

**REDUCTION OF FLOOD RISK BY INDIGENOUS
KNOWLEDGE AT ALEKDIAR CHAR OF SHIBALAYA
UPAZILA IN MANIKGANJ DISTRICT**



A Dissertation for the Degree of Master in Disaster Management

By
Selina Hakim
Student ID: 11268023

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Postgraduate Programs in Disaster Management (PPDM)
BRAC University, Dhaka, Bangladesh

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Abstract

The present study tries to identify the livelihood practices of the char dwellers. It also focus to assess their economic condition in relation to livelihood practices. Local people's participation in the research process has ensured by Focus Group Discussion, Informal Interview. Most of the farmers don't have their own land as well as they also cultivate khas (public) land. The rest of the people are engaged in day labor activities, petty business and others (boatmen). Cultivated land, Domestic animal, grazing land and wet land are the major natural resources of Alekdiar Char. The Char dwellers face flood & river bank erosion almost every year. They have some traditional knowledge by which they are able to cope up with this situation. In my study I tried to understand the socio-economic profile of Alekdiar Char. I also tried to find out the practices regarding house, agriculture, health. They have no academic knowledge but they are living for many years in Chars. As a result they have a very good capacity which we called indigenous knowledge. With this they are able to reduce vulnerabilities. Finally I recommended some of my findings of Alekdiar Char for further study.

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CHAPTER 1 INTROUDUCTION

1.1 Background of the Study

Water related natural hazards and climate change issues have become a serious threat to the lives, livelihoods and sustainable development of Bangladesh. It is predicted that by the year 2030, an additional 14.3% of the country would become extremely vulnerable to floods, while the existing flood prone areas will face higher levels of flooding. Analysis of past floods suggests that, about 26% of the country is subject to annual flooding and an additional 42% is at risk of floods with varied intensity (IPCC, 2002, WG II).

Bangladesh was, and continues to be, formed by sedimentation and accretion of three rivers the Jamuna, the Padma and the Meghna as they flow from the Himalayas to the Bay of Bengal. Extensive char areas have been created along the bed or basin of these big rivers. Char lands are the sandbars that emerge as islands within the river channel or as attached land to the riverbanks. EGIS, 2000 found that on an average 5% of Bangladeshi population as well as 6.5 million people live on the Chars covering almost 5% of the total land area of the country and miserably it is narrowed as 7,200 square kilometers. The riverine sand and silt landmasses known as char in Bengali are home to over 5 million people in Bangladesh (Kelly and Chowdhury, 2002).

People living in the river islands (locally known as Char) in Bangladesh are extremely vulnerable to periodic floods, as these low-lying temporary sand islands built through silt deposition are only a few inches above normal river water level. Though anticipated, the extent and severity of the flood depends on monsoon precipitation together with the glacier melt of the Himalayas. Impacts of periodic flood on the Char dwellers are systematically different than from the dwellers of inland regions due to many reasons. Firstly, Char is the most vulnerable area to floods and rising levels of river water compared to inland, causing frequent evacuation for the dwellers to nearby flood shelters. Secondly, periodic floods have a significant negative impact on migration. Thirdly, in most cases Char dwellers are routinely indebted to the landlords for borrowing money with high interest rates or in exchange for labor during when floods occur.

Fourthly, due to the frequent erosion of soil and assets, people are expected to be discouraged in investing in long-term assets.

Chars are large pieces of land in the river where sand has deposited layer by layer over years. '*Bhanga and gora*' (which roughly translated means destruction and reconstruction) is the rule of the game for such chars, used in many folk songs in Bangla music, to explain its nature. The sandy char is eroded by the river, sinks down and raises again somewhere else. Life of char people also moves with such 'bhanga and gora' phenomena. This drowning sand is the most important characteristic of chars that has shaped char people's life throughout the generations. In contrast, the banana tree is the holy rescuer at any cost. It has many uses for char people, both during their normal and flooding life. People make raft out of this. Banana trees provide fruits for consumption as well as a source of regular income. Many char people can be seen going to the rural market with a bunch of bananas to sell. During the seasonal food crisis, people also eat part of the plant as curry. It serves as a barrier around the house, giving privacy to the women during flood and can also be used by them as a floating toilet. Banana leaves are also fed to goats when grazing land goes under water.

1.2 Objective of the study

The main aim of this study was to explore the use of indigenous knowledge and practices in Char People to reduce the impact of flood disasters. Disasters are more frequent and prominent at the present. Bangladesh is not an exception either. When the disaster strikes, it is poor and marginalized groups that suffer the most. Hence it is crucial to increase the understanding about the ways which impacts of extreme events can be reduced. To carry our Disaster Risk Reduction approaches, it is first required to understand what community needs. Promotion of new risk reduction options needs to consider local tradition and norms to ensure their acceptability by the local people. In spite of huge investments in the area of disaster management, losses continue to mount. The need to bridge the gap between practice and policy with the recognition of indigenous knowledge and local coping strategies is the must. Hence this paper is an attempt to understand the local practices used by Alekdiar Char Community. The research showed that the community people did have knowledge regarding the

changing climate and are putting their own efforts in order to cope up. They have their own ways of forecasting and early warning systems. They are using the traditional ways of embankment in order to minimize the adverse effects of flood. However, the indigenous practices which proved to be useful in the past years were not enough to cope with the rapid change in climatic patterns. Need to integrating scientific strategies in these indigenous practices is a must.

Objectives with specific aims and possible outcomes:

The objective of the study is to make an evaluation and give possible suggestion(s) on taking Indigenous Knowledge for flood risk reduction (FRR).

The followings are the specific objectives to be to achieve the main objective:

1. Determination of the ways that the community people are exposed to flood and its impacts
2. Identification of existing common and different adaptation measures (if there are) for men, women and vulnerable groups
3. Evaluation of those methods to minimize the flood risk, damages and losses.
4. From evaluation result, give recommendation(s) on these methods.

1.3 Limitation of the Study:

This dissertation is made within very short period. I conducted two FGD in my study area. If I could give more time in field level I would have been able to collect more information from Char dwellers & also from key informants.

CHAPTER 2 LITERATURE REVIEW

Bangladesh has an area of only 144,000 square kilometers with a population of about 150 million. This makes it one of the most densely populated countries in the world (1050 inhabitants/square kilometres). Bangladesh is also said to be one of the most environmentally vulnerable nations with respect to climate change. The environmental problems of Bangladesh, such as poor soil, water or air quality, natural disasters (like floods, drought or tropical storms) make it difficult for the people to survive in their area of residence. The country is situated in a fertile alluvial plain where rice, tea, jute and other crops are grown.

The economy is primarily based on the land, with the majority of the country's population employed in the agricultural sector. The average landholding is about 0.11 hectares (Mahtab and Karim 1992: 50). About 80 percent of the people live in rural areas and less than 40 percent own cultivable land. One of the main causes of landlessness is riverbank erosion. The impact of riverbank erosion is exacerbated by floods and other natural calamities. The shifting of the river channel causes land erosion (Hossain 1991: 307). Consequently, involuntary migration occurs due to the catastrophic changes in the environment. About 94 upazilas³ of 50 districts face riverbank erosion each year (ACD n.d.). Furthermore, about 135,632 families became homeless due to riverbank erosion on 12 rivers including the 3 major rivers in the last 5 years (ibid.).

