into School. In September 2011, he gets sick and taken to Dhaka Medical College where Doctor detects his asthmatic problem and suggests him to leave his existing profession. In January 2013, Mr. Dhali return back to his origin and started hardship life again. His son, Md. Rasel Hosen left school after completion class 7 and engaged with construction work in the village. Mr. Dhali, now work as a mason with the help of his son to maintain his family overlooking doctor's advice.

Mr. Dhali, mentioned that there are so many negative impacts he experienced since last two decade. Firstly, flood damages agriculture crops at the cost of Taka around 5000. After flood; he used to spend around Tk. 8000-10000 for homestead renovation. There are around 30-40 days he remains unemployed at the destination due to flood and loss around Tk.6500. He mentioned that the following losses due to migration make them more vulnerable. Mr. Dhali mentioned that there are 140 families in the village takes shelter in a 3 storied building during flood where they face serious problem in sanitation, cooking, livestock rearing and children education.

Case-4: Salinity causing untold sufferings

Kakali Akhter (25)
Mohammadnagar, Batiaghata, Khulna.
Affected by salinity intrusion

I heard from my father that our village Kalabogi used to be very beautiful. The world's biggest mangrove-forest, wildlife, various rivers and widespread cropping land made Kalabogi a wonderful creation of nature. The people of the village had a good life. I am from the village Kalabogi of Dacope upazila under Khulna district. Shrimp culture using saline water was started in our village 80 years ago at a very small scale. It has gradually increased and the intensity of salinity has also exceeded our tolerance level. Crop production has been seriously hampered and the income source in our village from homestead gardening, livestock rearing, freshwater fish culture, and wage labour in crop land has almost stopped. All agriculture land has turned into shrimp farming and we no longer get agricultural by-products like straw, cow dung etc. which is very essential for rural livelihood. As a result of salinity intrusion, household expenditure has been significantly increased. We are suffering from lack of pure drinking water and scarcity of fuel for cooking. Although shrimp farming is profitable, it is not ideal for small and marginal farmers due to the high input cost and frequent threat of natural disasters. As a result, many small and marginal farmers like us leased out small pieces of agriculture land to influential shrimp farmers for a negligible amount of money.

In the last two years before moving out from the village, we were living on handouts, which was a matter of great shame for us. At times I wondered why Allah had sent us to Kalabogi where everybody struggled with salinity, cyclone, social violence and so on. Frequent climatic disasters like the AILA, SIDR, tidal surge and intense salinity made our lives extremely vulnerable. Many people like us have left our upazila in search of a better life and livelihood. My husband and I decided to permanently shift to Mohammadnagar of Batiaghata upazila as many of our neighbors have also moved here because of the good availability of work as well as less threat of tidal surge and salinity. My husband has joined a local company as night guard. As for me, I have received training in tailoring from an NGO operating in this upazila and have opened a shop with financial assistance from my husband. Our combined income is Tk. 6000 per month on average and we are happy with it. I have also put my daughter in a school.

5.4.3 Impacts on host communities

Displacement, irrespective of whether it is permanent or temporary, has an impact on the receiving/host communities. The host communities identified several impacts which they requested to be mitigated through effective and immediate initiatives. Some of major impacts are described in the following paragraphs.

Increasing population density: The people in places of destination are concerned that the population density has increased in their areas. Displaced households are congested and clustered.

Pressure on natural resources: The natural resources and the environment of the places of destination come under increasing pressure with the inflow of displaced people.

Sharing of social amenities: In places of destination, people have to share social amenities like ponds, tube-wells, latrines etc. as a result of which there is a risk of disease outbreaks.

Competition in labor market: Agriculture, fish farming, fishing and wage-based labor market are the main economic activities of the study area. There exists surplus labor that eventually decreases wage rate and increases competition in the labor market.

Weakening of social bonding: Local people reported that social bonding has weakened among both displaced and host populations. This is mainly because displaced people usually find themselves in environments where people do not live in closely knit communities.

CHAPTER 6

Strategic Plan and Institutional Framework

Nationally(e.g. Sixth Five Year Plan, Bangladesh Perspective Plan 2021, Integrated Coastal Zone Management Plan, Bangladesh Climate Change Strategy and Action Plan 2009) and internationally (e.g. IPCC, IMO, IDMC) disaster has been recognised as one of the major reasons behind migration and displacement. Climate change is known to be one of the drivers of such disasters. However, current knowledge on the relation between climate change and migration and displacement of people is still limited. In Bangladesh, two action plans on climate change have been prepared namely, the National Adaptation Programme of Action (2005) and the Bangladesh Climate Change Strategy and Action Plan (2009). Both these plans have indicated migration as an impact of environmental hazards and more specifically, BCCSAP has mentioned some specific adaptation measures.

Migration and displacement owing to either natural (e.g. natural hazards) or man-made (e.g climate change, socio-economic) reasons have a significant impact on people, their livelihoods, the surrounding environment and on the utilisation of resources. Understanding the process of migration, displacement in relation with climate change and disaster is important which needs to be considered at policy as well as implementation level. In order to properly address the issue of migration and displacement, three important considerations are: i) adoption of migration or displacement management strategies; ii) implementation of disaster management strategies; and iii) implementation of migration or displacement management strategies through developing a strong institutional basis.

6.1 Migration and displacement management strategies

According to the International Organization for Migration (IOM), migration should be an option rather than an act of compulsion which can be ensured through taking some options such as preventing forced migration and making migration work for adaptation; preparing for potential migration, displacement and relocation; managing (mass) migration; mitigating the impact of (forced) migration; and addressing (forced) migration through sustainable solutions. In the context of Bangladesh, although the issue of displacement and migration has been addressed at international and national levels, there is a need to incorporate it at local level also, so that proper action can be taken to deal with the problems within the country. In line with the guidelines of the IOM, migration or displacement can be prevented, managed and its impacts can be dealt with through taking strategies that cover policy, planning, design, development phases as well as fund allocation and development of capacities.

Policy level

- Mainstream the issue of migration and displacement into national development plans, such as FYPs and Country Strategy Papers.
- Develop policies to ensure social protection of more vulnerable or poorer migrants.
- Develop policies to support the relocation of affected populations. This is perhaps the most contentious of all possible policy options, since relocation could itself be seen as a 'forced migration', one that pro-poor policies should be seeking to avoid.
- Develop specific policies on river and coastal erosion, including assistance and protection measures for those affected.

Planning, Design and Development

- Assess climate change and its impacts on out-migration (BCCSAP 2009);
- Contingency planning for relocation of communities threatened by coastal erosion.

- Design and implement community specific local level projects to help the migrants and displaced people to cope with the changed environment.
- Prepare plans for major areas of destination for migrants from environmentally vulnerable regions.
- Promote de-concentrated urban economic development with a focus on secondary cities and towns in regions of environmental vulnerability.
- Provide basic housing, safe water, basic health and education, as well as employment, in cities and potential areas which receive in-migrants.
- Provide protection for vulnerable individuals in affected communities (e.g. measures to reduce trafficking) or taking into consideration the needs of seasonal in-migrants.
- Design a protocol to provide adequate support for their re-settlement and rehabilitation (BCCSAP 2009);
- Develop a monitoring mechanism for internal and external migration (BCCSAP 2009);
- Allocate unused government-owned 'khas' land and/or newly accreted land in coastal areas to displaced households and improve regulatory mechanisms for resolving land disputes.
- Allocate funds for immediate repair of breached embankments

Capacity building and awareness

- Facilitate internal and external migrants in environmentally vulnerable regions for re-settlement in a new environment through educative training and awareness programmes.
- Provide long-term skill development training by promoting skill circulation and transfer among migrants and in local communities where migration is already taking place.
- Develop networks among the communities in environmentally vulnerable regions (both through financial and social aids etc.).

6.2 Disaster Management Strategies

Disaster management is already inbuilt at policy level in the National Plan for Disaster Management 2008-2015, the Standing Orders on Disaster, the Perspective Plan for Bangladesh 2010-2021 etc. At implementation level, disaster management activities are carried out by the institutions' setup for disaster management at different tiers of the government. The Perspective Plan based on IPCC has proposed a three-pronged approach to adapt with climate change for the coastal zone of Bangladesh, which are: i) Managed retreat from the coastline in order to relocate inland; ii) Selective accommodation with the altered environment (including submergence) through adjustments in livelihood pattern; and iii) Promoting protection with accretion. While these approaches can help prevent and mitigate disaster impacts, more specific measures are required. For preventing disaster risks and dealing with its aftermath, measures can be taken at three phase–pre (G–P) disaster phase (preparedness and prevention), disaster phase (response) and post disaster phase (recovery).

a) Preparedness and prevention phase

Planning, Design and Development

- Transforming homesteads into safe places through proper planning.
- Development of cluster villages for the landless or affected people.
- Development of a system for issuing early warning in time for floods, erosion and cyclones for ensuring emergency evacuation to safer places.
- Construction of embankment for controlling flood and protecting river erosion
- Adoption of initiatives in protecting the embankment with the coordination of LGED and BWDB.
- Raising height of households and institutions like schools, district/upazila/union complex.
- Introduction of proper drainage system and cultivation of flood tolerable crops.
- Construction of fence using bamboo and sand bags for temporary protection against erosion. Provide piling or deposit blocks from the bottom of the bank.
- Strengthening of banks with blocks, spreading stones/geo-bags along vulnerable spots.
- Painting on iridium and building which is saline tolerable.
- Installation of sluice gate for protection from saline water.

- Cultivation of salt tolerant crops.
- Adoption of long term plan for mitigating water logging problems.
- Dredging the riverbed of Kapodak and restoring the depth of the river.
- Taking initiatives for opening closed canals.
- Storing water purification tablets for emergencies and harvesting rain water.
- Installation of deep tube wells in higher places.
- Building sustainable latrines in high platforms.
- Improving the health facilities in existing community clinics.
- Increasing the number of doctors, nurses and health attendants.
- Construction of new roads and transformation of mud roads into metal roads through the LGED, Union Parishad and NGOs.
- Elevation of roads for easy and effective communication and evacuation during emergencies.

Capacity building and awareness

- Ensure skill and awareness development training
- Training on response activities during emergencies.
- Training of farmers by government and non-government organisations regarding how to cope with the hazards.
- Building good relationship between displaced people and host community through awareness raising.
- Creating awarenessamong people on hazard preparedness action through awareness programmes.
- Raising social awareness on sanitation issues.

b) Response phase

Shelter for protection

- Provide temporary shelter in a safe place. Primary schools and other education centres can be built above the danger level of flood so that people can take shelter. District/Upazila/Union Parishad complexes can be utilised as flood shelter during emergencies.
- Use khas lands to develop Asrayan Project for rehabilitating permanently displaced people.

