



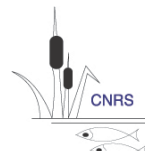
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Disaster Risk Reduction (DRR) on Tanguar Haor



inter
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Disaster Risk Reduction (DRR) on Tanguar Haor

The Study Team

Research Team

Remeen Firoz
Ahana Adrika
Ahsanul Wahed
Zinat Hasiba
Karishma Sinha
Maria Mahbub
Amir Md. Khan

Technical Editors

Dr. Istiak Sobhan
A. F. M. Rezaul Karim
Prof. Niaz Ahmed Khan, PhD

IUCN Bangladesh Country Office

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LIST OF ACRONYMS

BELA	Bangladesh Environmental Lawyers Association
BRAC	Bangladesh Rural Advancement Committee
CNRS	Centre for Natural Resource Study
DRR	Disaster Risk Reduction
ECA	Ecologically Critical Area
FGD	Focus Group Discussion
GOB	Government of Bangladesh
GUS	Gana Unnayan Shangstha
IC	Inter-Cooperation – a technical partner organization
IUCN B	International Union for Conservation of Nature, Bangladesh
LEAF	Livelihood, Empowerment and Agroforestry Project
MoL	Ministry of Land
MoEF	Ministry of Environment and Forests
NCS IP	National Conservation Strategy Implementation Project
NGO	Non-Government Organization
SDC	Swiss Agency for Development and Cooperation
TH	Tanguar Haor
GO	Government Organization

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EXECUTIVE SUMMARY

Disaster Risk Reduction (DRR) is particularly relevant to communities living in and around Tanguar Haor, one of Bangladesh's largest wetland systems, where communities are vulnerable to various disasters including, flash floods, hail storms and wave erosions and their lives and livelihoods are often influenced by these tragedies. The DRR study under the auspices of the project 'Community Based Sustainable Management of Tanguar Haor II' was carried out during January – February 2010, to capture people's vulnerabilities induced by climate change manifestations. The study also documented the current coping strategies and recommendations from the local level, for reducing people's risks resulting from disasters.

In total, 9 villages were covered from 4 Unions, namely Uttar Sripur, Dakhhin Sripur, Uttar Bangshikunda and Dakhhin Bangshikunda. A total of 23 FGDs were performed, where various stakeholders were consulted. The findings of this study have been presented according to the various dimensions conceptualized in the framework of the study model. In order to supplement the FGD findings, seasonal calendar of crops, disasters and ranking and scoring of options were also done.

About 240 community members and field workers shared their perceptions regarding disasters and recommended a number of measures that they viewed as strategies for risk reduction. A number of the recommendations that were prioritized are listed as follows:

- Multipurpose shelters, serving as disaster shelter, school, community clinic, market, etc.
- Infrastructure development such as building roads and submersible *pucca* (concrete) embankments, protection walls, etc.
- Alternate cropping practices such as early variety and floating gardens (*baira*) and training on techniques such as IPM (Integrated Pest management)
- Alternative income generating opportunities such as 'Ecotourism facilities/guiding' for lean season (or during seasonal ban on fish catch)
- Access to proper health care and sanitation facilities, by installing sanitary latrines and tube wells

The aim of the study was to capture people's needs and priorities, so that these could be documented and presented to the development community and policy makers at large. In future, it is expected that the recommendations and people's aspirations can be taken into account while planning and developing projects and development initiatives for the area.

CHAPTER 1

INTRODUCTION

1.1 Background

Disaster Risk Reduction (DRR) measures are designed to protect livelihoods and the assets of communities and individuals from the negative impacts of hazards. This is done by the use of mitigation, preparedness and advocacy. Mitigation is reducing the scale, intensity and impact of hazards. Preparedness is strengthening the resilience of communities to withstand, respond to and recover from hazards, and of government, implementing partners and all other stakeholders such as IUCN-B to establish speedy and appropriate interventions when the community's capacities are overwhelmed. Advocacy means favorably influencing the social, political, economic and environmental issues that contribute to the causes and magnitude of impacts of hazards.