The main three rivers of the country, the Padma (also called Ganges), Meghna and Jamuna (called Brahmaputra in India), as well as another 16 rivers, are the main locations of riverbank erosion. At the time of the monsoon, it used to be that one third of the territory on average was submerged. Residents had learned to adapt to these climatic issues. Global warming has broken this pattern. On the one hand, the increase in rainfall during the monsoon coupled with the melting of Himalayan glaciers has increased the quantity of water flowing downstream. On the other hand, sea level rise makes the stream flow increasingly difficult. The annual floods thus gradually gain in volume and duration in this overpopulated country. In Bangladesh, every year, a significant number of people are victims of riverbank erosion and floods. The impact

of riverbank erosion and of unusual floods on the local economy is great as it diminishes agricultural land, infrastructure and communication systems and thus leads to impoverishment and marginalization. Bangladesh has limited internal resources to help in coping with catastrophic natural hazards (like riverbank erosion and its related consequences) (Zaman 2007).

2.1 Flood Forecasting

Flood forecasting will need in the future to be oriented towards communities at risk not only from embankment failure or overtopping but at risk from flash flooding and also, people living in areas prone to prolonged water logging.

For flood warnings in the monsoon season in areas where river and excessive rainfall are the cause of flooding, the warning system could be revamped to communicate information from Flood Forecasting and Warning Centre (FFWC) directly to Disaster Management Committees and residents using shortwave radio/ or telephone. These can be used to broadcast warnings to volunteers/media centers or Grameen rural centers, etc.

At community level, communities can also be encouraged to develop a local communication network to inform people of the problem using local dialect/mosque megaphones/colour coded warning signals in centers, etc, as well as mobile phones, Grameen Rural Phone networks can also be used in markets to communicate to other rural centers where mobile phones are used, so that word of the impending flood can spread quickly. Meanwhile, flood forecasting agencies can attempt to improve the lead time on flood warnings so that women can prepare fodder and food before the advent of the flood and save their livestock (GoB: 1996).

2.2 Flood Proofing of Infrastructure

The National Water Policy has advocated greater emphasis on flood proofing. To date this has been undertaken by NGOs and an issue is whether and how GoB should support flood proofing. Should GoB have its own flood proofing projects or provide support to NGOs to continue with community level programmes? Should individuals be able to obtain subsidies to flood proof their own building? The community level approach is the most attractive, particularly in rural areas.

NWPO requires that infrastructure and public buildings be constructed above the highest recorded flood levels. If this philosophy is applied then such works will become progressively more flood proofed as they are built or reconstructed. In addition to reducing damage and disruption during floods, these works can serve as flood refuges in times of emergency. It is less clear whether this approach must also be applied within urban areas which have flood protection, but to do so would reduce their vulnerability. Any works which may serve as flood refuges should have available water supply and sanitation facilities, with more specific attention given to issues of access and safety of women and children.

Consideration must be given during the design and construction of embankments, for either roads or flood protection (or both) for their potential role as flood refuges. Widening of embankments to provide flood-proofed land for housing may be more cost-effective than raising nearly flood-proofed areas. However, due attention must be made to ensure that embankments do not increase flooding by impeding the passage of water.

Flood proofing is a combination of structural and non-structural options. If used together, they can substantially reduce the losses and distress, which regularly occur during and after the annual floods. In conjunction with support to make activities more flood proof, relief will be used more sparingly.

2.3 What's Local Knowledge?

Knowledge is defined by the Oxford English Dictionary (Trumble, 2007) as 'information and skills acquired through education or experience' or an 'awareness or familiarity gained by experience of a fact or situation'. This can then be divided further into 'scientific knowledge' and 'indigenous knowledge'. While the former is generally understood to involve western technology or techniques, there exists no concise definition of the latter. Indigenous knowledge is referred to in a number of ways including, but not limited to, 'local knowledge', 'traditional knowledge', 'indigenous technical knowledge', 'peasants' knowledge', 'traditional environmental knowledge' and 'folk knowledge' (Sillitoe, 1998). To summarize relevant literature, indigenous knowledge is considered to be a body of knowledge existing within or acquired by local people over a period of time through accumulation of experiences,

society-nature relationships, community practices and institutions, and by passing it down through generations (Brokensha et al., 1980; Fernando, 2003; Sillitoe, 2000). Scientific knowledge is global in nature whereas indigenous knowledge is considered local. However, as with scientific knowledge, indigenous knowledge is dynamic in nature, continually influenced both by internal creativity and experimentation, and by contact with external systems (Flavier et al., 1995).

The current research proposes investigation of natural hazards from a people-centred perspective: that is what the residents know about natural hazard risks and what they believe and do about them in a given situation. As such local knowledge is used here in its broadest sense. We all have local knowledge: it refers to the relationship people develop with their surroundings over time. The terminology is diverse: the literature refers to: 'indigenous knowledge', 'traditional knowledge', 'folk knowledge', 'folk science', and 'citizen science' among others. Indigenous knowledge is part of local knowledge: it refers to: "local knowledge held by indigenous people, or local knowledge unique to a given culture or society." (Berkes 1999) Local refers to, and emphasises, a place, a region, a location as much as the regular movements between different points (e.g., knowledge related to the routes or different locations of groups of people who migrate on a routine basis such as nomads, commuters, seasonal migrants (Antweiler 1998, p 17) rather than time (a knowledge that is anterior to another, traditional versus contemporary knowledge). It is important to learn how people (local and indigenous) in a particular area view and interact with their environment; whether or not they have local knowledge that helps monitor, interpret, and respond to dynamic changes in ecosystems and the resources and services that people generate; and whether or not their knowledge can be used to design appropriate interventions, including disaster preparedness (Berkes et al. 2000; Langill 1999). Local knowledge is dynamic and is always changing over time through experimentation and adaptation to environmental and socioeconomic changes (Thrupp 1989, p 15). Disaster preparedness refers to a combination of short- and long-term strategies that help minimize or reduce the negative effects of natural hazards, prevent their impacts on assets, and escape certain peak values (e.g., during periods of excessive rainfall, etc) or their consequences. As such disaster preparedness is defined broadly and goes well beyond emergency preparedness which is used by nations to refer to crisis management based on command-and-control (civil defense) and short-

term response strategies. It is difficult to isolate disaster preparedness from other components of disaster management (e.g., disaster relief) as they are inter-related.

In the 1960s and 1970s, geographers studied the impacts of natural disasters on people mainly from a technical perspective. The dominant approach to natural hazards and disasters focused on hazards as physical events requiring scientific and technical solutions (technical or technological fixes). Natural hazards were understood in the context of simplistic determinism (where physical processes determine human actions) and linear causal relationships from geophysical events to impacts to human responses. People were also assumed to be the masters of their fate to a much greater degree than now seems valid (White et al. 2001). They were assumed to live in vulnerable conditions due to a lack of knowledge (Schilderman 2004, p 416). In the 1980s and 1990s, researchers in the field of natural hazards and disasters began to criticize the deterministic, ahistorical, and asocial concept of hazards and disasters and its dependence upon the use of choice and decision models (Hewitt 1983; Gardner 2002). As Messer (2003, p 3) reports: “As recently as the late 1990s, scholars complained of the absence of much social science research on disasters in developing countries.”