Relief and aid

- Distribute relief to the affected people.
- Emergency food supply e.g. food for the elderly, infants and children.
- Ensure all types of emergency support services through GOs and NGOs.
- Arrangefor drinking water in saline affected areas.
- Provide drinking water and water purifiers and supply adequate water purifying tablets and saline.
- Setup mobile toilets for emergency needs.
- Ensure medical team for emergency health treatment.
- Arrangement of alternative communication system such as waterways for easy access to conduct rescue and relief activities.

c) Recovery phase

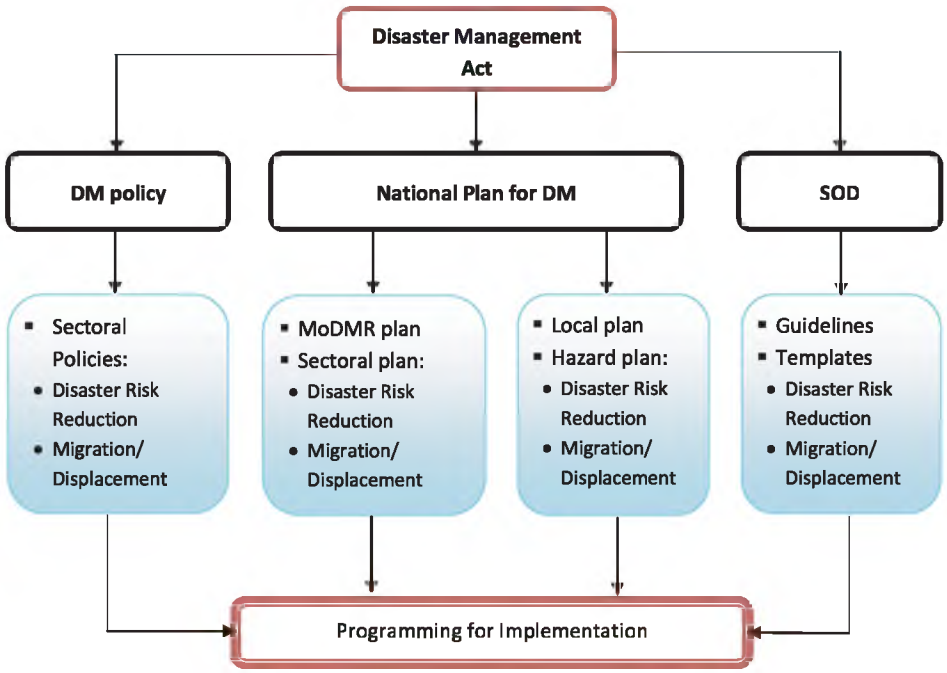
Relief and aid

- Provide monetary assistance to the affected people for re-building houses.
- Make available soft and easy loans to the affected households.
- Provide occupation-based aid and equipmentto the affected people. For example-supply fertilizer and seeds to the affected farmers and nets, boats etc. for the fishermen.
- Provide support to the affected as well as the displaced people for pursuing alternative occupation such as poultry, dairy farms, handicrafts, and small cottage industry.
- Sanction adequate money for repair of roads and embankments.
- Repair the damaged structures and infrastructures.

6.3 Institutional Framework for Management of Migration and Displacement

A number of institutions are working on disaster management at national, sub-national and local levels. For disaster management there is a regulatory framework and an institutional framework included in the Standing Orders on Disaster (SOD). The SOD has been issued by the Ministry in 1997 in order togive guidance and monitor disaster management activities in Bangladesh. The regulative framework gives an overview of the relevant legislative, policy and best practices under which the activity of Disaster Risk Reduction and Emergency Management is being conducted in Bangladesh. The issue of migration/displacement can be dealt with through the preparation of plans and policies and should be integrated as shown in the following framework (Figure 6.1):

Figure 6.1: Proposed Regulatory Framework for Mainstreaming of Migration under Disaster Management

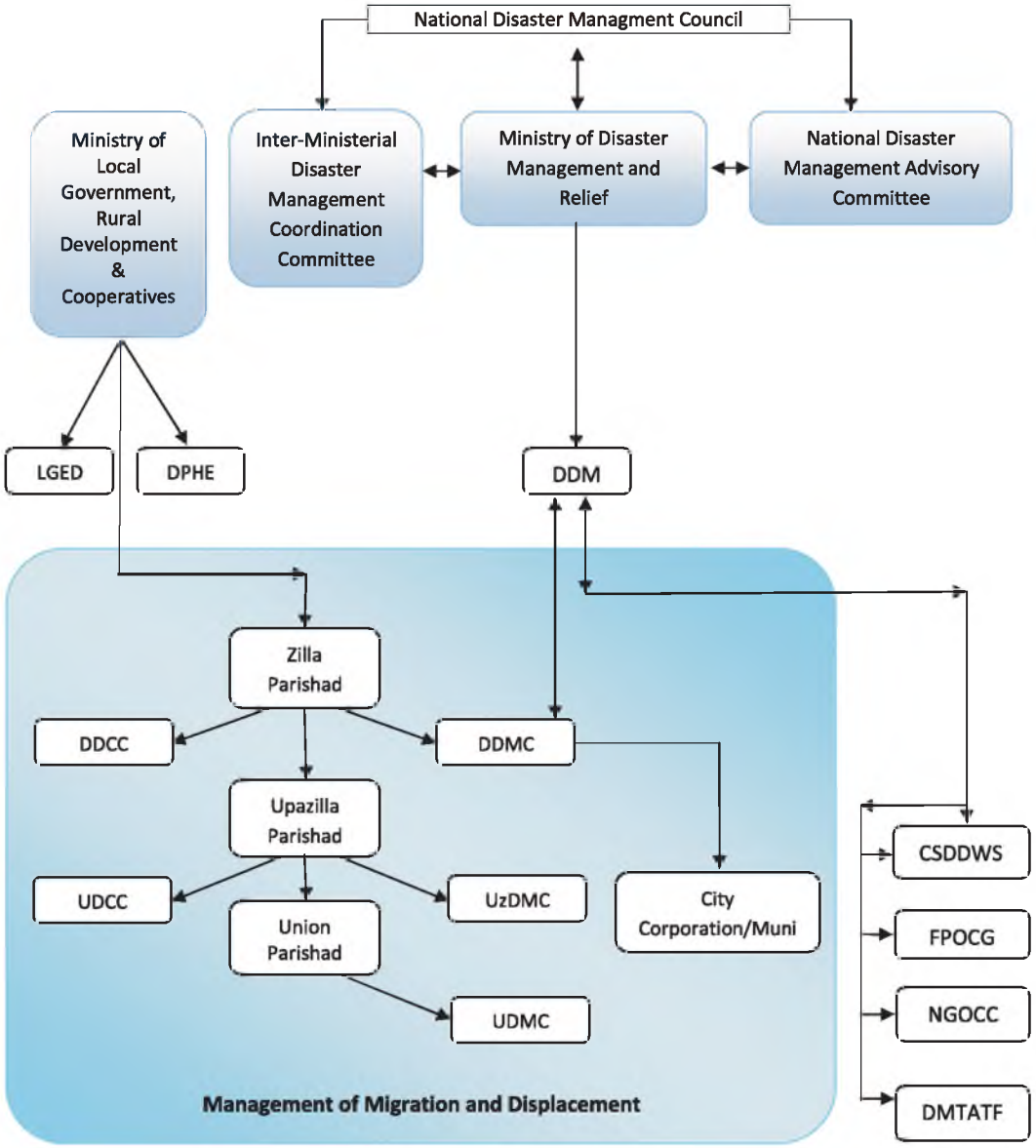


The Disaster Management Act provides the legislative framework under which disaster risk reduction and emergency response management is done. The act includes mandatory obligations and responsibilities for the Ministries, committees and appointments.The National Disaster Management Policy includes policy guidelines on disaster risk reduction andemergency response management. The policy states the national objectives and strategies in disaster management. The National Plan for Disaster Management providesan outline for the systemic and institutionalmechanisms under which disaster risk reduction and emergency response management is done. The government approved the National Plan for Disaster Management 2010-2015 on 7th April, 2010. The Plan includes the disaster management vision, strategic goals and conceptual framework. It establishes disaster management regulatory and planning frameworks, and identifies priority areas for disaster risk reduction and emergency response management.

The institutional framework spells out the inter-linkages of institutions and their responsibilities in conducting activities in the different phases of disaster (Figure 6.2). Disaster management activities are already embedded into the government system at national, regional and local levels through different ministries and agencies. Therefore, to properly implement the migration and displacement management strategies, it should be linked within the institution setup of disaster management at these three levels. The local level institutions namely the District Development Coordination Committee (DDCC) and Upazila Development Coordination Committee (UzDCC) should include migration and displacement in their agenda for discussion. They should provide the guidelines, maintain statistics and accordingly monitor any type of migration in or out of their respective locality. The Disaster Management Committees at district, upazila and union level i.e. District Disaster Management Committee

(DDMC), Upazila Disaster Management Committee (UzDMC) and Union Disaster Management Committee (UDMC), should be responsible for collecting data, managing the migrants and arranging programmes at field level.

Figure 6.2: Proposed institutional framework for mainstreaming of migration under disaster management institutions



The responsibilities of the different institutions are detailed out below. Under each institution, the new activities relevant with managing migration/displacement has been proposed (marked in blue colour).

National Disaster Management Council

The Council is headed by the honorable Prime Minister. Its main task is to formulate and review the disaster management policies and issue directives to all concerned.

Inter-Ministerial Disaster Management Coordination Committee

The committee is headed by the Hon'ble Minister in charge of the Disaster Management and Relief. It implements disaster management policies and decisions of the NDMC/ government.

National Disaster Management Advisory Committee (NDMAC)

The National Disaster Management Advisory Committee is headed by an experienced person nominated by the Hon'ble Prime Minister to give advice on disaster related issues.

Ministry of Disaster Management and Relief (MoDMR)

- Identify the disaster prone upazilas and special disaster prone areas under those upazilasalong with the population likely to be affected by the disaster.
- Identify areas from where migration/displacement might occur
- Arrange for house building grant, test relief and Food for Works programmes for the disaster affected people.
- Arrange for house building grant and test relief for the migrants/displaced people.
- Continue emergency rehabilitation work in affected areas until return of normalcy.
- Coordinate rehabilitation programmes.

Department of Disaster Management (DDM)

- Supply information/input to authority concerned for the preparation of rehabilitation plan.
- Ensure adoption of steps for minimising future disaster risks in the rehabilitation plans.
- Arrange employment of disaster affected people through test relief.
- Arrange employment of migrated/displaced people through test relief.

Directorate of Food (DG Food)

- Management and operation of the country's overall food system.
- Implementation of national food policy strategies.
- Establishment of dependable national food security system.
- Establishment of uninterrupted supply of food grains.
- Preparation and execution of various development projects in the food sector.
- Ensure minimum price of produce to the growers of food grains.
- Inquiries and statistics on any of the subjects allotted to this Directorate.
- Watch over food supply position of the country.
- Ensure stability of the market prices of foodstuffs.

District Disaster Management Committee (DDMC)

- Arrange trainings and workshops regularly on disaster related issues by keeping the DDM informed.
- Prepare a contingency plan (emphasis on earthquake and fire) and update regularly.
- Regularly review the implementation status of short, medium and long-term action plans through coordinating the programmes of development and service organisations at district level.
- Provide necessary support to union, municipality and upazila disaster management committees.
- Inform the DDM on the progress of action plans and other activities at district level.
- Disseminate forecasts and warnings regarding disasters and make the people conscious about them.
- Prepare a district disaster Risk Reduction Action Plan (RRAP) including the following issues with a view to keep the district authority and local organisations well-prepared to meet disasters effectively and efficiently through warning signals about imminent disasters and their occurrence.
- Prepare a checklist of emergency activities including the time schedule of assigned personnel.
- Coordinate all relief activities (GO-NGO) at union, municipality, upazila and district levels so that relief materials are distributed impartially.
- Assist people in transferring their essential resources (livestock, poultry, essential food, kerosene, candle, matches, fuel, radio, etc.) to safe places.
- Supply information relating to loss, needs, available resources and priority needs for relief and rehabilitation work to the EOC at the MoDMR and DMIC of the DDM.
- In addition, follow the "SOD" and comply instantly with the orders of appropriate authority.