A disaster takes place when a hazard occurs and impacts on a community, overwhelming its capacity to cope. Disasters affect people, their livelihoods and their environment. The magnitude of impact is directly related to the intensity and scale of a hazard and the vulnerability of individuals and communities. Thus DRR can be seen as a means of strengthening livelihood security, reducing vulnerability and increase opportunities of pursuing sustainable livelihoods. Climate change and its potential negative impacts such as increased storm surge, floods will be affecting the most vulnerable communities living in rural areas of developing countries like Bangladesh. It is thus important to recognize the importance of climate change adaptation and its relationship with disaster risk reduction. This is particularly relevant to countries like Bangladesh where adaptation is the main method of combating climate change.

Disaster risk and climate change are two threats that correlate positively reinforcing each other. This is particularly relevant to communities living in and around Tanguar Haor, one of Bangladesh's largest wetland systems. Wetland ecosystems act as sinks for carbon and contribute and provide numerous ecosystem services. However, they are particularly vulnerable to climate change. Thus DRR can be used as a powerful tool to understand the threats being faced by communities living in those areas in a way that preparedness and adaptation methods can be devised accordingly.

Against this backdrop, the report informs the experience and observations of a DRR study conducted in TH under the auspices of the project 'Community Based Sustainable Management of Tanguar Haor II' from January to February 2010. The study mainly endeavored to identify people's vulnerabilities to climate change induced disasters in the project area and document their current coping strategies, in order to recommend measures that can reduce their risks from disasters.

The report is organized under 4 sections. The introduction chapter provides the background and objectives of the study, along with describing the method adopted. After this general introduction, the reader is presented with a compilation of the findings from the field, where people's perceptions and coping practices have been documented. This is followed by another section on

the synthesis and interpretation of the major findings. The last chapter focus on the conclusions and recommendations extracted from the field level information and categorize the recommendations in a meaningful way, specific for the project or for other actors in the field of development.

1.2 The Context and Methodological Considerations of the Study

1.2.1. Wetlands, Livelihoods and Disasters

The Ramsar Convention is the only global environmental treaty that uses a broad definition of the types of wetlands covered in its mission. Under the Convention on Wetlands (Ramsar, Iran, 1971) 'wetlands' are defined by Articles 1.1 and 2.1 as:

Article 1.1:

'For the purpose of this Convention wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.'

Article 2.1 provides that wetlands:

'may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands' (Appendix 7. Ramsar Wetland Definition, Classification and Criteria for Internationally Important Wetlands).

At the centre of the Ramsar philosophy is the "wise use" concept. The wise use of wetlands is defined as "the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development". "Wise use" therefore has at its heart the conservation and sustainable use of wetlands and their resources, for the benefit of humankind.

Wetlands ecosystems are rich in biodiversity, providing both tangible and intangible ecosystem services in the form of crop and fish production, maintenance of swamp forests and reed land, water flow regulation and water quality maintenance. These provide both cultural and economic benefits that are vital to the livelihoods of communities living in close proximity to the area. According to the Ramsar definition of wetlands, about two-thirds of Bangladesh falls within the category of 'wetlands', of which 21% is deeply flooded to a height of more than 90cm (IUCN, 2005). The Tanguar Haor wetland falls under the category of a "Haor", being of fluvial origin, commonly identified as freshwater wetlands.

Tanguar haor (perennial wetland) is a wetland system comprising 10,000 ha of land area and is located at the north-eastern district of Sunamgonj, situated at the foothills of Garo hill range of the Indian state of Meghalaya. Tanguar haor is an important wetland resource, providing a range of social, economic and environmental benefits and services to some 77,000 people spread over 88 villages. This haor is the source of their livelihoods providing income and employment. (Tanguar Haor Census Report, 2006).

Tanguar haor plays an important role in fish production as it functions as a 'mother fishery' for the country, where parent fishes take refuge in the winter and in early monsoon the grassland and rice field surrounding the haor becomes their spawning ground. The fisheries resources of the haor ecosystem provide direct economic benefit to the local inhabitants as well as to the Government,

accruing the largest share of Government revenue earnings from this wetland. Moreover, this wetland also provides cultivable land to the local farmers, while functioning as a back-water reservoir during the rainy season.