2.4 Local Knowledge in Disaster Management

The growing focus of research and development is the need to take the human dimensions of natural hazards into account (including local knowledge, practices, and perceptions) in disaster management (Anderson and Woodrow 1989; Johnson et al. 1982 in a case study documenting local knowledge of landslide hazards in the Kakani- Kathmandu area, Nepal). In fact, the studies on hazard perception emerged in the US from Gilbert White’s group at Chicago in the 1960s. This work initially focused on wheat farmers’ perceptions of and responses to droughts in the Great Plains of North America (Saarinen 1969). However, a lot of this work degenerated into standardized questionnaire surveys and ‘official’ analyses applied in developing countries (Personal communication, Ken Hewitt). The hazard perception studies show that natural hazards are non-linear and complex events shaped by and resulting from the combination of not only geophysical and meteorological factors but also (and mainly) political, economic, sociocultural, and psychological (or perceptual) phenomena and factors. The social dimension of risks and hazards is important

because local communities see them through a cultural lens; and this is dependent upon their view of the cosmos and accumulated experience (Linkenbach-Fuchs 2002, p 7). The case of flood management in Bangladesh can illustrate this shift in thinking. The ineffectiveness of flood management in Bangladesh has been attributed to the focus on large-scale technological solutions which tend to emphasize short-term, sectoral approaches. A growing literature has been promoting the importance of building upon local knowledge and local adaptive strategies for improved flood management in Bangladesh (Paul 1984; Rasid and Paul 1987; Haque 1988; Zaman 1991).

Research into natural hazards and disasters has been influenced also by the international arena. In 1989, the United Nations General Assembly proclaimed the decade from 1990-2000 as the International Decade for Natural Disaster Reduction. The United Nations recognized the disastrous impacts of natural hazards on vulnerable communities and, by the year 2000, all countries were encouraged to have comprehensive national assessments of natural hazards and risks integrated into national development plans and to address long-term disaster prevention, preparedness, and community awareness in mitigation plans. In reality, funds dropped – mainly because of the Gulf War (1991) and a series of natural disasters in developed nations, including the Kobe earthquake. The Kobe earthquake demonstrated that developed nations could not prevent disaster and that relief aid was inappropriate. In 1994, the United Nations World Conference on Natural Disaster Reduction in Yokohama called for paying more attention than before to traditional knowledge and community based action. The Kobe earthquake also led to a switch from a technocratic view of natural hazards to a focus on vulnerability. (Personal conversation, Ken Hewitt)

2.5 Local Knowledge in Coping Strategy

The criticism of research helped to generate a growing interest in the concept of vulnerability in hazard literature (Blaikie et al. 1994) as elsewhere (and it is also a central component of the sustainable livelihood approach) and especially led to a focus on reducing social and community vulnerability and examining its links to disaster and risk responses. Some researchers argue that the focus should be directed towards vulnerability and local coping strategies instead of hazard per se (Battista and

Baas2004). In any case, the shift towards the vulnerability perspective in research into natural hazards and disasters encourages looking at disasters through the lens of socioeconomic and political structures and processes. The recognition is growing that research should broaden its analytical scope to include questions of sustainable development such as livelihoods, poverty, governance, equity, climate change (which some research links with the threat of increased extreme events), and natural resource management (UNEP 2004; Van Aalst and Burton 2002; Sudmeier-Rieux et al. 2006). The maintenance of sustainable livelihoods is based on people's adaptation to environmental changes (including natural hazards) together with economic and political changes (Batterbury and Forsyth 1999). Researchers examining adaptations to natural hazards and disasters study adaptation in terms of social and power relationships also (political-economic perspective) and not only from a biological point of view (i.e., adaptation perspective) (Goodman and Leatherman 2001, p 21). Some studies focus on community adaptation to climate variability and climate change (Allen 2006; Ahmed and Chowdhury 2006; Rojas Blanco 2006; Hageback et al. 2005; Stiger et al. 2005) and multiple stresses, including natural hazards (McSweeney 2005). That said, these aspects still lack visibility in mainstream literature (Flint and Luloff 2005) and are neglected in practice, reflecting the compartmentalization of science and the difficulty of overcoming it; and this is also reflected in government and donor budgets and the challenges surrounding (real) inter- and cross-disciplinary studies.

Recently, resilience literature has examined the processes of adjustment and self organization from a more dynamic and complex perspective than the adaptation literature (IFRC 2004; Gardner and Dekens 2007). The resilience perspective also attempts to investigate adaptation to change from a more positive angle than the vulnerability perspective, focusing on people's strengths rather than on their vulnerabilities.

Overall local knowledge was absent from the early mainstream research into natural hazards and disasters. Then, the change from a focus on natural hazards to vulnerability and resilience was accompanied by a growing recognition of the importance of local knowledge and practices. Yet, even though research and development organizations acknowledge the existence and importance of local

knowledge and practices related to disaster preparedness, in practice little documentation of its application through official channels exists. Ultimately, the growing interest in local knowledge, including in disaster management and preparedness, should be understood in the context of governance issues and the movement to participatory approaches in development and resource management.

Understanding local knowledge is not enough: it is only a means to the inclusion and participation of local people in disaster management and preparedness activities. As such local knowledge can be an entry point for promoting local people's participation with 'higher-level' institutions in those aspects of disaster risk prevention and management for which they have a comparative advantage (Battista and Baas 2004, p 8).

Participatory approaches to disaster management and preparedness often pre-suppose a basis in local knowledge and practices because communities in disaster-prone areas have accumulated a lot of experience over time (Battista and Baas 2004, p 10). These approaches also recognize that local people are the primary actors by default when a disaster strikes. From a local knowledge perspective, according to Battista and Baas (2004, p 29), it is more interesting to examine recurrent shocks that gradually increase the vulnerability of communities. Exceptional disasters require external means, beyond normal coping strategies.

According to the participatory discourse, taking local knowledge into consideration in terms of practices and contexts can help implementing organisations improve their planning for and implementation of disaster preparedness activities; and it can help improve project performance and project acceptance, ownership, and sustainability specifically. This means that understanding, accounting for, and respecting local knowledge contribute to cost-effectiveness in the long-term, from both a financial and a social point of view— especially in the context of complex, changing, and growing hazards. Firstly, from a financial point of view, economies of scale are based on the assumption that people perform better on some scales than on others and that different resources are found on different scales (Berkes 2002, p 317). Solutions in resource management, development, and disaster management need to go beyond the dichotomy between local versus state management levels and integrate cross-scale institutional linkages. Understanding local knowledge and practices can help identify

what is needed and acceptable locally and how people's participation can be solicited to ensure their support for external action. Building on local knowledge and practices (i.e., capitalizing on local strengths), when it is relevant to do so, can decrease dependency on external aid. Local people provide continuity and can monitor the actions taken (Wisner and Luce 1995, p 344).

Secondly, from a social point of view, taking local knowledge and practices into account promotes mutual trust, acceptability, common understanding, and the community's sense of ownership and self-confidence. Understanding local knowledge, practices, and contexts helps development and research organizations to tailor their project activities and communication strategies to local partners' needs. It also enables development research organizations to act as intermediaries in translating messages from government level to communities in a way that is understandable and credible. For example, a meteorological agency might release the following message to communities: "the river is going to rise by one to two metres in the next 24 hours." But is it enough? What does it mean to the locals? Government agencies often release information that is not understood at local level (Cronin et al. 2004; Jaarsma et al. 2001; Messer 2003; ILO 2002; ISDR 2004). Cronin et al. (2004, p 663) in Ambae Island, Vanuatu, describe how depictions of volcanic hazard on a map could not be understood locally, because the community had a different perception of the landscape from that of the mapmakers. Hence, communication tools for disaster preparedness, such as official warning messages or hazard maps, need to incorporate local references.