Upazila Disaster Management Committee (UzDMC)

- Arrange trainings and workshops regularly on disaster related issues by keeping the DDM informed.
- Arrange trainings and workshops regularly on migration/displacement related issues by keeping the DDM informed.
- Prepare a contingency plan (emphasis on earthquake) and update it regularly.
- Prepare a comprehensive report on the lists of vulnerable communities and location map at district level based on the compilation of the 'lists of vulnerable community and location map' prepared by individual upazila and municipality (grade 'A') disaster management committees and submit itto the DDM.
- Disseminate forecasts and warnings regarding disasters and make the people conscious about them.
- Disseminate information to migrated/displaced people to enable their resettlement in new places.
- Ensure supply of safe drinking water, which can be filled in cans, ensure security and other essential services at safe centres/shelters located in district headquarters. Arrange similar services and facilities at union, municipality and upazila levels in communication with union, municipality and upazila DMCs.
- Collect and verify statistics relating to loss according to instructions issued by the Department of Disaster Management and other national authorities from upazila officials and members of the Upazila/Municipality DMCs regarding loss due to disastera according to the directives of the DDM and other national authorities; to determine priorities and requirements through emergency survey by officials or any other competent persons.
- Collect and verify statistics relating to migration/displacement according to instructions issued by the Department of Disaster Management and other national authorities from upazila officials and members of the Upazila/Municipality DMCs regarding loss due to disaster according to the directives of DDM and other national authorities; to determine priorities and requirements through emergency survey by officials or any other competent persons.
- Supply information relating to loss, needs, available resources and priority needs for relief and rehabilitation work to the EOC at the MoDMR and DMIC of the DDM.
- Supply information relating to migrants/displaced population, needs, available resources and priority needs for relief and rehabilitation work to the EOC at the MoDMR and DMIC of the DDM.
- Supervise the distribution of materials under relief and rehabilitation activities and maintain their account and send the same to national authority and other relief donor organisations.
- Take necessary measures so that people can return to their previous places after the disaster is over. In such cases, if there is any dispute regarding the legality of the land itshould not be an obstacle to returning to itafter the disaster.

City Corporation Disaster Management Committee

- Arrange regular trainings and workshops on migration management especially on earthquake issues by keeping the DDM informed.
- Identify community at risk based on age, sex, physical fitness, social status, profession and economic condition.
- Prepare short, medium and long-term vulnerability reduction and capacity building action plans for the high-risk people with active participation of the community at risk.
- Establish effective coordination with utility services for immediate restoration of lifeline services and manage local funds for the implementation of risk reduction action plans.
- Inform the DDM on the progress of implementation of the action plans.
- Take emergency measures to fill up the stock of life saving drugs after careful scrutiny of the stock at City Corporation and Ward levels.
- Operate emergency rescue work with the facilities locally available and if directed, provide support services to other rescue teams.
- Coordinate all relief activities (GO-NGO) in the City Corporation so that relief materials are distributed impartially.

- Collect and submit statistics regarding loss due to disasters according to directives from the Department of Disaster Management.
- In addition, follow the SOD and comply instantly with the orders of the appropriate authority.

Union Disaster Management Committee (UDMC)

- Prepare a short, medium and long term vulnerability reduction and capacity building action plan for the identified high-risk people with active participation of the people at risk.
- Raise fund at local level to implement the risk reduction action plan.
- Stock emergency life-saving medicines at union level (Union Health and Family Welfare Centres)
- Arrange a lesson learning session with the participation of relevant institutions and individuals on learning about the event during a hazard and in the aftermath.
- Arrange a lesson learning session with the migrants/displaced people in groups or on individual basis to learn about each other's experience.

Committee for Speedy Dissemination and Disaster related Warning and Signals (CSDDWS)

- Determine the means, methods and strategy of disaster related publicity matters e.g. weather bulletins, warning signals, slogans, etc.
- Discuss matters relating to weather bulletins and signals and formulate recommendations thereof.
- Determine the ways and means for speedy dissemination of weather signals among the people.
- Take steps for enhancing public awareness in respect of weather.

Disaster Management Training and Public Awareness Building Task Force (DMTATF)

- Co-ordinate disaster related trainings.
- Co-ordinate migration related trainings.
- Co-ordinate the public awareness activities of the government, NGOs and other organisations.

Focal Point Operation Coordination Group of Disaster Management (FPOCG)

- The FPOCG is headed by the Director General of the DDM.
- Review and coordinate the activities of various government departments related to disaster management.
- Review and coordinate the activities of various government departments related to migration management.
- Review the contingency plan prepared by relevant departments.

NGO Coordination Committee on Disaster Management (NGOCC)

- The NGOCC is headed by the Director General of the DDM.
- Review and coordinate the activities of various relevant NGOs in the country.

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Annexure

Annex-A: Comments and Responses

SL	Comments	Responses	Responses addressed in
1	The development of a data base on internally displaced people by gender, age and other characteristics for specific hazards associated with climate change over 1981-2011	Database preparation for designated period is not possible, since there is no institutional record on the rate of IDPs and their details	N/A
2	The sample size should have been larger in various types of hazards for each chosen locality and good data base	Sampled size has been drawn following established methods for selected disasters. It is now impossible to change it. Additionally, time and fund limitation interplay in decision making.	N/A
3	There is a huge limitation on data base regarding trend analysis and certain manipulations have been done to arrive at size of population displacement.	No manipulations have been made in analysis in this regard. Since estimation has been done on the basis of household responses through history recalling approach, data in some cases, made confusion. Now, memory recalling data of recent past and of catastrophic events have been considered.	**Chapter-4; Section-4.3**
4	The population displacement due to riverbank erosion and flood was not happened in each year, but it is observed in this report.	Action taken as accordingly	**Chapter-4; Section-4.2&section 4.3**
5	Spell out the sample size and sampling method (snowball sampling is not random sampling). What would have happened to the respondents had there been no hazard.	Action taken accordingly	**Chapter-3; Section-3.6**
6	Compare displaced households with those not displaced	Action taken	**Chapter-5; all sections**
7	Analyze on who chooses to migrate and who does not? This is important as most of the displaced persons are one or other kind of wage laborers.	Action taken	**Chapter-5; Section-5.4**
8	The findings show that people have been displaced several times in quite a few cases. That means some do come back to their origin. Why do they do that and under what conditions? This important issue does not seem to have been investigated at all.	Action taken accordingly	**Chapter-4; Section-4.1 & Chapter 5; Section-5.4**

9	Population displacement scenario in future not so much actual, to solve this researchers could do project future average income and other such socio-economic trends such as education and real sector development and then utilize the migration decision equation to project internal displacement.	Initially it was attempted but finally it is omitted due to unavailability of data	**Omitted**
10	Recommendations should have been unbundled and institutions and policy analysis should have been separated as a specific objective on its own	Action taken accordingly	**Chapter -6; all sections**
11	The chapter situation and impact analysis of displacement cannot indicate what would have happened if the natural hazards had	Action taken accordingly	**Chapter -5; Section -5.4**
12	Table 5.29 of page 114 ; this list of impact is too generic to quantify the extent of impact and draw any policy recommendations	Omitted (section is revised)	N/A
13	Tables 5.30 and 5.31. Figure 5.16 is also misleading – it is not clear what is meant by average loss.	Omitted (section is revised)	N/A
14	Table 5.32 and Table 5.33 (wrongly numbered as Table 33) are the only quantitative measures of impact of the incidence of hazards.	Omitted (section is revised)	N/A
15	The impact also depends on households' capacity to cope with disasters such as income, asset, health, etc. In short, there is a degree of heterogeneity of impact on the displaced households – some will be affected more than others. The study fails to capture this aspect of impact. To address these issues, a full blown regression analysis is required.	Action taken accordingly	**Chapter -5; Section -5.4**
16	The study includes 204 such households. However, in the report there is no analysis of how these two groups are similar or dissimilar. It is interesting to know while people are migrating from a village due to natural disasters, what are the reasons for other people to migrate to the same village from other places.	Action taken accordingly	**Chapter -5; Section -5.4**
17	Incidence of displacement may suffer from memory bias. People tend to remember and report the recent past more than the distant ones.	Action taken accordingly	**Chapter -4; Section -4.3**
18	The connections between the study and the list of recommendations are very weak. The recommendations hardly follow the findings of the study.	Action taken accordingly	**Chapter -6; all sections**
19	Bring the issue the potential for generating a local level trust fund with pilot demonstration on adaptive social protection for the displaced people	Action taken accordingly	**Chapter -6; all sections**

Annex-B: Household Survey Questionnaire

COMPREHENSIVE DISASTER MANAGEMENT PROGRAMME (CDMP II)

Trend and Impact Analysis of Internal Displacement due to the Impacts of Disasters and Climate Change

Household Survey Questionnaire

A. Household Identification Information

1. Household serial no.:	
2. Household no. (office use only):	
3. Household location (put tick):	1. Origin 2. Destination

4. Location of interview (put tick):	1. Urban 2. Rural
5. Village:	
6. Mauza:	
7. Union/Paurashava:	
8. Upazila:	
9. District:	

10. Original address of household: (in case of households located in destinations)	Village-	Mauza-
	Union-	Upazila-
	District	

11. Date of interview:	

12. Name of interviewee*:		1. Male 2. Female

(* the interviewee should be the household head. If the household head remains unavailable, the interviewee should be the eldest person of the household)

13. Mobile number of interviewee:	

14. Name of interviewer:	

B. Household Information

Sl. No.	Name of household members (start with household head)	Relation with HH head	Age	Sex	Marital status	Education	Occupation		Monthly income	
							Primary	Secondary	Primary	Secondary
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Code - 15

Relation with HH head

1. Household head
2. Husband/wife
3. Son/daughter
4. Son-in-law/daughter-in-law
5. Grandson/granddaughter
6. Father/mother
7. Brother/sister
8. Nephew/niece
9. Father-in-law/mother-in-law
10. Brother-in-law/sister-in-law
11. Housemaid/butler
12. Servant
13. Others (specify)

Sex

1. Male
2. Female

Marital status

1. Married
2. Unmarried
3. Widow/widower
4. Divorced
5. Abandoned by husband
6. Separated from each other

Occupation

1. Agriculture
2. Agriculture labor
3. Non-agriculture labor
4. Fisher
5. Forest related work
6. Petty business
7. Service employee
8. Day labor
9. Small cottage (garments, pottery, etc.)
10. Housewife
11. Student
12. Child
13. Livestock
14. Loom
15. Others (specify)

Education

1. Infant/child
2. Illiterate
3. Able to sign
4. Able to read & write
5. Primary/Ebtedayee (class 1 to class 5)
6. Secondary/Madrasha (class 6 to class 10)
7. SSC/Dakhil
8. HSC/Alim
9. Degree/Fazil
10. Diploma
11. Masters/Kamil

C. Disaster & Displacement/Migration

16 Which disaster(s) is/are more frequent in your locality and in which year these disasters were most catastrophic? (Rank disasters on the basis of extent & intensity and put code accordingly)

Disaster 1	Year	Disaster 2	Year	Disaster 3	Year	Disaster 4	Year
Disaster 5	**Year**	**Disaster 6**	**Year**	**Disaster 7**	**Year**	**Disaster 8**	**Year**