A disaster occurs when a significant number of vulnerable people experience a hazard and suffer from severe damage and/or disruption of their livelihood system in such a way that recovery is unlikely without external assistance (IUCN, 2008). A disaster is a combination of vulnerabilities and risks and is influenced greatly by the social, economic and political processes. Although the haor ecosystem is extremely productive and provides numerous services, but they are also highly vulnerable to various disasters such as flash flood, early flood, hail storm and river and wave erosion. These disasters not only inundate and damage the homesteads and other infrastructures of the local communities, but also damage the only crop they grow in many cases. Their lives and livelihoods are often dictated by the natural disasters in the Tanguar Haor region.

1.2.2. Community Based Sustainable Management of Tanguar Haor (Project)

Considering the national significance of Tanguar Haor, it has been declared as one of the Ecologically Critical Areas of the country in the year 1999. Subsequently; on July 10, 2000 it became the second RAMSAR site of Bangladesh highlighting its global importance, especially for migratory birds. The environmental importance of Tanguar Haor was first emphasized by the wetland study of Flood Action Plan 6 (FAP 6 Wetland Specialist Study, 1993). However, the first ever conservation initiative undertaken by the Government in Tanguar haor was the National Conservation Strategy Implementation Project (NCS IP) in mid 1990s, where IUCN Bangladesh Country office worked as a technical partner. Over the next few years, IUCNB advocated and lobbied for the conservation of Tanguar haor and its natural resources, which successfully culminated with the transfer of ownership from Ministry of Land (MoL) to Ministry of Environment and Forests (MoEF). To sustain and enhance the natural resources of Tanguar Haor and to ensure sustainable harvest and equitable distribution of these resources, a community based management system was deemed necessary. Consequently, MoEF commenced a project called Community Based Sustainable Management of Tanguar Haor, in which IUCN Bangladesh is nominated to implement the project on behalf of the government. The project was designed with three different phases in which the entry point was to develop a resource governance system for the wetland.

The preparatory phase (from year 2006 to 2009) was geared towards confirming the interest of government and communities to collaborate in managing the biodiversity of Tanguar haor, while ensuring well-being of communities. During this phase, a co-management system was developed in order to fetch benefits for the poor.

Based on the experiences of the preparatory phase, the second phase includes 88 villages within a single management unit. This phase focuses capacity building for promoting alternative livelihoods amongst the ultra poor, especially women. Adaptation to climate change and Disaster Risk Reduction (DRR) are also being considered for long term sustainability of the project results. The project introduces for the first time in Bangladesh an innovative Knowledge Management System which integrates local and scientific knowledge into guidelines for best management practices.