The inclusion of local people in disaster management and preparedness activities is challenging. In practice, participation and decentralization involve complex processes and the devolution of power to local levels does not always transfer into power being given to the most marginal groups, mainly because increased access to (political) resources does not always translate into increased benefits from those resources . Chambers and Richards (1995, pxiii cited in Ellis and West 2000, pp 6-7) argue that development practitioners use jargon, such as empowerment and participation, easily but have not changed their attitudes towards rural people and still undervalue their knowledge.

A leading local NGO in Bangladesh named BARCIK (**Bangladesh Centre for Indigenous Knowledge**) is working on traditional knowledge mainly focusing on Agro-biodiversity. In a Climate Change perspective this help to Disaster Management applying indigenous knowledge. Here it's believed that local people have to face disaster regularly so they know best what the problems are & what mechanism they have to take to cope with the situation.

Traditionally, popular wisdom has most effectively been used in mitigating the problems & difficulties which surround popular lives, i.e. the life & living of disadvantaged local (rural) communities in Bangladesh. Local cases and examples of popular wisdom or Indigenous Knowledge, therefore need to be documented and disseminated for designing appropriate developmental policies and actions on a broader(regional, even global) scale.

A major study entitled "The Indigenous Knowledge and Practices in Bangladesh" focuses on some issues of conceptualizing and documented Indigenous Knowledge in Bangladesh, together with the particular wisdom and practices relating to biodiversity, health, agriculture, water, watershed, housing and disaster management. It is addressed to all who have an interest in facing the challenge of development of the rural people, irrespective of discipline, profession, philosophy, or institutions. The underlying thesis of the book is basic: knowledge & practices of local communities may offer valuable lesson for policy discourses, and therefore, deserve to be integrated into the mainstreaming developmental agenda.(Sen: Sukanto, Ahmed:Niaz Khan)

The need for formulating national plans and priorities based on local needs and experiences has now been recognized as an important pre-condition for a sustainable development endeavor. Participation is viewed as a vehicle of making policies sensitive to the needs of the majority and thus the interventions more efficient and effective.

CHAPTER 3 METHODOLOGY

3.1 Site Selection

For my dissertation I selected a char at Shibalay upazila in Manikgonj district. Every year the char people face flood & river bank erosion. As they are living with natural disaster they have their own mechanism to cope up with the situation. This knowledge is very much important for Disaster Risk Reduction where community play a vital role. My dissertation topic is Indigenous Knowledge for flood risk reduction. So I think this is the right place for me. BRAC Water, Sanitation & Hygiene program is working at Alekdiar char since 2007. It will help me to get information of Alekdiar Char.

3.2 Methodology:

3.2.1 Collection of Secondary Data/Information

Secondary data and information was collected from relevant agencies to identify study areas exposed to different water related hazards. All the documents those were available from government, NGO and research/academic institution on water related natural hazards, impacts on vulnerable groups and their adaptation strategy were thoroughly reviewed to meet the study objective.

3.2.2 Development of Primary Data Collection Tools

A set of questionnaire for sample survey and a checklist for FGDs were developed to collect the primary data/information from the study sites. A number of issues including perception on water related natural hazards, effects of hazards on vulnerable groups and coping strategies were emphasized in both questionnaire and checklist.

3.2.3 Primary Data Collection

- **Key Informant Interviews (KII)**

Interviews were taken with different professionals for experiencing the true gradual impact of flood and climate change in this particular area. Because the locals are direct observers of the changes but they do not have immense idea about the hidden causes of the changes. So I felt the importance of mapping experience of the experts

of that particular area. Making sense with my own knowledge, I have tried to analyze the fact with checking and rechecking their ideas, perception and experience.

The key informants were selected based upon their expertise on the relevant subject matters required for analyzing the issue rigorously. For the current study, two Key Informants Interviews were taken from GO (UNO) and local NGO BRAC. Key informants were interviewed face to face and over telephone using semi-structured questionnaire (Given in annexure- 1). Apart from questionnaire, their comments were also taken into consideration.

- **Focus Group Discussion (FGD)**

Using qualitative approach, Focus Group Discussion was conducted comprising both men and women. Most of male member's occupation is fishing & farming. Some of them are small businessmen & day labor. Most of the women engaged themselves in household activities & sometimes they also involved in agricultural activities. Focus group helps to gather a wide range of information in a relatively short time. FGD were organized by Mr. Khorshed Alam, Upazilla Manager BRAC WASH program. I conducted two FGD in my study area. Participants were divided in two groups. In one group there were 16 participants and in another group there were 14 participants. They are living permanently in Alakdiar Char for a long time fighting with natural calamities. The participants were asked question regarding the flood related hazard, livelihood, agricultural production, income generation, and food security and adaptation technique applied in the locality. The data collected from FGD were crossed checked by the interviewee from different households.

3.2.4 Secondary data collection

The information about the agriculture related issues was compiled by cross matching among different sources. The information had been taken from different relevant books, articles, Reports, maps, journals, research paper, website, daily newspapers, library, Shibalay Upazila office, Reports from local NGO offices, Field study report (DMG-605, PPDM) under BRAC University etc.

CHAPTER 4

DESCRIPTION OF THE STUDY AREA

Nearly 1.3 million people live in an area of total 1378.99 sq km. Main rivers are the Padma, Jamuna, Dhaleshwari, Ichamati and Kaliganga. Annual temperature: maximum 36°C and minimum 12.7°C; annual rainfall 2376 mm. Average literacy 26.9% (male 33.7%, female 20.1%). Main occupations include agriculture, fishing, agricultural laborer, wage laborer, industry, commerce, construction, service, transport etc.

Flood is one of the main hazards of the people of Manikganj.

The study Area is Alekdiar Char of Teota Union 9 no Ward under Shivalaya upazilla.



Figure 1: Map of Shibalay Upazila (Source: Internet)

The Alekdiar Char is surrounded by Jamuna & Padma river. By Jamuna river total land area is around 6 kilometer & by Padma it's around 4 kilometer. Total Population 2626, among them male 1394: female 1232.

Since 25 years people are living here. From FGD I got the information that from Pakistan period the char was there. Then most of the people were Hindus. After Liberation war Hindus were displaced & the Muslims take over the char.

In Char there are three Primary Schools, One Secondary School, One Mosque & One Madrasha.

Average lowest income 3000 to 4000 taka per month only. Main occupations are Fishing, Cultivation, Day Labor, and Small Business.

CHAPTER-5

FINDINGS OF THE STUDY

From FGD & Key Informants interview it was found that main threat of Char people are

- Flood
- River Bank Erosion

For the inhabitants of the char, floods and erosion are events which are related to the Jamuna, without which the Jamuna would not be the Jamuna.

5.1 Demography & Socio-economic profile

Every Year the char people face the flood and river bank erosion. Floods are thus normal, useful and “good” for agriculture, because they bring fertile strength”. A flood however becomes a problem if it enters the homestead, or stays too long, and thus damages the harvest. Moreover, flood cause the channels to change their course. The banks of the Jamuna also erode during low and stable water levels, but more so during rising and falling flood levels. Flood and erosion are related to each other. The difference is that one can withstand floods but not erosion.