Code - 16			
1. Flood	2. Cyclone	3. Riverbank erosion	4. Coastal erosion
5. Water logging	6. Salinity	7. Tornado	8. Other (specify)

17. What sort of loss you had to face due to these disasters? (Use multiple code)

Rapid onset disaster	Type of loss	Monetary value (Tk.)
(1)	(2)	
Riverbank erosion		
Flood		
Slow onset disaster	**Type of loss**	**Monetary value (Tk.)**
(3)	(4)	
Coastal erosion		
Water logging		
Salinity		

Code - 17	
1. Loss of homestead infrastructure	8. Income loss
2. Loss of homestead land	9. Scarcity of pure drinking water
3. Loss of agriculture land	10. Fuel scarcity
4. Crop loss	11. Unhealthy sanitation
5. Livestock loss	12. Morbidity/increasing intensity of disease
6. Loss of employment	13. Injury
7. Food scarcity	14. Other (specify)

18. For how long, you along with your household are living at this locality?

1. From father's generation ( )	
2. Time (temporary)	month

19. Did you ever had to displace due to disasters? (put tick)

1. Yes	2. No

20. If the answer is Yes for Q. 19, then for which disaster you were displaced? (use the disaster code of Q. 16 and use multiple code, if necessary)

21. If the answer is Yes for Q. 19, then how many times you were displaced?

22. If the answer is Yes for Q. 19, then during last five years when year you were last displaced?

23. If the answer is Yes for Q. 19, then you have chosen this place for residing? (use code and there could be multiple answers)

Code - 23		
1- Easy to migrate/shift	5- Above from flood level	9- Many people can reside together
2- Low price of land	6- Relatives are residing here	10- Enough facilities for women
3- Away from river	7- No alternative place to shift	11- Availablesanitation facilities
4- Enough space for cattle	8- Near to the house	12- Others (specify)

24. If the answer is Yes for Q. 19, why you were displaced from your own house? (there could be multiple answers)

Code – 24		
1. To avoid inundation	6. To protect households from cyclone	11. Occupation change
2. To avoid erosion	7. Lack of employment	12. Others (specify)
3. To avoid water logging	8. Loss of homesteads	
4. To avoid salinity	9. For better lifestyle	
5. To avoid storms	10. Mortgager won't extend time	

25. If the answer is Yes for Q. 19, then where you were displaced/migrated? (describe name of 3 places synchronically)

Places (mention names in case of code no. 1, 2, 4, 6, 7 only)	Reasons of preference (use code of Q. 23)	Time (Year)

Code - 25
1. Govt./non-govt. shelter; 2. Embankment; 3. High elevated land/field; 4. Relatives' houses; 5. Roof of own houses; 6. School/college/madrasha; 7. Adjacent village/union/upazila; 8. Other (specify)

26. If the answer is No for Q. 19, what are the reasons? (there could be multiple answers)

Code - 26
1. Shelter centre is away from home; 2. Not enough facilities for women; 3. Fear, that household assets would be theft; 4. No place to migrate; 5. Fear of sexual harassment; 6. No sanitation facilities; 7. No need to be migrated; 8. Financial crisis; 9. Fear of occupational change; 10. Took shelter for few days/ not had to displaced; 11. Others (specify)

27. Do you have any plan to be displaced from this locality? (If No, then skip to Q. 30)

1. Yes	2. No

28. If the answer is Yes for Q. 27, would you tell me the reason(s)? (There could be multiple answers)

Code - 28			
1. To avoid inundation	4. To avoid salinity	7. Lack of employment	9. For better living standard
2. To avoid erosion	5. To avoid storms	8. Infrastructural damage of households	10. Others (specify)
3. To avoid water logging	6. To avoid cyclone		

29. If the answer is Yes for Q. 27, which placed you have chosen for migration/displacement? (mention name of three places sequentially)

Place (use code of Q. 26)	Reasons for preference (use code of Q. 23)

D. Human Capital of Household

Health

30. How much time you have to spend to reach the adjacent health center from the household? Minutes

31. Is there any member of your households is suffering from any critical disease/disability? (put tick) 1. Yes 2. No

32. What are the common diseases your household members suffer from? (there could be multiple answers)

Code - 32
1-Cholera; 2-Fever/coldness/coughing; 3-Malaria; 4-Pox; 5-Diabetes; 6-Diarrhoea; 7-TB; 8-Arsenic; 9-Others (specify)

33. From where you/your household members take medical treatment? (use code)

Code - 33
1-Quack doctor; 2-MBBS;3-District govt. hospital; 4-Upazila health complex (govt.); 5-Union health center (govt.); 6-Private/NGO health center; 7-Community health clinic; 8-Rural physician; 9-Pharmacy; 10-Others (specify)

34. Between 1981 and 2011, is there any member of your households has died due to climate change induced disasters? (put tick) 1. Yes 2. No

35. If the answer is Yes for Q. 34, what sort of disaster that was? (use code of Q. 16)

36. Between 1981 and 2011, is there any member of your households has suffered from injury due to climate change induced disasters? (put tick) 1. Yes 2. No

37. If the answer is Yes for Q. 36, what sort of disaster that was? (use code of Q. 16)

38. If the answer is Yes for Q. 36, is there any member of your household is suffering from physical or mental disability? (put tick) 1. Yes 2. No

39. Is there any child (under 5) of your household has died? (put tick) 1. Yes 2. No

40. If the answer is Yes for Q. 39, what were the reason(s)? (there could be multiple reasons)

Code - 40
1-Disease; 2-Accident;3-Injury due to disasters; 4-Normal death; 5-Unknown reasons; 6-Others (specify)

Knowledge & Skill

41. Do you have mobile phone/radio/television is your household? (put tick)

1. Yes	2. No

42. If the answer is Yes for Q. 41, do you watch television/listen to radio? (put tick)

1. Yes	2. No

43. If the answer is Yes for Q. 42, did you ever receive disaster forecasting and other related information through mobile phone/radio/television? (put tick)

1. Yes	2. No

44. Is there any member of your household ever receive any sort of livelihood improvement training? (put tick)

1. Yes	2. No

45. If the answer is Yes for Q. 44, which sort of training? (put tick)

Code - 45
1-Income generation; 2-AIG; 3-Technical/vocational; 4-Disaster management; 5-livestock rearing; 6-Others (specify)

E. Financial Capital of Household

Asset

46. Amount of land your household own

Land type	Type of ownership	Amount (decimal)
Homestead		
Agriculture land		
Garden		
Pond		
Others (specify)		
Total		

Code - 46
1-Self ownership; 2-Give lease; 3-Take lease; 4-Give mortgage; 5-Take mortgage; 6-Give sharecropping; 7-Take sharecropping; 8-khas (directly owned by govt.); 9-khas (directly operated by govt. institution); 10-Charity/donation; 11-Others (specify)

47. List of assets owned by your household

Name of assets	Number/Amount	Valuation (Tk.)
Cattle		
Hen/Duck		
Farm equipments		
Vehicle		
Trees		
Garden (specify)		
Net		
Boat		
Loom		
Others (specify)		

Household income

48. Income from agriculture, employment & wage (last year)

Sl. No.	Type	Tk.
01.	Income from employment & wage (cite from Q. 15)	
02.	Income from agriculture (cite from Q. 15)	
03.	Total (A)	

49. Off-farm income (last year)

Sl. No.	Type	Tk.
01.	Land sale (yearly)	
02.	Power tiller (yearly)	
03.	Irrigating water (yearly)	
04.	Cow/buffalo sale (yearly)	
05.	Goat/sheep sale (yearly)	
06.	Milk and lactic product sale (monthly)	
07.	Egg sale (monthly)	
08.	Fish sale (monthly)	
09.	Hen/duck sale (monthly)	
10.	Others (specify)	
11.	Total (B)	

50. Non-farm income (last year)

Sl. No.	Type	Tk.
01.	House rent (monthly)	
02.	Shop rent (monthly)	
03.	Pity business (monthly)	
04.	Remittance (monthly)	
05.	Pity/small industry (monthly)	
06.	Others (specify)	
07.	Total (C)	

51. Total annual income (A+B+C): ..... Tk.

Household expenditure

52. Agriculture expenditure (last year)

Sl. No.	Type	Tk.
01.	Farm equipment (seeds, fertilizer, pesticide etc.) (yearly)	
02.	Farm equipment (irrigation, labor/wage etc.) (yearly)	
03.	Land purchase (yearly)	
04.	Taking land mortgage (yearly)	
05.	Sharecropping (yearly)	
06.	Lease (yearly)	
07.	Mortgage (yearly)	
08.	Rice processing activities (yearly)	
09.	Transportation (monthly)	
10.	Storage	
11.	Cow/buffalo purchase (yearly)	
12.	Fodder for cow/buffalo (monthly)	
13.	Hen/duck purchase (yearly)	
14.	Irrigation equipment (yearly)	
15.	Others	
16.	Total (A)	

53. Homestead building expenditure (last year)

Sl. No.	Type	Tk.
01.	Construction expenses (yearly)	
02.	Maintenance	
03.	Furniture (yearly)	
04.	Utensils	
05.	Others	
06.	Total (B)	

54. Family expenditure (last year)

Sl. No.	Type	Tk.
01	Rice (monthly)	
02	Wheat (monthly)	
03	Pulse (monthly)	
04	Fish/dry fish (monthly)	
05	Meat (monthly)	
06	Vegetable (monthly)	
07	Fruits (monthly)	
08	Sugar (monthly)	
09	Edible oil (monthly)	
10	Tea (monthly)	
11	Milk & lactic products (monthly)	
12	Egg (monthly)	
13	Spice & salt (monthly)	
14	Others (specify)	
15	Total (C)	

55. Family expenditure (excluding food) (last year)

Sl. No.	Type	Tk.
1.	Soap (monthly)	
2.	Fuel (wood, cow dung etc.) (monthly)	
3.	Kerosene (monthly)	
4.	Electricity (monthly)	
5.	Cloth (monthly)	
6.	Education (monthly)	
7.	Medicine/treatment (monthly)	
8.	Transportation (monthly)	
9.	Jewellery (yearly)	
10.	Radio/TV (yearly)	
11.	Others (specify)	
12.	Total (D)	

56. Family non-farm expenditure (last year)

Sl. No.	Type	Tk.
1.	Cottage & pity industry (monthly)	
2.	Pity trade (monthly)	
3.	Fishery in pond (monthly)	
4.	Transportation (if any) (monthly)	
5.	Others (specify)	
6.	Total (E)	

57. Total annual expenditure (A+B+C+D+E): .....Tk.

Credit

58. Did your household receive any credit/loan, last year, from any local cooperative society or any other institution (put tick)

1. Yes	2. No

59. How did you use that credit/loan? (use code)

Code - 59		
1- Investment in business	5- Building houses	9- Boat repairing
2- Land purchase/mortgage/lease	6- Farming/equipment purchase	10- Sending child abroad
3- Cattle purchase	7- Marriage of child	11- Payment of previous loan
4- Medical treatment	8- Education expenses of child	12- Others (specify)

Savings & Investment

60. Do you (or your household) have any savings? (put tick)

1. Yes	2. No

61. If the answer is Yes for Q. 60, what is the amount of savings?

Tk. (monthly

C. Natural Capital of Household

Land

62. . Between 1981 and 2011, is there any agricultural land of your households has affected/degraded due to climate change induced disasters? (put tick)