1.2.3. Conceptualizing and Approaching the DRR analysis

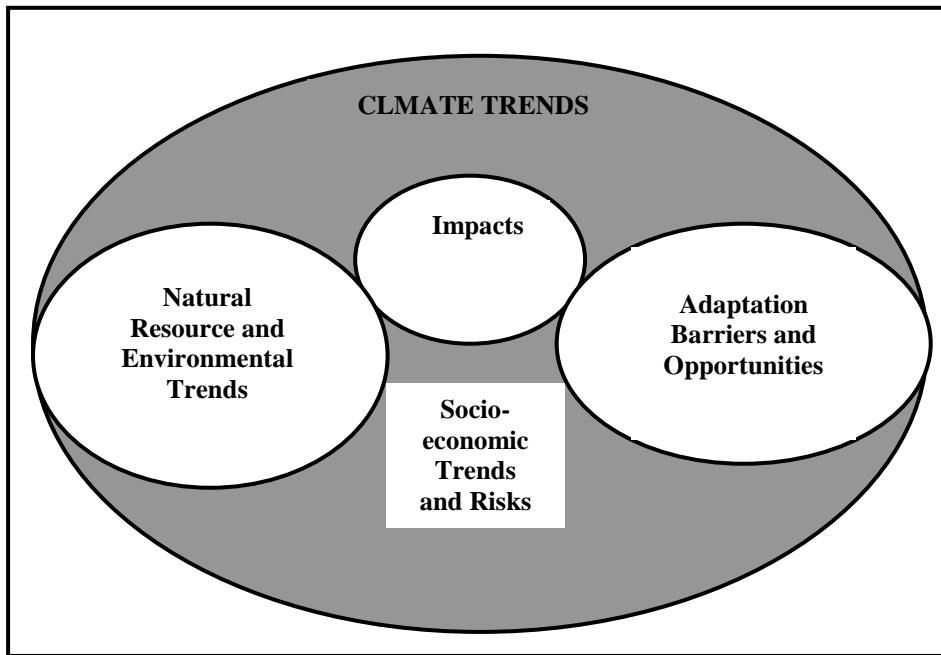


Figure 1.1: Conceptualization for DRR

The conceptual framework of the study: for the ease of analysis and benefit of comparison a framework is imperative and the above diagram and analyses in the following texts broadly follow the framework.

Using the DRR approach, risk assessments are carried out to identify which hazards are more likely to occur and to have the biggest impact on communities or individuals assets, there are two components to this: Hazard analyses and Vulnerability assessment. Focus group discussions are one of the tools that can be used to carry out these assessments.

The following FGD's carried out have been designed to find out some key aspects of disaster risk, from getting information about current coping mechanisms, awareness of climate change, health security, occupation and frequency of natural disasters. These are used to quantify the assets or lack of such that it may be equated to levels of vulnerability. Under the DRR model, the concept of vulnerability needs to include a predictive quality that informs us of what may happen to a particular population or parts of that population under specific conditions caused by hazards. This predictive quality should allow us to use the information gathered to direct interventions that protect and enhance assets and livelihoods.

1.2.4. The Study Objectives

The objectives of the DRR study were to:

- identify the vulnerabilities, induced by climate change manifestations
- document the current coping strategies adopted by the communities
- prioritize and recommend DRR measures for the communities.

1.2.5. The Methodology

The Site Profile and Characteristics

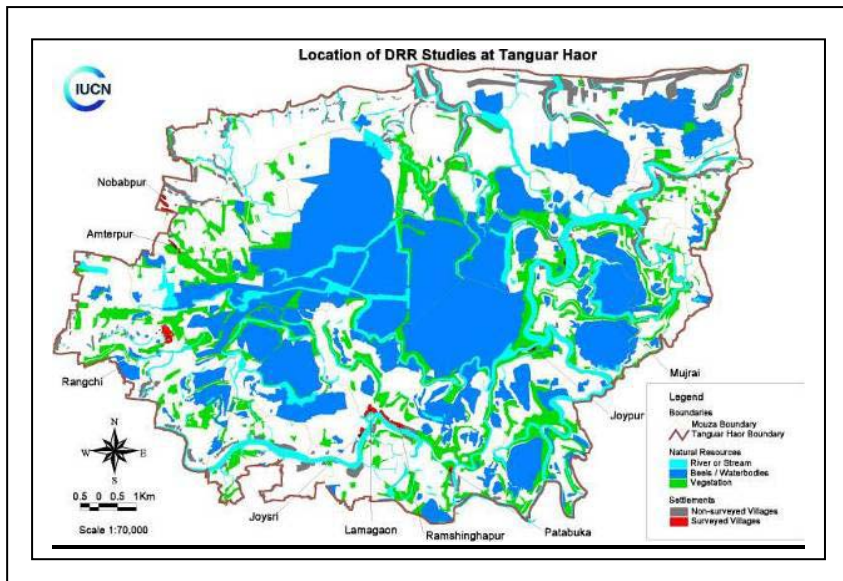


Fig 1.2: Location of DRR Studies at Tanguar Haor

The Tanguar Haor wetland system is located in the north-eastern part of Bangladesh in the district of Sunamganj (25°06' -25°11' N and 91°01' -91°06' E) under Sylhet Division. Covering 9,727 hectares, adjacent to the Indian border, Tanguar haor is part of a complex wetland system of the Meghna and Surma river basin. Administratively, one third of Tanguar Haor lies in the Tahirpur Upazila and the remainder in Dharmapasha Upazila, both within the Sunamganj District of the Sylhet Division. About 50% of the area (5,682 ha) of Tanguar haor is water bodies, followed by 31% crop land (Phase I Completion Report, IUCN 2010).