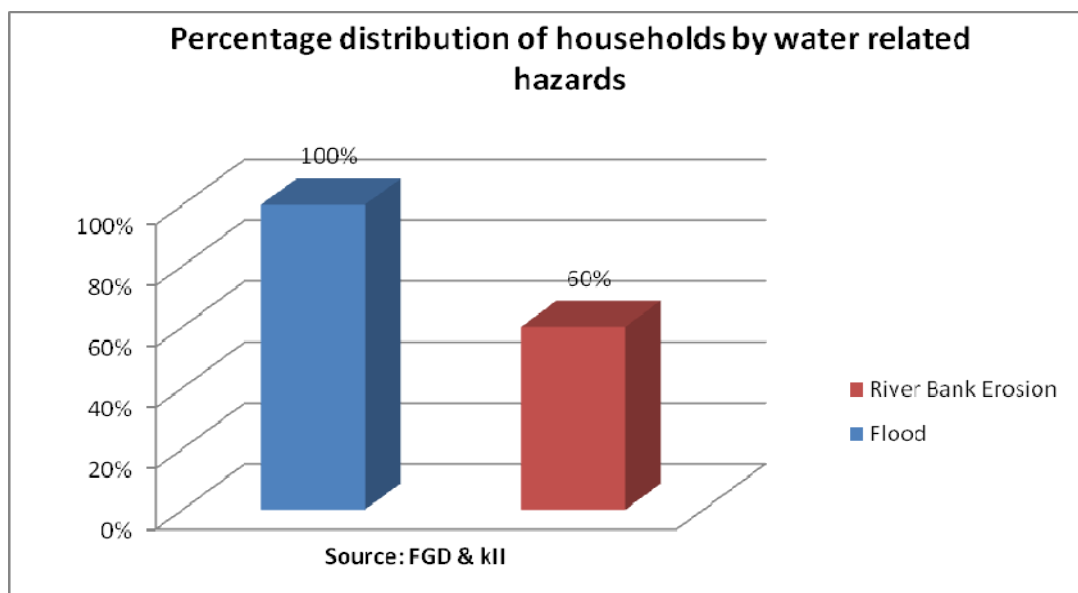


Figure 2: Percentage distribution of households affected most by water related hazards

(Source:FGD & KII)

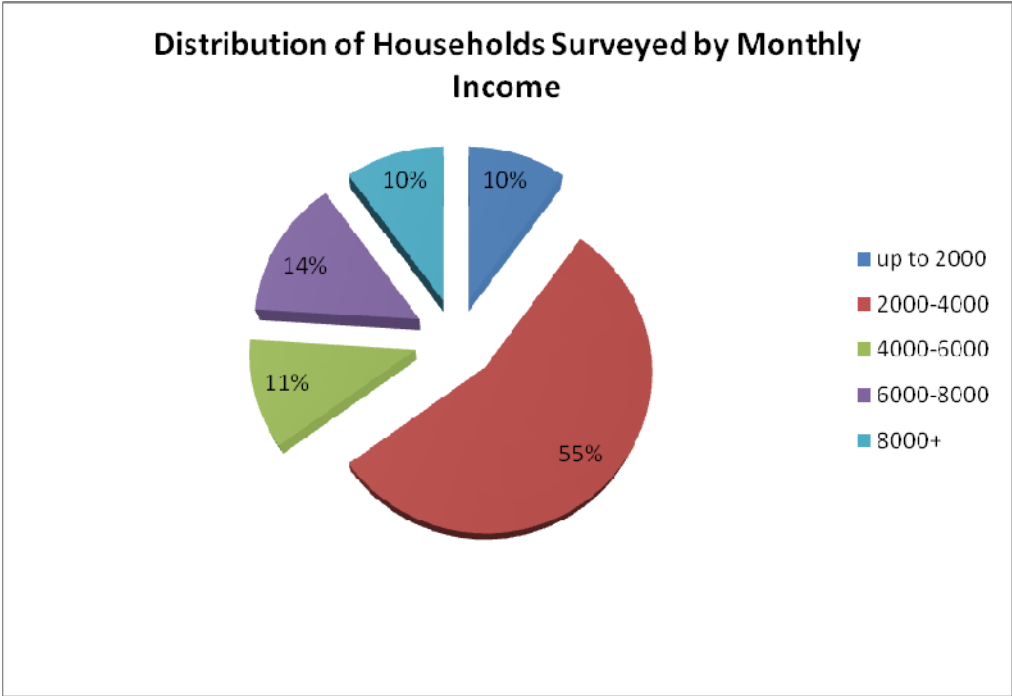


Figure 3: Distribution of Households Surveyed by Monthly Income (Source: FGD& KII)

Most of the people average income is 2000-4000 taka per month.

In Alekdiar char ninety percent of the total population are involved in agriculture and fishing. During flood they catch fish and sell in the market. After flood the soil becomes fertile and then they cultivate the land. Five percent of them are day labor, small businessmen, boatman.

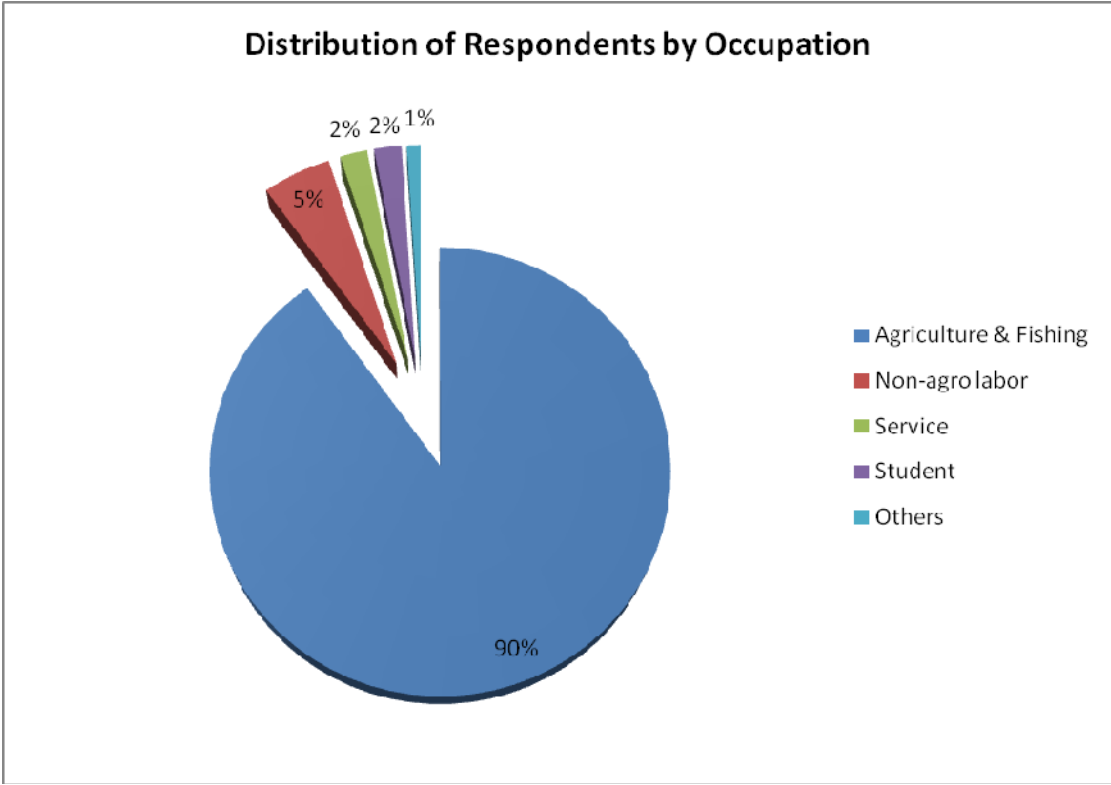


Figure 4: Distribution of Respondents by Occupation (Source: FGD& KIII)