1. Yes	2. No

63. Between 1981 and 2011, is there any homestead land of your households has affected/degraded due to climate change induced disasters? (put tick)

1. Yes	2. No

Fuel

64. What is the major source of fuel in your household? (use code)

Code - 64		
1- Fuel wood, dry leaf, thatch, cow-dung, jute-stick etc.	3- Electricity	5- Biogas
2- Kerosene	4- Natural gas	6- Others (specify)

65. How much time you have to spend to collect fuel for your household?

Code (use code of Q. 64)	Minutes

G. Social Capital of Household

Social Network & Relations

66.	Is your household affiliated with any large social institution (e.g. club, cooperative society, community organization)? (put tick)	1. Yes	2. No
67.	Did you ever receive any assistance/help from your friend & relative during natural disaster or hardship? (put tick)	1. Yes	2. No
68.	Did any of your household members ever seek for relief during disasters from local government? (put tick)	1. Yes	2. No
69.	Are any of your household members affiliated with any local cooperative society/private institution? (put tick)	1. Yes	2. No

H. Physical Capital of Household

70. What is the type of your residence? ____

Code - 70	
1- Kutcha (made of bamboo, thatch, earthen, Golpata etc.)	4- Paved wall & paved roof
2- C.I. sheet/wood/bamboo	5- Tent
3- Paved wall & roof of C.I sheet	6- Others (specify)

71. What if the ownership pattern of residence? ____

Code - 71
1-self ownership; 2-rented; 3-relatives' ownership; 4-others (specify)

72. Is there any electricity facility in your household? (put tick) ____

Code - 72
1-REB/grid electricity; 2-solar panel; 3-generator; 4-no facility; 5-others (specify)

73. What is the source of your drinking water? ____

Code - 73	
1- Tube-well	4- Pond
2- Tap/supply	5- Fountain
3- River	6- Others (specify)

74. How much time you have to spend to collect the drinking water from source? ____ minutes

75.	Is your drinking water free from arsenic? (put tick)	1. Yes	2. No	3. Don't know

76. What is the type of your household's sanitation facility? ____

Code - 74		
1- Paved (water sealed)	4- Kutcha	7- Others (specify)
2- Paved (not water-sealed)	5- Hanging/Jhupri	
3- Ring slab	6- No sanitation facilities	

Annex-C: Checklist for FGD

FGD Checklist

১. নির্বাচিত দুর্যোগের নামঃ

২. FGD এর স্থানঃ

৩. তারিখ ঃ

৪. সময় ঃ

5. Participant list -

৬. উৎপত্তি স্থলঃ

গ্রাম- ইউনিয়ন- উপজেলা- জেলা-

৭. লক্ষ্যস্থল ঃ

গ্রাম- ইউনিয়ন- উপজেলা- জেলা-

(ক) দুর্যোগ

৮. এখানে প্রধানত কি কি দুর্যোগ দেখা দেয় ?সবচেয়ে প্রভাব বিস্তারকারী দুর্যোগ কোনটি ?

৯. দুর্যোগ ভিত্তিক ক্ষতির ধরণ ।

১০. উপস্থিত পরিবারের মধ্যে কতটি পরিবার স্থানচ্যুত হয়েছে? এবং কতবার?

১১. কোন দুর্যোগের জন্য স্থানচ্যুত হতে হয় (স্থায়ী স্থানচূতি/অস্থায়ী স্থানচূতি)

১২. বছরের কোন সময়ে এই দুর্যোগ দেখা দেয় ?

১৩. বিগত কোন বছরে এই দুর্যোগের তীব্রতা বেশী ছিল ?

১৪. দুর্যোগের ফলে কোথায় কোথায় আশ্রয় নেয় ? দুর্যোগ পরবর্তী সময়ে তারা ফিরে আসে কি না ?

১৫. নির্দিষ্ট দুর্যোগের ফলে কত দিন বাইরে থাকতে হয়? এই সময়ে তাদের জীবিকার ধরণ কি ? যেখানে আশ্রয় নেয় সেখানে কি কি সমস্যায় পড়তে হয় ?

১৬. দুর্যোগের কারণে এলাকার কেউ মারা গেছে কি না ? বিগত ৩০ বছরের মধ্যে মারা গিয়ে থাকলে কোন দুর্যোগে এবং কিভাবে?

১৭. আশ্রয় কেন্দ্রে যাওয়ার ক্ষেত্রে নারী, প্রতিবন্ধি ও বৃদ্ধরা কোন সমস্যায় পড়ে কি না ?পড়লে কি কি সমস্যা ? দুর্যোগের আগাম বার্তা পাওয়া যায় কিনা? পেলে কোথা থেকে কিভাবে পায়? আগাম বার্তা পেলে কি ধরণের প্রস্তুতি গ্রহণ করে থাকে?

(খ) দুর্যোগ পরবর্তী সহযোগিতা

১৮. দুর্যোগেআক্রান্তহলে কোন সরকারী/ বেসরকারী/ এলাকাভিত্তিক প্রতিষ্ঠান সহায়তার জন্য এগিয়ে আসে কি না? সর্বশেষ কবে সহায়তা পেয়েছেন?

১৯. দুর্যোগে সরকারী/বেসরকারী প্রতিষ্ঠান থেকে কি কি ধরনের সহযোগিতা প্রদান করা হয়ে থাকে?

২০. দুর্যোগ পরবর্তীতে এলাকায় কোন ধরণের পুনর্বাসনমূলক কর্মকা- হাতে নেওয়া হয় কি না ? নিলে কি কি ধরণের কাজ হয়ে থাকে?

২১. পূণর্বাসনের কাজ হয়ে থাকলে তা যথেষ্ট বলে মনে করেন কি না ?

২২. স্থানান্তরের উপর এধরণের সাহায্য- সহযোগিতার কোন প্রভাব আছে কি না ?

(গ) পেশা/জীবিকা

২৩. নির্দিষ্ট দুর্যোগের ফলে পেশাগত পরিবর্তন, পরিবর্তনের ধরণ ও পরিবর্তনের কারণ।

২৪. দুর্যোগ পরবর্তীকালে পূর্বের পেশায় ফিরে আসে কি না?

(ঘ) অন্যান্য

২৫. দুর্যোগকালীন সময়ে এই এলাকায় সাধারণত কোন ধরণের অসুখ-বিসুখ দেখা দেয়?

২৬. অসুখ-বিসুখ হলে দুর্যোগকালীন এবং দুর্যোগ পরবর্তী সময়ে কোথা থেকে চিকিৎসা গ্রহণ করে?

২৭. দুর্যোগ পরবর্তী সময়ে এলাকার লোকজন রান্নার কাজে কোন ধরণের জ্বালানী ব্যবহার কওে ? এগুলো সংগ্রহ করতে কেমন সময় লাগে? এবং কোথা থেকে এগুলো সংগ্রহ করে?

২৮. দুর্যোগকালীন ও দুর্যোগ পরবর্তী সময়ে এলাকায় মানুষ কোথা থেকে খাবার পানি সংগ্রহ করে? এই পানি নিরাপদ কি না? নিরাপদ না হলে কোন অসুখ-বিসুখে হয় কি না?

২৯. দুর্যোগ পরবর্তী সময়ে এখানকার বেশীরভাগ মানুষ কি ধরণের পায়খানা ব্যবহার করে?

৩০. দুর্যোগ পরবর্তী সময়ে শিক্ষা ব্যবস্থায় কোন ব্যাঘাত ঘটে কি না ? ঘটলে কি ধরণের ? বিস্তারিত।

৩১. এলাকায় কোন স্বাস্থ্য কেন্দ্র / হাসপাতাল আছে কি না ?না থাকলে এলাকা থেকে কত দূরত্বে যেতে হয়?

৩২. এলাকার বেশীরভাগ ঘরবাড়ী কিসের তৈরী? এই এলাকায় বিদ্যুৎ আছে কি না?

Annex-D: Procedures SLA model analysis

Annex-D: Procedures SLA model analysis

Methods of SLA model: A balanced weighted average approach is used to formulate SLI where each indicator contributes equally to the respective capital index even though each capital is comprised of a different number of indicators. Because it is intended to develop an assessment tool accessible to a diverse set of users in resource-poor settings, the SLI formula uses the simple approach of applying equal weights to all major components. This weighting scheme could be adjusted in the future as needed.

a. Normalizing indicator scores: In order to combine components which are based on different units of measurement, the values need to be 'normalized' before combination. This means putting them on the same scale. In this study, scores for each indicator are calculated by the following formula:

$Index_{Ih_{id}} = \frac{IV_d - IV_{min}}{IV_{max} - IV_{min}} \times 100$	Here, • Ih_{id} is the index of the indicator for *i-th* individual HH • IV_d is the actual indicator score of *i-th* household • IV_{max} is the maximum possible indicator value • IV_{min} is the minimum possible indicator value
The value for any indicator then lies between 0 and 100. The maximum and minimum values are usually adjusted so as to avoid values of 0 or 100. The aim is to get values in the range 0 to 100 for each indicator.	

The equation used for the conversion of ordinal scale into an index, will be adapted from that used in the Human Development Index to calculate the life expectancy index, which is the ratio of the difference of the actual life expectancy and a pre-selected minimum, and the range of predetermined maximum and minimum life expectancy.

b. Combining the indicators into a composite index: The SLI calculates indicator indexes - by using following equation - for all possible households and then take arithmetic average of all indexing values to get a combined index value for respective household.

$\text{Average Index Value of a indicator (AIV)} = \frac{Ih_1 + Ih_2 + Ih_3 + \ldots Ih_n}{N_h}$	Here, • Ih is the individual indicator index value for a HH/HH member • N_h is the total number of HH/HH member used in indexing

To get capital index, the SLI will take arithmetic average of all average index values by using the following equation.

$CapitalIndex = \frac{AIV_1 + AIV_2 + \cdots .. + AIV_n}{N_{indicator}}$	Here, • AIV is the average index value for an individual indicator • Nindicator is the total number of indicator for respective capital

Finally, once index values for each of the five capitals are calculated and averaged using following equation to obtain the area-wise SLI value.

$SLI_d = \frac{\sum_{i=1}^{5} W_{C_i} \times CI_i}{\sum_{i=1}^{5} W_{C_i}}$	Here, • Li_d is the livelihood index of an individual geographical area • W_{ci} is the weight of a certain capital which derive from the number of indicators hold by the capital • CI_i is the individual capital index

[1] Sullivan, C., 2002. Calculating a water poverty index. World Development 30, 1195–1210.
[2]UNDP, 2007.Human development reports. http://hdr.undp.org/en/ (accessed 25 December 2007).

Where, SLId, the Sustainable Livelihood Index for area d, equals the weighted average of the five capitals. The weights of each capital, Wci are determined by the number of indicators that make up each capital and are included to ensure that all indicators contribute equally to the overall SLI[3].