It is a unique ecosystem that supports nearly 200 species of wetland flora, 141 species of fish (half of the total freshwater fish species found in Bangladesh), 11 amphibians, 34 reptiles and 208 species of birds of which 98 are migratory.

The Stakeholders and the Consultations Process

In total, 9 villages (total 23 FGDs) were covered in 4 unions under the DRR study. The distribution of total 23 FGDs were:

Union	Village	Number of FGDs/Name of Group/Date FGD conducted
Uttar Sripur	Joypur	In total 3 FGD s were covered 3 Groups consisted of Farmers and Fishermen, Women and Children and a mixed group. Date: 25 th January,2010
	Mujrai	In total 3 FGD s were covered 3 Groups consisted of Farmers and Fishermen, Women and Children and a mixed group. Date: 27 th January,2010
Dakhhin Sripur	Joyosree	In total 3 FGD s were covered 3 Groups consisted of Farmers and Fishermen, Women and Children and a mixed group. Date: 26 th January,2010
	Lama Gao	In total 3 FGD s were covered 3 Groups consisted of Farmers and Fishermen, Women and Children and a mixed group. Date: 26 th January,2010
	Ramshinghopur	In total 3 FGD s were covered 3 Groups consisted of Farmers and Fishermen, Women and Children and a mixed group. Date: 26 th January,2010
	Patapuka	In total 2 FGD s were covered 2 Groups consisted of Farmers and Fishermen & Women and Children Date: 23 rd February ,2010
Uttar Bangshikunda	Antorpur	In total 2 FGD s were covered 2 Groups consisted of Women and Children and a mixed group. Date: 24 th February,2010

Union	Village	Number of FGDs/Name of Group/Date FGD conducted
	Nababpur	In total 2 FGD s were covered 2 Groups consisted of Farmers and Fishermen, Women and Children Date: 24 th February 2010
Dakhhin Bangshikunda	Rongchi	In total 2 FGD s were covered 2 Groups consisted of Women and Children and a mixed group. Date: 24 th February,2010

Table 1.3: Union and Village Wise Distribution of FGDs

Stakeholders are individuals or groups who have the current and past experience of coping with, and adapting to, climate variability and extremes. The principal resource for responding to climate change impacts are people themselves, and their knowledge and expertise. Through an ongoing process of negotiation, they can assess the viability of adaptive measures. Together, the research community and stakeholders can develop adaptive strategies by combining scientific or factual information with local knowledge and experience of change and responses over time too.

Vulnerability is gender differentiated and the way women experience this is far different than men, because of the socially constructed gender roles and power relations. That is why, separate women and children's groups were also interviewed, in order to understand and relate to the varying needs of the identified stakeholders. Following is a list of major stakeholders consulted during the DRR exercise:

- Farmers
- Share croppers
- Women farmers
- Landless
- Fishermen
- Fish merchants
- Shopkeepers
- Day laborers
- Handicraft artisans

Tools of Empirical Investigation

The Disaster Risk reduction (DRR) surveys were conducted, in order to identify the existing situation regarding disaster management and coping techniques that the communities practices and also assemble their recommendations for facilitating the adaptation to disasters and climate change impacts.

The DRR used a step-by-step approach to systematically analyze the causes of vulnerability by:

- tracking hazards to determine the level of exposure to risk, as well as causes and effects

- examining unsafe conditions (factors that make people susceptible to risk at a specific point in time)
- tracking systems and factors (dynamic pressures) that determine vulnerability, resilience and root causes
- analyzing capacities and their impact on reducing vulnerability.