During flood as because of vast inundation most of the male member becomes workless. They move to another place for searching their livelihood. They cross the river come to plain land work as a day labor, rickshaw puller. Female member stay at home to look after their family members & also assets

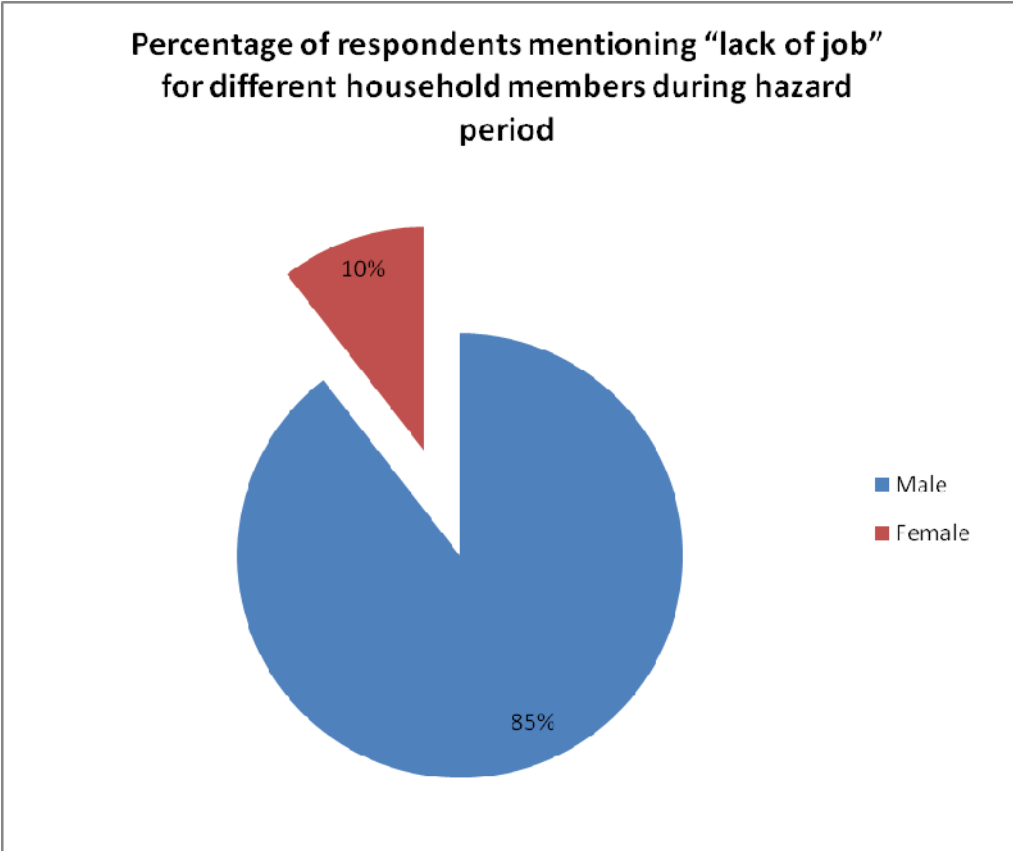


Figure 5: Lack of job for different household members during hazard period
(Source:FGD & KII)

The poor people in the chars can't afford to take measures that can protect them from flood permanently simply because they do not have the means.

Even when they have the ability to improve a physical condition such as reinforce their house, in some cases people are reluctant to invest in doing so, given the unpredictability of floods and the potential threat of their homestead and assets being washed away again within a few months.

Over the years, the people in the chars have experimented, experienced, practiced and advised the new generations on a wide variety of ways to deal with flood, depending on the situation. Some of these practices have sustained for generations while others have gotten modified to some extent. Identifying the right strategy to cope with flood continues throughout their lives, even as they move from one char to another. There are times when they cannot do anything even when they know that a flood is imminent and the only rational option available to them is to sit back and wait for it.

This study documented three broad types of coping mechanisms in the study chars - precautionary strategies taken before a flood to avoid the likely impact; managing strategy taken in response to the circumstances during a flood and recovery strategies taken to recover from the damage caused by a flood.

5.2 Coping strategy to Flood & River Bank Erosion applying indigenous Knowledge

While talking to Char People I asked them are you ready to face any kind of disaster. 100 % of the FGD respondent answered strongly yes we are always ready to fight with our fate locally called 'Niyoti'. No body knows tomorrow our house, asset will be there or not. But we will try our level best to survive with flood or river bank erosion. We have to find alternative way to live.



Photo 1: Taken by author on 12 November 2012

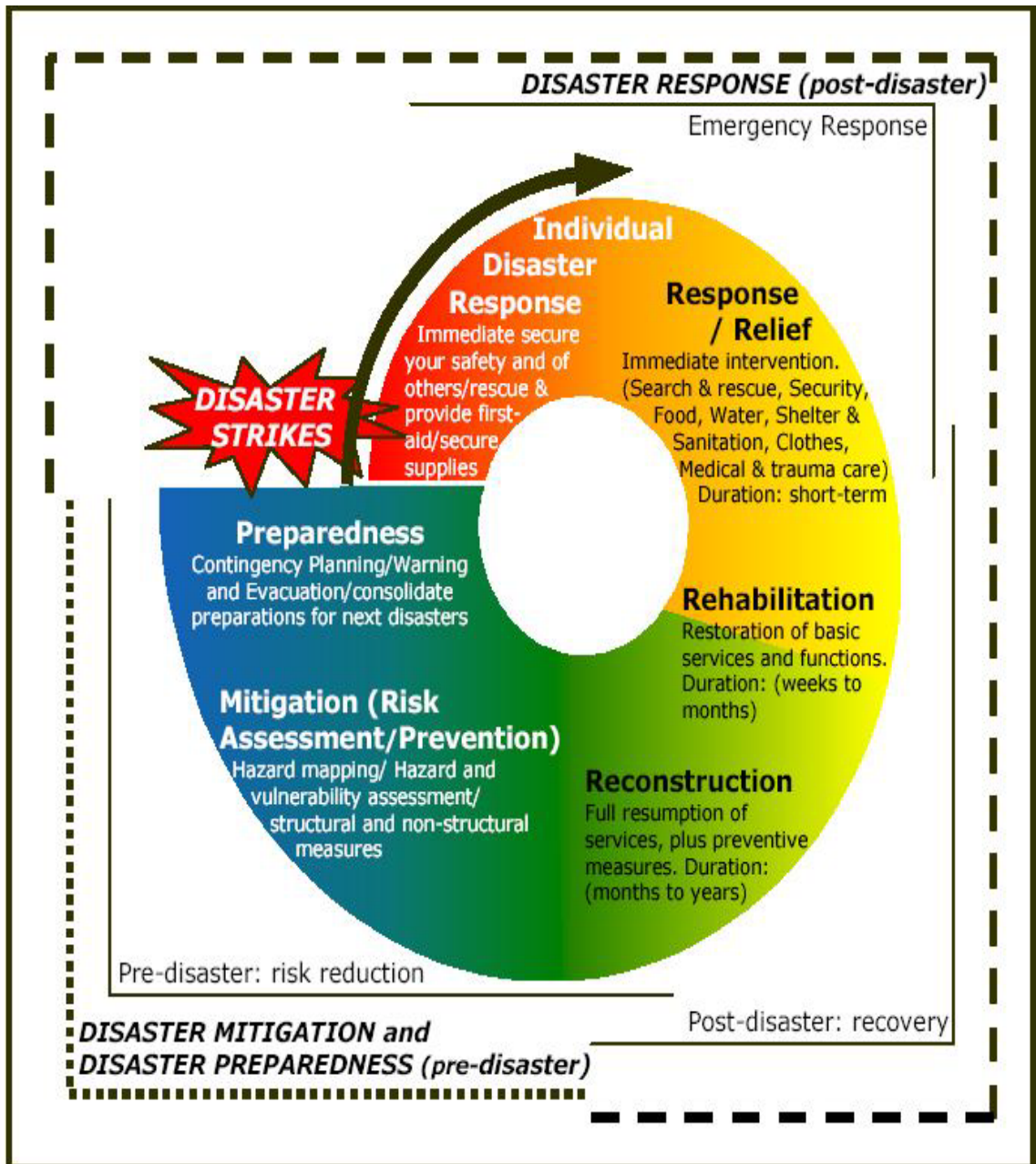
Disaster management can be defined as the body of policy and administrative decisions and operational activities which pertain to the various stages of a disaster at all levels. Broadly disaster management can be divided into pre-disaster and post-disaster contexts. There are three key stages of activity that are taken up within disaster management.