Indicators comprising the Livelihood Index (LI) model:

Capital/Assets	Indicators	Survey questions	Scoring scales (ordinal)
Financial capital	Total Income	Total annual income from agriculture, employment & wage; off-farm and non-farm sector	0= <=20,000 tk. 1=<=58230 tk. (lower poverty line) 2=<=67105 tk. (upper poverty line) 3=>=67106 tk.
	Total expenditure	Total annual expenditure for homestead building, family, family expenditure (excluding food), family's non-farm	0=<=20,000 tk. 1=<=56228 tk. (lower poverty line) 2=<=65776 tk. (upper poverty line) 3=>=65777 tk.
	Loan	Did your household receive any credit/loan, last year, from any local cooperative society or any other institution?	1=Yes 2=No
	Savings	Do you (or your household) have any savings?	2=Yes 1=No
	Amount of total savings	What is the amount of savings?	1=<=15000 tk. 2=<=25000 tk. 3=<=40000 tk. 4=<=70000 tk. 5=>=70001 tk.
Human capital	Time reaching to the health centers	How much time you have to spend to reach the adjacent health center from the household?	4=<=15 minutes 3=16-30 minutes 2=31-59 minutes 1=>=60 minutes
	Status of chronic disease/disability	Is there any member of your households is suffering from any critical disease/disability?	1=Yes 2=No
	Death due to hazard	Between 1981 and 2011, is there any member of your households has died due to climate change induced disasters?	1=Yes 2=No
	Affectedness due to hazard	Between 1981 and 2011, is there any member of your households has suffered from injury due to climate change induced disasters?	1=Yes 2=No
	Status of physical/mental illness	Is there any member of your household is suffering from physical or mental disability?	1=Yes 2=No
	Death of children	Is there any child (under 5) of your household has died?	1=Yes 2=No
	Having mobile/radio	Do you have mobile phone/radio/television is your household?	2=Yes 1=No
	Use of mobile/radio	Do you watch television/listen to radio?	2=Yes 1=No
	Listening forecast on mobile/radio	Did you ever receive disaster forecasting and other related information through mobile phone/radio/television?	2=Yes 1=No
	Training	Is there any member of your household ever receive any sort of livelihood improvement training?	2=Yes 1=No
Physical capital	Type of dwelling	What is the type of your residence?	1=Kutcha (made of bamboo, thatch, earthen, Golpata etc.) 2=C.I.

[3] Sullivan, C., 2002. Calculating a water poverty index. World Development 30, 1195–1210.

Capital/Assets	Indicators	Survey questions	Scoring scales (ordinal)
			sheet/wood/bamboo 3=Paved wall & roof of C.I sheet 4=Paved wall & paved roof 1=Tent
	Ownership of HHs	What is the ownership pattern of residence?	4=Self ownership 3=Rented 2=Relatives' ownership 1=Others
	Electricity	Is there any electricity facility in your household?	5= REB/Grid 4=Solar panel 3=Generator 1=No facility 2=Others
	Drinking water source	What is the source of your drinking water?	5=Tube-well 4=Tap/supply 3=River 2=Pond 1=Others
	Time for fetching drinking water	How much time you have to spend to collect the drinking water from source?	5=<=15 minutes 4=16-29 minutes 3=30-59 minutes 2=60-89 minutes 1=>90 minutes
	Arsenic prevalence	Is your drinking water free from arsenic?	3=Yes 1=No 2=Don't know
	Sanitation	What is the type of your household's sanitation facility?	5=Paved (not water-sealed) 4=Ring slab 3=Kutcha 2=Hanging/Jhupri 1=No sanitation facilities 1=Others
Social capital	Relationship with large social organizations	Is your household affiliated with any large social institution (e.g. club, cooperative society, community organization)?	2=Yes 1=No
	Help from relatives/neighbors	Did you ever receive any assistance/help from your friend & relative during natural disaster or hardship?	2=Yes 1=No
	Help from local administration	Did any of your household members ever seek for relief during disasters from local government?	2=Yes 1=No
	Relationship with local organizations	Are any of your household members affiliated with any local cooperative society/private institution?	2=Yes 1=No
Natural capital	Loss of agricultural land	Between 1981 and 2011, is there any agricultural land of your households has affected/degraded due to climate change induced disasters?	1=Yes 2=No
	Loss of homestead land	Between 1981 and 2011, is there any homestead land of your households has affected/degraded due to climate change induced disasters?	1=Yes 2=No
	Sources of fuel	What is the major source of fuel in your household?	2=Wood 3=Kerosene 5=Electricity 6=Natural gas 4=Biogas 1=Others

Details of livelihood modeling:

A. Temporarily Displaced						
Capital/Assets	**Indicators**	**Indicator index**	**Capital Index value**	**Indicator no./weight**	**Index value*weight**	**Livelihood index**
Financial capital	Total Income	0.92	0.62	5	3.1	0.58
	Total expenditure	0.88				
	Loan	0.46				
	Savings	0.60				
	Amount of total savings	0.23				
Human capital	Time reaching to the health centers	0.48	0.70	10	7.0	
	Status of chronic disease/disability	0.77				
	Death due to hazard	0.98				
	Affectedness due to hazard	0.96				
	Status of physical/mental illness	1.00				
	Death of children	0.88				
	Having mobile/radio	0.75				
	Use of mobile/radio	0.55				
	Listening forecast on mobile/radio	0.48				
	Training	0.13				
Physical capital	Type of dwelling	0.28	0.68	7	4.76	
	Ownership of HHs	0.97				
	Electricity	0.33				
	Drinking water source	1.00				
	Time for fetching drinking water	0.92				
	Arsenic prevalence	0.83				
	Sanitation	0.40				
Social capital	Relationship with large social organizations	0.08	0.31	4	1.24	
	Help from relatives/neighbors	0.41				
	Help from local administration	0.50				
	Relationship with local organizations	0.26				
Natural capital	Loss of agricultural land	0.36	0.24	3	0.72	
	Loss of homestead land	0.17				
	Sources of fuel	0.20				

B. Permanently Displaced						
Capital/Assets	**Indicators**	**Indicator index**	**Capital Index value**	**Indicator no./weight**	**Index value*weight**	**Livelihood index**
Financial capital	Total Income	0.95	0.67	5	3.35	0.57
	Total expenditure	0.95				
	Loan	0.64				
	Savings	0.47				
	Amount of total savings	0.31				
Human capital	Time reaching to the health centers	0.58	0.66	10	6.6	
	Status of chronic disease/disability	0.83				

B. Permanently Displaced						
Capital/Assets	**Indicators**	**Indicator index**	**Capital Index value**	**Indicator no./weight**	**Index value*weight**	**Livelihood index**
	Death due to hazard	0.98				
	Affectedness due to hazard	0.92				
	Status of physical/mental illness	0.99				
	Death of children	0.83				
	Having mobile/radio	0.74				
	Use of mobile/radio	0.35				
	Listening forecast on mobile/radio	0.34				
	Training	0.08				
Physical capital	Type of dwelling	0.24	0.66	7	4.62	
	Ownership of HHs	0.95				
	Electricity	0.33				
	Drinking water source	0.98				
	Time for fetching drinking water	0.99				
	Arsenic prevalence	0.80				
	Sanitation	0.37				
Social capital	Relationship with large social organizations	0.15	0.34	4	1.36	
	Help from relatives/neighbors	0.70				
	Help from local administration	0.25				
	Relationship with local organizations	0.26				
Natural capital	Loss of agricultural land	0.28	0.21	3	0.63	
	Loss of homestead land	0.14				
	Sources of fuel	0.21				

Annex-E: Categories of independent variable for regression analysis

Family Size		Primary occupation of HHH		Land holding category		Education status of HHH	
Category	**Member**	**Category**	**Occupants**	**Category**	**Decimal**	**Category**	**Education level**
Small	1-3	Agriculture	Farmer	Small	0-100	Illiterate	No academic access
Medium	4-6	Labor	Agriculture, Non Agriculture, Day labor	Marginal	101-250	Primary	1 to <=Class 5
Large	6+	Others	Business, Service, Small cottage, Livestock, Loom etc.	Large	250+	Secondary and over	Class 5+

Annex-F: Detail distribution of sampled households

District	Upazila	Union	Village	Flood	River Bank Erosion	Salinity	Water logging
Bhola	Burhanuddin	Hassan Nagar	Dakshin Char Lamchhidhali	-	2	-	-
Bhola	Burhanuddin	Hassan Nagar	Hassan Nagar	-	35	-	-
Bhola	Burhanuddin	Hassan Nagar	Maddhamdali	-	7	-	-
Bhola	Burhanuddin	Hassan Nagar	Sudharampur	-	36	-	-
Bhola	Burhanuddin	Tabgi	Dalalpur	-	4	-	-
Bhola	Burhanuddin	Tabgi	Mulai Pattan	-	1	-	-
Chandpur	Hajiganj	Dakshin Kalocho	Naohata	45	-	-	-
Chandpur	Hajiganj	Dakshin Kalocho	Sidla	40	-	-	-
Jessore	Keshabpur	Sagardari	Fatapur	-	-	-	2
Jessore	Keshabpur	Sagardari	Mirzapur	-	-	-	4
Jessore	Manirampur	Kultia	Sujatpur	-	-	-	6
Jessore	Manirampur	Nehalpur	Balidaha	-	-	-	9
Jessore	Manirampur	Nehalpur	Pachakari	-	-	-	65
Khulna	Batiaghata	Batiaghata	Charkhali	-	-	1	-
Khulna	Batiaghata	Jalma	Krishna Nagar	-	-	12	-
Khulna	Batiaghata	Jalma	Sachiabunia	-	-	6	-
Khulna	Dacope	Tildanga	Chak Kaminibasi	-	-	23	-
Khulna	Dacope	Tildanga	Garkhali	-	-	33	-
Khulna	Dacope	Tildanga	Tildanga	-	-	13	-
Kurigram	Char Rajibpur	Char Rajibpur	Char Rajibpur	48	-	-	-
Kurigram	Char Rajibpur	Char Rajibpur	Rajibpur	36	-	-	-
Kurigram	Char Rajibpur	Mohanganj	Sannyasikandi	1	-	-	-
Nawabganj	Shibganj	Uzirpur	Uzirpur	-	85	-	-
Satkhira	Assasuni	Sreeula	Kalimakhali	-	-	46	-
Satkhira	Assasuni	Sreeula	Mariala	-	-	16	-
Satkhira	Assasuni	Sreeula	Naktara	-	-	1	-
Satkhira	Assasuni	Sreeula	Puinjala	-	-	7	-
Satkhira	Assasuni	Sreeula	Sreeula	-	-	11	-
Satkhira	Kalaroa	Joynagar	Khetropara	-	-	-	4
Satkhira	Kalaroa	Joynagar	Sarash Kathi	-	-	-	1
Satkhira	Satkhira Sadar	Ward No-04	Polashpole	-	-	1	-
Satkhira	Tala	Islamkati	Ghona	-	-	-	64
Satkhira	Tala	Islamkati	Gopalpur	-	-	-	1
Satkhira	Tala	Islamkati	Narayanpur	-	-	-	14