Following is a list of socio-economic research techniques that were put into use while carrying out DRR in the selected sites TH:

- Focus Group Discussions
- Transect Walks
- Participatory Resource/Social Mapping
- Seasonal Calendar of Crops
- Seasonal calendar of risks/disasters
- Disaster mapping
- Prioritization of risks (frequency of disasters)
- Situation Analysis (current and future scenarios)
- Coping Strategies (current and future suggestions)
- Poverty Analysis

Using the DRR approach, risk assessments are carried out to identify which hazards are more likely to occur and to have the biggest impact on communities or individuals assets, there are two components to this: Hazard analyses and vulnerability assessment. Focus group discussions are one of the tools that can be used to carry out these assessments.

The following FGD's carried out have been designed to find out some key aspects of disaster risk, from getting information about current coping mechanisms, awareness of climate change, health security, occupation and frequency of natural disasters. These are used to quantify the assets or lack of such that it may be equated to levels of vulnerability. Under the DRR model, the concept of vulnerability needs to include a predictive quality that informs us of what may happen to a particular population or parts of that population under specific conditions caused by hazards. This predictive quality should allow us to use the information gathered to direct interventions that protect and enhance assets and livelihoods.

Limitations

A number of limitations or problems encountered while carrying out the DRR study are listed below.

- Seasonal disruptions caused problems in commuting to the study sites. As the primary surveys/consultations were done in January – February 2010, the level of water in the haor was low (wetlands dry up in winter months) and so it was difficult to travel to places by boat. Often, longer and riskier routes had to be taken, which were both time consuming and costly.
- In any social research, 'breaking the ice' or getting to know the respondents (in this case the community members) in order to extract meaningful information from them, it is necessary for the researcher to be comfortable with them. Time limitation was one of the

other drawbacks of this research, as the FGDs had to be conducted within a given timeframe of about 1 hour or more for each session.

- About 10% of the target group (of the Tanguar haor Project) from 23 villages were consulted, as the representative of the entire population of 88 villages in the area. While this is a good representation of the people of the haor, there are some gaps in the findings which were validated through key informant interviews with the local people working in Tanguar Haor.

CHAPTER 2

VIEWS FROM THE FIELD: VILLAGE – WISE FINDINGS OF THE SURVEYS

In this chapter, detailed empirical observations and findings from the DRR study villages are presented. The conceptual framework discussed earlier aims to capture the following broad dimensions, namely:

1. livelihood options/alternative livelihoods
2. education and awareness
3. out-migration
4. medical care and hospitals
5. schools and flood shelters
6. access to micro-credit
7. preparedness campaigns
8. relief or rehabilitation
9. food consumption/calorie intake
10. radio news/warnings/signals
11. housing and sanitation
12. farming techniques
13. natural disasters/rainfall and flash floods
14. transport and communication
15. local institutions and government policies

The purpose of this chapter is to portray the relevant field realities as the local villagers/people experience them in their day to day life and living. While this chapter deals with the broader picture of the ground, the next chapter summarizes and recapitulates the key relevant information from the perspective of DRR policy and practice.

The information in this chapter is presented in its raw form; on the basis of the checklist that was used to gather those in the field (see Annex 1 for more information). The total number of villages covered was 23, which is about 10% of the total project coverage (out of 88 villages) and in the following pages, the outputs from each FGD session are presented. In most cases, more than one FGD was conducted in each village, in order to capture the micro-scale differences between different genders, social strata or age group.

The dimensions mentioned earlier from the DRR conceptual framework were all addressed and information gathered has also been stratified according to the checklist.

2.1 Village: Joypur

Union: Uttar Sreepur

General Information

The total number of participants interviewed in this village was 34, including fishermen, farmers and women. There were no hospitals nearby; the nearest school is quarter mile away from the village. In addition, there are no disaster shelters in the locality.