1. before a disaster strikes (**pre-disaster**). Activities taken to reduce human and property losses caused by the hazard and ensure that these losses are also minimized when the disaster strikes.

Risk reduction activities are taken under this stage and they are termed as mitigation and preparedness activities.

2. during a disaster (**disaster occurrence**). Activities taken to ensure that the needs and provisions of victims are met and suffering is minimized. Activities taken under this stage are recalled as **emergency response activities**

3. after a disaster (**post-disaster**) Activities taken to achieve early recovery and does not expose the earlier vulnerable conditions. Activities taken under this stage are called as **response and recovery activities**



(Training Handout by Red R INDIA, Source : Internet)

Pre-Disaster Preparedness Applying Indigenous Knowledge

These strategies are undertaken as preventive measures from traditional knowledge before a flood occurs and mostly involves protecting household and assets, securing shelter, stocking on food and necessities and preparing for communication and transport well in advance.

i) Protecting homestead



Photo 2: Taken by author at 13 November,2012

Houses destroyed by flood & River Bank erosion are a common impact in char areas. Protecting homestead in the sandy char has many challenges. First, people cannot build permanent structures (mostly thatch wall and roofs with corrugated sheets or thatch) as they are more likely than not to be displaced because of erosion. Second,

many of them do not have permanent deed. Third, protecting homestead from flood needs mud which is expensive in the sandy land.

The char people can understand seeing the current of wave which side will be destroyed. Common strategies to protect the homestead include elevating and reinforcing the homestead. Elevating the homestead requires high quality mud but since this mud is expensive, people often steal it from others. Protecting the superior mud in the homestead from washing away becomes the next challenge, which is commonly solved by planting of *dhol-kolmi* (local vegetation) and banana tree. These plants help to keep the soil granules compact and binds them together stronger. Char peoples also use *kaisha* (type of local grass) and bamboo to reinforce the homestead wall from outside. With the protection of plinth, many cautious and financially solvent people buy extra pipe to raise the tube-well base above flood level to ensure fresh source of water. During flood, many neighbors depend on these raised or safe tube-wells.

ii) Protecting livestock

Livestock - usually cow and goats - are the most valuable assets of the char people. They raise livestock to cope with sudden emergency, paying dowry for their daughter's marriage or to repair houses. But not everyone has a goat or a cow-some raise goats and cows on a sharing basis. Protection of livestock is thus a crucial preventive strategy used by the char people. Depending on affordability, they store fodder, elevate cattle sheds and vaccinate their cows in advance.

When flood water reaches the level of the shed, people no longer keep their livestock at home. People in Alekdiar Char shift their livestock to the embankment. In some cases, they send their cattle to relatives places. Some poor families try to sell livestock in an attempt to keep some money at hand so that they have a source of finance when regular income is jeopardized due to flood. In this way, they get hold of some security money while avoiding the risk of losing livestock to flood.

Another big challenge is the collection of fodder for livestock, particularly goats which need green grass that go under water during flood. Sometimes they have to move another places to collect fodder.

iii) Protecting harvest



Photo 3: Taken by author on 14 November 2012

Types of crops	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Maskalai, Mustard, vegetables												
Paddy (IRRI, Aus)												
Badam												
Aman												
Sowing												
Harvesting												
Source: FGD& KII												

There are some coping strategies for protecting harvest at both the chars. A few farmers prefer to harvest flood resistant crops even if the production is less. This behavior shows that people are ready to accept some temporary loss to avoid bigger losses in future.

Farmers also use other techniques to reap maximum benefit, such as sowing such varieties of seeds that can be harvested earlier in the lower lands and harvesting regular seeds at higher lands.

Few farmers also preserve seeds in advance, so that even if the flood destroys the expected production, they still get a chance for re-sowing seeds, if time permits.

To protect crops, farmers take actions collectively. They try to make embankments in front of khals (streams) to stop the water flow. Sometimes they also work together to dig channels to drain out floodwater from crop fields.

Another pre-flood coping strategy involves selling the products earlier than usual; people sell surplus crops before floods and use the money during floods.

iv. Securing shelter

Many people arrange for ropes, bamboo, wood etc. before a flood. These materials are needed to build a traditional structure that works as an elevated shelter called a macha. People, along with their assets and furniture try to take shelter on this macha when their house is flooded. Poor people, who can't afford to buy these materials, usually try to borrow from other community people.

For shelter, some families decide to move into relative's places before or during flood. Some send only few members to other places. There is an inbuilt concern about the security of female family members being sent off to relative's place. So, few families prefer to keep them away for a very short period of time. If the house is badly inundated, sending pregnant women and children to relatives' or neighbors' houses becomes necessary.

v. Storing food, fuel and preparing portable stove

Prior to floods, people try to store dry food that does not need to be cooked, such as chira (flattened rice), muri (puffed rice), gur (molasses). For cooking purposes, they preserve rice, peas etc. as back up. Usually, in most households, jute-made hangers - locally known as shika - can be found where they store these dry food products. Often firewood is collected in advance.

Another pre-flood strategy is used to make portable stoves prior to a flood. During flood, these can be moved around to where the water level cannot reach the stove.

vi. Preparing emergency communication and transportation

Few people also plant Banana trees which can prove useful during flood. People use these trees for making rafts which serve both as transport and as shelter during floods. For communication purposes, people also build locally developed bridges called shako. Those who can afford buy boats beforehand or start repairing old ones.

vii. Health

During flood they suffered from fever, cold, diarrhea. They stored some medicine, saline considering the flood situation.

They apply some traditional knowledge for Health criticalities. For Jandis they take medicine from 'Kabiraj'. Tulshi leaf is used for cold.

They know how to make saline. In case of Diarrhea & Dysentery they take hand made saline.

'Dublar Ras' is used for the constipation & also for injury.

Neem leaf is also used for worm of children.