District	Upazila	Union	Village	Flood	River Bank Erosion	Salinity	Water logging
Shariatpur	Damudya	Dhankati	Char Malgaon	54	-	-	
Shariatpur	Damudya	Dhankati	Purbakandi	31			
Shariatpur	Zanjira	Barakandi	Barakandi	-	8	-	-
Shariatpur	Zanjira	Barakandi	Nazumuddi Beparirkandi	-	17	-	-
Shariatpur	Zanjira	Barakandi	Saulgaria Kantarsar	-	51	-	-
Shariatpur	Zanjira	Kunder Char	Chitar Char	-	4	-	-
Shariatpur	Zanjira	Paler Char	Kalikal	-	5	-	-
Sirajganj	Belkuchi	Belkuchi	Agura	1	-	-	-
Sirajganj	Belkuchi	Belkuchi	Aguria	1	-	-	-
Sirajganj	Belkuchi	Belkuchi	Belkuchi	3	-	-	-
Sirajganj	Belkuchi	Belkuchi	Chandangati	1	-	-	-
Sirajganj	Belkuchi	Belkuchi	Chhota Beara Kharua	5	-	-	-
Sirajganj	Belkuchi	Belkuchi	Mukundaganti	2	-	-	-
Sirajganj	Belkuchi	Belkuchi	Mulkandi	60	-	-	-
Sirajganj	Belkuchi	Belkuchi	Shahapur	4	-	-	-
Sirajganj	Belkuchi	Belkuchi	Sohagpur	2	-	-	-
Sirajganj	Belkuchi	Belkuchi	Somoshpur	1	-	-	-
Sirajganj	Belkuchi	Belkuchi	Uttar Delia	1	-	-	-
Sirajganj	Belkuchi	Bhangabari	Tamai	1	-	-	-
Sirajganj	Belkuchi	Jamtail	Jamtali	1	-	-	-
Sirajganj	Belkuchi	Rajapur	Aguria	1	-	-	-
Sirajganj	Belkuchi	Rajapur	Nagganti	1	-	-	-
Sirajganj	Chauhali	Bagutia	Char Salimabad	-	13	-	-
Sirajganj	Chauhali	Gharjan	Char Salimabad	-	1	-	-
Sirajganj	Chauhali	Omarpur	Moarpur	-	1	-	-
Sirajganj	Chauhali	Omarpur	Omarpur	-	67	-	-
Sirajganj	Chauhali	Omarpur	Poila	-	1	-	-
Sirajganj	Chauhali	Sthal	Char Salimabad	-	2	-	-

Annex-G: Recommendations proposed by the local people

i) Disaster-Flood

S.I	Sector	Problem	Recommendations		
			Short term	Medium term	Long term
01	Homesteads	1. Most of the homesteads receive enormous damage in the high flood 2. The houses fall down. 3. Flood cause loosen the house-base soil and rotten the fence and poles. 4. Houses broken down by river Waves and current	- Taking temporary shelter in a safety place(like education institution) - Repairing of houses as and when necessary - Dissemination of flood early warning so that they can explore the safer places	- Heightening the plinth level houses - Monetary assistance to the affected people for re-building houses from the government part - Using Khas lands for developing permanent Asrayan Project	- Construction of embankment for controlling flood and protecting river erosion - Primary school and other education center can be built above the danger level of flood so that people can take shelter - Union parishad can be built as a flood shelter during emergencies - Construction of flood protection embankment
02	Occupation/Employment	1. They have no employment opportunities 2. They change their occupation impermanent	- Create alternative occupation - food for work - Distribute relief to the affected people - supply vegetable seeds to the affected people	- Make availablethe soft loan to the affected households. - Tree plantation program will be start	- Livestock project will be taken
03	Income	1. No income facilities this period 2. Financial crisis	- Start handicraft work - Emergency food supply (like infant food) - 40 days activities will be continue	- Make availablethe soft loan to the affected households. - Tree plantation program will be start	- Livestock & poultry farm project will be taken - Construction livestock and poultry house at household level
04	Migration/Displacement	1. People are migrated from village to town so shortage of local day labour 2. Increase slum 3. Increase turbulence at town/city	- Dissemination flood early warning for ensuring emergency evacuation and exploring safer places.	- Make availablethe soft loan to the affected household.	- Construction of embankment for controlling flood and protecting river erosion - Construction of adequate number Asrayan project/shelter for emergency shelter during flood hazard
05	Education	1. School going students could not attend school 2. Most of the time schools are closed this time(about 2 months are closed)	- In the short term closed the school by education office/authority - Arrange engine boat for students communication	- For easy access to school and rescue activities it needs to construct new roads and repairing of risky roads	- Primary school and other education center can be built above the danger level of flood

S.I	Sector	Problem	Recommendations		
			Short term	Medium term	Long term
06	Efficiency	1. Most of the local people are not efficiency about their own occupation	- Skill and consciousness developing training - Informing the doings and preparedness during hazards through awareness building programme involving mass people.	- Capacity building training needs to be introduced significantly. - Informing the doings and preparedness after hazards through awareness building programme involving mass people.	- Skill and consciousness developing training arrange for flood affected people

ii) Disaster-Riverbank erosion

Sl. No.	Sectors	Problem	Recommendations		
			Short term	Medium term	Long term
1	Household	- Poor people cannot repair houses due to monetary insolvency - Lack of government assistance in renovation of houses - Loss of homestead - Loss of lives and property - Unable to make new house in the displaced area due to financial disability	- Providing of easy loan to the affected people for construction of house - Emergency sheltering of affected people - Construction of fence using bamboo and sand bag for protecting erosion temporarily - Transforming homesteads in the safe zone through a proper planning	- Construction of embankment with proper planning - Cooperation of social services organizations - Development of cluster village for the landless or affected people - Strengthening the banks with blocks, spreading stones/Geo-bags along vulnerable spots	- Sanction of adequate money for construction of embankment - Protection measures should be implemented by piling/ depositing blocks from the bottom of the bank
2	Occupation	- People become unemployed - Less employment opportunities - Change of occupation - Lack of alternative opportunity	- Providing of easy loan or occupation based equipments(net, boat etc for fisherman) to the affected people for occupation purpose	- Cooperation of social services organizations - Increasing of employment opportunities as poultry, dairy farms, handicrafts, small cottage industry	- Creating gas based industry as cottage industry and providing its related training
3	Income	- Decreasing of income sources - Financial crisis - Conflict between existing and migrated labors	- Providing of easy loan to the affected people	- Increasing of employment opportunities (poultry, dairy, fishery etc)	- Create employment opportunity by cottage industry, Poultry and provide related training - Establishing new industry at local level

Sl. No.	Sectors	Problem	Recommendations		
			Short term	Medium term	Long term
4	Migration/displacement	- Increasing of out migration	- Emergency sheltering of affected people	- Development of cluster village for the landless or affected people - Cooperation of social services organizations	- Protection measures should be implemented by piling/ depositing blocks from the bottom of the bank
5	Education	- Hampering of study - Increasing of child labor - Dropout rate should be decreased	- To ensure proper education system for children - Child labor should be prohibited	- Facilitation of stipend for children	- To ensure all types of education facilities by GO and NGO - Establishing new educational institute in cluster villages
6	Working ability	- Lack of new employment opportunity due to absence of working ability	- -	- Providing training facilities to the affected people	- Establishing new technical institute
7	Health	- Lack of medical treatment and medicine	- Cooperation of social services organizations about health - Ensure medical team for emergency health treatment	- Health facilities should be increased at existing community clinic.	- Improving health care services through makingavailableMBBS doctors and availablemedicine.
8	Drinking water	- Scarcity of pure drinking water - Arsenic problem - Lack of tube well	- Storing water purification tablets for emergency needs	- Rain water harvesting	- Installation of deep tube well in the higher places
9	Sanitation	- Lack of proper sanitation facilities	- Construction of mobile toilet for emergency needs	- Raising social awareness on sanitation issues	- Modernization of sanitation system and distribution of standard sanitary materials, especially toilets of 5-6 rings should be provided
10	Agricultural land	- Loss of agricultural land - Decreasing of land price due to river erosion - This poor people are unable to buy new agricultural land	- Temporary bank protection using bamboo and sand bags - Providing of easy loan to the affected people	- Give modern training on vegetable gardening, tending of cattle and rearing of poultry	- Initiatives should be undertaken to protect the Magna river erosion by the government - Protection measures should be implemented by piling/ depositing blocks from the bottom of the bank
11	Crop	- Damages of the crops - Loss of crop production - They cannot cultivate two crops	- Providing of easy loan to the affected people	- Easy supply of fertilizer and seed to the affected farmers govern- mentally	- Initiatives should be undertaken to protect the Magna river erosion

Sl. No.	Sectors	Problem	Recommendations		
			Short term	Medium term	Long term
12	Livestock and poultry	- Various diseases of livestock (cow, goat, hen, and duck) and their death - Scarcity of fodders for the domestic animals arises and possibility of death increases	- Cooperation of social services organizations - Providing of easy loan to the affected people for livestock and poultry	- Give modern training on tending of cattle and rearing of poultry	- Grass cultivation on khas lands for fodders - To ensure veterinary surgeon, medicine and other equipments
13	Tree/Orchard	- Damages of bank line and homestead vegetation	- Temporary bank protection by using bamboo and sand bags	- Tree plantation by the side of river - Tree plantation in the cluster villages	- Awareness program should be raised for local people on plantation
14	Loan	- They do not get loan facility as they are displaced people due to river erosion - They cannot retaliate their loaned money - Increasing of business of earnest money (Dadon)	- Providing soft loan to the affected people	- Providing loan facility without interest	- Loan should be exemption to the affected people after river erosion
15	Fuel	- Loss of trees due to river erosion and it create the scarcity of fuel - The displaced people cannot buy wood as fuel due to their financial crisis	- -	- Tree plantation by the side of river - Tree plantation in the cluster villages	- Gas supply from Shahbazpur gas field
16	Electricity	- The displaced people do not get proper electricity facility - Destruction of electric post	- Repairing the damaged electric posts	- Taking proper initiatives for providing them solar energy at easy terms and conditions	- Making the cluster villages connected with electricity - Strengthening the existing Bhola power plant
17	Communication	- The rural roads and embankment cum roads were immensely damaged due to river erosion in the year of 2007 - The school going children's cannot go to school due to vulnerable road communication - Problems in the sector of commodities transportation	- Heightening the roads by laying soil locally and repairing - Construction of embankment using fence, bamboo and sand bag for protecting erosion temporarily	- Trans-formation of mud roads into semi-pucca - roads should be developed - Piling the river bank of the risky areas	- Heightening of roads, repairing of risky roads, transformation of mud roads into metal roads through LGED, Union Parishad and NGOs - Adoption of initiatives in protecting the embankment with the coordination of LGED and BWDB
18	Social safety	- Lack of sufficient social safety - They do not get VGD, VGF and all	- Providing loan facilities at easy conditions	- Repairing of the existing embankments	- To ensure all type of social safety based facilities

Sl. No.	Sectors	Problem	Recommendations		
			Short term	Medium term	Long term
		types of facilities provided by the government			provided by government and NGO
19	Relationship with neighbor	- It's not a good matter to fellow citizen taking us as displaced people due to river erosion. - River erosion takes away good relationship with the neighbors	- Providing financial facility to the displaced people	- Building good relationship between displaced people and host community through raising - social awareness program	- Ensure all type of social, financial facilities through GO and NGO

iii) Disaster-Salinity

Sl. No	Sectors	Problems	Recommendations		
			Short term	Medium term	Long term
1	Household	It causes great damage to households such as rusty in Iridium made house, Shedding plaster in building etc. it also occurs great damage to kutcha house.	Painting on iridium and building which is saline tolerable	Compost should be used abundantly	Reforming households
2	Occupation	-Though most of the people are engaged in agriculture, due to salinity people are getting workless. it is reducing the opportunities of working in the field of agriculture - Decreased wages of the daily agriculture related labour - Increase unemployment -Possibility to change of profession	-Salinity drainage should ensured -Putting lime on agriculture field	-Using compost abundantly	-Building new embankment, constructing new sluice gates and setting up deep tube well
3	Income	-Salinity causes great damage to agriculture, fish culture, poultry, dairy farm etc which leads the abatement of income - Affected family income thus may cause conflict -Destitution of local people	-Introducing salinity drainage system -Putting lime on agriculture field	-Arrangement of freshwater	-Building new embankment, constructing new sluice gates and setting up deep tube well
4	Out-migration	Lack of proper transportation	Arranging local transportation system such as Van, easybike, Nosimon etc.	-	-Constructing roads and bridge as well as arranging public vehicles
5	Education	Occurring damage to educational structure, detriment of students health, frequent destruction of educational instruments & equipments - Obstructed education of the schooling children -Reduction of literacy rate	-Protection from salinity of educational institutions -Arranging free treatments facilities in the school	-	-Frequent reformation of educational institutions as well as structures