Vadari leaf usually grow in paddy field is used for snake poison.

viii. Self-Preparedness:



Photo 4: Taken by author on 15 November 2012

Almost everybody knows swimming including children. When they are 6-7 years old their family guides them to gain knowledge of swimming

During flood coping mechanism of Char People by indigenous knowledge:

When the rainy season come they observe the current of wave, danger level of water & by life experience they can understand which side will be badly eroded. As a first respondent they quickly shift their houses to safer place. Take shelter sometime embankment & also in relatives house.

Social bonding among neighbor is a great capital for them. During flood most of the time robber attack them. So they formed a committee themselves to guard the char people by rotation.

Those who don't have own boat can use the boat of their neighbor. Small boys sometimes give lift & take small amount of money.

The char people are very careful about their children because during flood they drowned.

Some people have nothing to do during flood. Vast inundation creates difficulties to catch fish. So the male members move to another place for livelihood. Most of the time the poor people take loan from 'Mohajan' with high interest.

Almost every year the Char people face flood & river bank erosion. These natural calamities make them courageous over the year.

In Char area they have Solar Energy, Mobile phone. These make a opportunity to have information from media like radio. Now they drink water from tube well. From their life experience they see that if drinking water is unsafe it creates lot of water borne diseases.

The People living Alekdiar Char is over 25 years. In their lifetime with nature they have lot of learning's to cope up with the situation. No formal awareness raising

activities is their. But they organize themselves to minimize the effect of flood & river bank erosion.

Coping mechanism by indigenous knowledge in Post Disaster period

After flood they again rebuilt their houses themselves, clean the dirt from yard. Make the land cultivable for next harvesting. From traditional knowledge they make a crop plan. So most of the houses have seeds.

Lots of diseases occurs in this situation. They have their own practices. Sometimes they take treatment from Kabiraj.

If the loses is much they failed to recover themselves & that's why they have to take loan from Mohajon.

Challenges of Char people:

- As there are no disaster management committee they have no organized plan to face disaster
- They take loan from 'Mohajon', have to pay a huge amount of interest. Government or NGO are not available for microfinance. So during flood some people lend money with high interest & also after flood to recover themselves. Day after day they are giving interest but the capital remain same
- During flood robber attack them & take over their assets like cow, boat, sometimes demand cash money & also valuable things. Thus they suffered from insecurity
- Their main occupation to catch fish & cultivation. During flood they move away to another places for alternative livelihood.
- Property ownership sometimes create problem for example those who are land owner it's not clear is there any legal documents or not. Sometimes they take control of land
- They get a little support from Government in case of security during flood.
- Char people are less conscious about sanitation In 2007 a survey was conducted by BRAC WASH program & it found that there was only one sanitary latrine in this char.

CHAPTER 6

CONCLUSION AND RECOMMENDATION FOR FURTHER STUDY

- Nature of floods as experience by char people is changing in terms of their frequency, intensity, time of occurrence (relation to cropping season) and predictability. This changing nature has an impact on people's ability to cope. Although the community has used its own science and arts to predict floods, this traditional tool is becoming of little help due to the changing nature of floods and leaving the community with no choice but to rely on whatever early warning system is in place. The study also indicates that early warning has little relevance if people do not have the ability to prepare for and manage the consequences of flood.
- Coping has a cost--financial, social and opportunity. Financial ability is the key. Vulnerable char people have little or no surplus income to invest on the measures that can protect them from flood. As a result, people's coping is limited to deal with immediate circumstances rather to undertake measures that are long term in nature. Social capital e.g. reciprocal support among the neighbors, support from immediate family members, greater kinship network are the vital safety net for the char people in coping with recurrent flooding. However, people are increasingly dependent on the formal institutions, particularly in the context of changing nature of flood. Pluralistic formal institutional setting is good for people to cope, as this increases likelihood of getting access to information and services. Therefore, a people centered governance where vulnerable people have access to must be promoted.
- Another observation from the study is how community coping mechanism can be weakened by development factors such as flood protection structures. Therefore, development NGOs and large development projects such as the Chars Livelihoods Project and government policy should have indicators to determine whether the projects actually strengthen or weaken community coping mechanism.

- Early warning system may reduce vulnerability in the areas
- Embankment/Bandhs need to be constructed if feasible
- Raise platform of the tube wells and latrines
- Seeds and fertilizer needs to be ensured and make available to each and every male and female farmers
- Gender issues should be considered during shelter designing and establishment
- Agriculture, water and health services need to be extended to all households. Special consideration is needed for all identified vulnerable households/population
- Women participation in all local level disaster related plan and activities need to be balanced
- Effective technology based on climate prone area should be reached to women for coping during, pre- and post hazard period
- Women can be trained on technology utilization to generate alternate income
- Free interest loans can be arranged for women for certain time at least after the hazard event
- Dams/embankments need to be constructed to avoid flood inundation
- A rehabilitation centre or call centre for hazard and coping information on water, agriculture and health can be established in each of the most vulnerable areas at least to serve during the hazard period. This centre can act as warning centre for the locality
- Roads and streets may be constructed considering danger level of water during flood elaborate kathas, which are then sold to retail outlets such as Aarong .It would better if the potential women are provided sewing equipments by GOs and NGOs.
- More Primary & Higher Secondary School Can be built in char areas considering the danger level of flood. Children can get education & also have shelter during flood
- Psychosocial training can be arranged for Char people. It will enhance their strength to live with flood applying indigenous knowledge
- Training on Health & Hygiene can be arranged for them

Most approaches to disaster management tend to focus on people's vulnerabilities and on what people do not know. Heijmans (2001) and Ellemor (2003) criticise the concept of 'vulnerability' and argue that communities do not use the concept and this is because: "they approach recurrent 'adverse events' as part of 'normal life', while rare or new disasters are dealt with from a perspective of survival." (Heijmans 2001, p 1) The focus on local knowledge and practices (especially adaptation strategies) provides an entry point for reversing this tendency. It enables internal and external organizations to explore what people's strengths are and what they actually do know, that is to build upon community resilience (Gardner and Dekens 2007). For instance, natural hazards can have profound impacts on social and ecological systems such as the loss of subsistence practices, the breakdown of sharing networks, and the disruption of communal control of native resources among others. However, they may also generate positive, social impacts to some extent, when strengthening social networks, and positive, ecological impacts, when revitalizing soil for instance (Smith 2003; Colding et al. 2003). Natural hazard risks and disaster can also offer new opportunities. Swift and Baas (1999) highlight the importance of identifying winners and losers. The rapid changes facing communities are as much a source of new vulnerabilities as of new opportunities and exploring new ways of risk adjustment. Oliver-Smith (1996, p 313)

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Appendices

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GLOSSARY

- *Bhanga & Gora*: This meant the ups and down of anyone's life but here it means the effect of river bank erosion
- *Char*: Chars are large pieces of land in the river where sand has deposited layer by layer over years.
- *Jamuna*: Name of River
- *Kabiraj*: Usually some people have traditional knowledge to give treatment to sick people. They have no academic degree but people trust them very much in any kind of physical or mental problem
- *Meghna*: Name of River
- *Mohajon*: Economically they are well established and they have control over land. Poor people lend money from them with high interest
- *Niyoti*: One's fate
- *Padma*: Name of River
- *Tulshi leaf*: A kind of leaf usually grow up in Shrub used as Herbal Medicine
- *Dublar Ras*: A kind of grass used as Herbal Medicine
- *Neem*: A tree , leaf used as Herbal Medicine
- *Macha*: Traditional structure that works as an elevated shelter called a macha usually made by ropes, bamboo, woods etc
- *Kaisha*: Type of local sun grass.