Sl. No	Sectors	Problems	Recommendations		
			Short term	Medium term	Long term
6	Working skill	Lack of proper training	-Need to arrange short time training course by different responsible authority	-Encouraging people and arrange mid duration training courses	- Setting up training institutes
7	Health & treatment	Spreading out different waterborne diseases -Increase of mental disorder - Increase Family treatment cost -Various diseases of men and children such as skin diseases, itch, diarrhea, dysentery, lack of vitamin and rock-salt are spread out -Mortality rate will increase	-Training on response activities during the emergencies -Inhibit the uses of polluted water -Providing water purification tablets, Oral saline and arranging primary treatment facilities -Cooperation of social services organizations	-Supply of adequate water purifying tablet and saline -Functioning of the community clinics	-Arrangement of required MBBS doctors (both male and female) in the health centers along with the arrangement of proper supply of medicines -Formation of emergency medical team from Khulna medical college -Establishment of union based health centers
8	Drinking water	Scarcity of drinking water	-Providing water filter and water purifier	-Preserving rainy water for drinking purpose -Setting up PSF	-Installation of deep tube well -Providing freshwater with pipeline
9	Sanitation	-Environment pollution	-Provide sanitary latrine -introducing proper drainage system	-Excavation of cannel	- Installation of sluice gates
10	Agriculture land	-Infertility and barren land -Cultivable lands decreased due to salinity	-Using compost abundantly -creating boundary surrounding the fields	-Creating new embankment	-Installment of sluice gate and protection from saline water
11	Crops	-Reduction of crops production -By entering saline water during monsoon used to cause severe damage to paddy, fish and other contemporary crops. If such continues for the next years there may be a high potential of food shortage. -Hamper production of pulse crop -Quality of crops hampered serious	-Ensure availabilityof seeds and fertilizers -Providing compost in the agriculture fields	-Arrangement of freshwater for irrigation -setting up sallow tube well	-Cultivation of non-prolonging crops -Salinity tolerable crops cultivation -Training up the farmer regarding how to cope with this hazard through GO and NGOs
12	Livestock	-Scarcity of food and spread out of different diseases -Livestock will sick due to lack of fodder -Husbandry of livestock & poultry will hampered	-Keeping the livestock and poultry in the safer place -Arrangement of monthly vaccine to the livestock and poultry -Providing food and medicine	-Train up village veterinarian -Cultivation of different grass	-Creating free meadow -protection of salinity and cultivation of crops
13	Tree/Orchard	Reduction of tree's growth, Shedding leaves, decline of production as well as death of trees as a result reduction of supplementary income	-Raising height with soil surrounding the trees -Soil dumping to the base	-Planting tree in high land -Unplanned deforestation should be restricted	-Planting saline tolerable tree

Sl. No	Sectors	Problems	Recommendations		
			Short term	Medium term	Long term
			root of trees -Trimming of branches of trees		
14	Loan	Problem in Requital of loan	-Application for condone of interest	-Requital of amount of loan -Providing of easy loan to the affected people	-Extending the time limit of requital of loan
15	Fuel	Scarcity of fuel due to lack of trees	-Using fuel instead of trees	-Using solar instead of fuel	Need to electricity supply
16	Electricity		-		-Electricity line needs to be high & safe
17	Communication	-Facing problem in transportation of population and goods - Increased transport cost - Hamper Local development	-Arrangement of alternative communication system such using water way	LGED will ascertain the Operation and Management (O & M) of the roads through Union Council and PIO	-Constructing new bridge and road and reforming existing one -Use of sandy soil to repair the roads
18	Social safety net	-Increasing social disorganization -Collapse Social system	-	-	

iv) Disaster-Waterlogging

Sl. No	Sectors	Problems	Recommendations		
			Short term	Medium term	Long term
01	Household	- The furniture and utensils of the affected houses also got immense damage. -Unsuitable for living due to water logging	- Temporary repair of embankment using sand bag -Migration to highland area	-Raising height of the households	-Introducing proper drainage system -Adoption of long term plan for mitigating the water logging problems
02	Occupation	-Creating hinder in different activities (agriculture, education, health etc.) -Laborers become workless	-Migration to highland area	-Raising height of the yard of the institution -Provision of long term loan without interest rate for grocery shop -Buy domestic animals, ducks and hens for the day labor families	- Distribution of Sewing machine and training provision
03	Income	Reducing income and becoming unemployed of the people	-Providing relief and rehabilitation	-Introducing income generating activities	-Addressing proper solution of water logging
04	Out-migration	-Lack of proper transportation due to water logging -Creating various problem in different sector such as education, health, agriculture, security etc;	-Assisting those people by providing food, education, drinking water, sanitation etc	-Creating shelter and rehabilitation centre	-Introducing proper drainage system

Sl. No	Sectors	Problems	Recommendations		
			Short term	Medium term	Long term
05	Education	-Spoiling the environment of the education -Occurring damage to educational structure, detriment of students health, frequent destruction of educational instruments & equipments - Obstructed education of the schooling children -Reduction of literacy rate	-Arrangement of education in another place	-Raising height of the yard of the educational institutions	-Addressing proper solution of water logging
06	Working skill	Lack of working opportunities	-Ensuing fulfillment of fundamental need of the people	-Ensuring working opportunities and supplying agricultural instruments	-Introducing proper drainage system and establishment of industry
07	Health & treatment	-Several deadly water borne diseases are broken out in the water logging condition. These diseases include coughing, diarrhea, dysentery, small pox, jaundice, eye viral diseases, skin diseases, etc. - Mosquito borne diseases like malaria, filarial, etc. The elderly and children are more vulnerable to these diseases. The children are died by sinking in the flood water. -The daily life of the people becomes more difficult due to water logging. -Various types of pest (mosquito, flies) infestation increases due to created water logging - This condition is highly risky for the infants, pregnant women, and elderly and disables.	-Training on response activities during the emergencies - Cooperation of social services organizations -Providing water purification tablets, Oral saline and arranging primary treatment facilities	-Make availablethe required medicines, treatment facilities and increase self consciousness -Supplying drinking water in flood affecting area and arrangement of sanitation as well as proper treatment facilities - Functioning of the community clinics	- Arrangement of required MBBS doctors (both male and female) in the health centers along with the arrangement of proper supply of medicines
08	Drinking water	Unsuitable for living due to water logging and scarcity of drinking water	-Providing drinking water and water purifier -Supply of adequate water purifying tablet and saline	-Repairing or resetting tube well after flood	-Installation of deep tube well with high platform -Dredging the riverbed of Kapotakho and restoring the depth of the river
09	Sanitation	-Deplorable condition of sanitation - Environment pollution due to proper use sanitary latrine	-Arrangement of peripatetic latrine	-Reformation of flood affected toilets	-Building sustainable latrine in high platform
10	Agriculture land	Water logging enormously hampered cultivation	-Supply of fertilizer and seed to the affected farmers govern- mentally in time -Taking initiative for opening closed canal	Compensating affected farmer and providing them seeds, fertilizer, medicine and agricultural instruments	-Introducing proper drainage system -Awareness training to inform farmers about the usefulness of IPM
11	Crops	-Water logging enormously hampered the crop cultivation -Damaging crops due to water logging -Crops destruction	Supply of fertilizer and seed to the affected farmers govern- mentally in time	-Providing seeds, fertilizer, medicine and agricultural instruments	-Introducing proper drainage system and cultivating flood tolerable crops -Re-excavation of local river and canal

Sl. No	Sectors	Problems	Recommendations		
			Short term	Medium term	Long term
12	Livestock	-Food scarcity may be arisen due to the sunken of the fodders for livestock. The wet fodder may be contaminated with various germs and the livestock may be suffered from various water borne diseases like swollen of jaw & belly, fever, dysentery, diarrhea, etc. -Due to water logging Poultry face some severe diseases such as, diarrhea, ranikhet, dysentery, etc. that may cause even death to the affected one.	-Keeping the livestock and poultry in the safer place -Providing food and medicine	-Heightening of the cow-sheds -Compensating and providing easy loan	
13	Tree/Orchard	-Many tree/orchard of less water tolerant such as papaya, jackfruit, *amra*, shaddock, lemon, etc. are more vulnerable to flood water. -Destruction of trees due to water logging	-Raising height with soil surrounding the trees	-Planting tree in high land	-Planting water tolerable tree -Dredging cannel and river
14	Loan	Problem in getting and requital of loan	-Providing loan facility for the poor -condone of interest	-Providing loan considering different class	-Extending the time limit of requital of loan
15	Fuel	Scarcity of fuel due for cocking	-Using fuel instead of trees		-Using solar instead of fuel
16	Electricity	Electricity disconnection for flood	-Connecting electricity as early as possible		-Ensuring connection of electricity for all households
17	Communication	-Water inundates the village grove and mud roads and hence elderly people, pregnant women, students, shifting of patients and transportation of goods fall in difficulties and transportation cost increases.	-Temporary repair of embankment using sand bag	-Reformation of road, bridge and culvert permanently	-Heightening of roads, repairing of risky roads, transformation of mud roads into metal roads through LGED, Union Parishad and NGOs to make the communication comfortable and evacuation easy and effective during the emergencies
		- The farmers sometimes cut the roads for removing deposited water from their croplands.	-Instantly reformation of roads and culvert	- Re-excavation of canals and khals	-Constructing new bridge and road and reforming existing one
		- Pregnant women face severe risk	- Reactivates the old and disrupted culverts		-Adequate forestation should be ascertained on the both sides of the roads

Annex-H: Reflections of Study Activities through Photographs

Riverbank erosion at Kutuba, Bhola

The processing of golden fiber at village level

Loss of homestead land due to riverbank erosion

FGD with local stakeholder at Char Rajibpur, Kurigram

Riverbank erosion

Nature of water logging at Keshabpur, Jessore

Local youth association at Damuddya, Shariatpur

Waterlogged area at Manirampur, Jessore

FGD with affected stakeholders due to salinity at Batighat, Khulna

FGD with affected people at Rishipara, Monirampur,Jessore

FGD with fishermen at Daspara,Jessore

FGD with at Borhanuddin,Bhola

Data collection at Char Rajibpur, Kurigram

Boat terminal at Borhanuddin

KII with displaced people at Batiaghata, Khulna

Severe water logging at Monirampur, Jessore

HHs inundation level due to water logging

Annex-I: Photo Gallery of Local, Regional and National workshop

Local Workshop on riverbank erosion at Borhanuddin, Bhola

Local Workshop on Salinity at Batlaghata, Khulna




Local Workshop on Flood at Char Rajibpur, Kurigram


Local Workshop on water logging at Keshobpur, Jessore







Result Sharing Workshopwith national level experts at CDMP office,Mohakhali, Dhaka

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