Fig 2.1.1: Focus group discussion being held with fishermen and farmer group

Occupational Migration

Due to the seasonality of occupations and lack of capital available in the haor areas, poor and landless people migrate to big cities such as Dhaka or Chittagong in the monsoon, to find alternative jobs in construction, coal collection, hauling soil, brick breaking, day labours, etc. Women participants of the FGD have expressed their interest to start their own business, like poultry.



Fig 2.1.2: Focus group discussions with Women and Children

Income

Majority of the people interviewed were single income households, with average income ranging from Tk. 3,000 to 5,000 per month. Sources of income of the households include farming, fishing, small business, day labour etc. It was observed that income during the winter season was higher, because of additional sources of *boro*(winter paddy) farming. Most of the households have little or no income during the rainy season.

Microcredit

Women in the haor area have access to microcredit provided by local NGOs, namely, ASA and CNRS, popularly known as ‘Baro (12) taikkar Shamity’, a part of the IUCN’s co-management project. The project has also provided tailoring training to women and these initiatives have improved their overall financial condition; they are now able to invest in buying livestock and other alternative income generating opportunities.



Fig 2.1.3: Woman raising livestock

Women in general have a positive reflection about borrowing, since they decide the repayment period and interest rates and these loans are more flexible than conventional microcredit or borrowing from local elites. However, there were contradictory opinions amongst the participants, about the repayment schedules and interest rates. A few of the women reported that they are caught up in a vicious cycle, in order to repay loan from one NGO, they often borrow from other NGOs and eventually are never able to recover from this situation.

Policy

In the recent past, little or no relief from the Government was received during disaster events. There are no Government interventions in this village to address vulnerabilities resulting from climatic events (like flash flood). They do not even receive any emergency aid from GOs/NGOs/other sources. Disaster preparedness programs or campaigns have never been carried out in this village. There is a common feeling amongst the people that there is corruption and nepotism regarding the distribution of relief in the villages.

Health security

There is no existing task force or emergency medical services provided by the Government. Groups from “Shabuj Chata” come on a monthly basis, for vaccination along with other groups that speak to women regarding health and livelihood.

Normally, villagers have to travel 5-7 miles to the nearest hospital in Tahirpur and it takes about 2 hours to reach there by engine boat. Medicines and good doctors are not available in this area. Local Muallem provides medication and advice for common ailments from the local village pharmacy. They do not grow herbal or medicinal plants and do not have knowledge regarding their uses.

Child vaccination/immunization is provided by the Government, but they do not maintain the timings. Medical services for pregnant women are not available either. Incidents of sickness vary from household to household and the common ailments are namely: fever, common cold, pneumonia, malaria, diarrhoea, dysentery, gastric and night-blindness. Health costs in terms of medicines, doctor’s fee and days missed at work amount to a total of 1 month every year, valued at Tk. 300- 15000/year.

The only source of pure drinking water is a tube-well and they have to depend on surface water sources otherwise. On an average, they eat two meals a day and this includes rice with chillies, fish. Sometimes in winter, they also have lentils and vegetables.

Occupation and Adaptation

FISHING

There is no radio in the village; people of this village do not use radio to listen to weather forecasts. They do not get any early warnings or campaigns about disasters from any source. News and warning of disasters are mostly conveyed through mobile communication. There are no existing early warning systems for impending disasters; use of indigenous knowledge and word of

mouth works as warning for such events. A change in temperature over the years has not been observed by the people of this village.

Fishing boats are all self-owned, installing engines in them would be a great improvement. The following nets/gear are used for fishing: “Shutar Jaal”; “Jhaap Jaal”; “Garoo Jaal”; ‘Borshi’, ‘Basket’, etc. Changes in species composition have been observed by them, i.e. certain species not as common anymore. Along with reduction in species composition, the following are extinct from the area: Nanid; Moha Shol; Pangash, Garua; Shilon, Bacha, Chital and Baghai.

The fishermen sell all their catch and sometimes retain some for personal consumption. They consider the current co-management system better than the previous leasing system in spite of security problems. Now they can fish with permits, whereas fishing by the locals was completely restricted before. The under water vegetation has also improved in recent years.

HOUSING

Currently soil, tin, *chhon* (thatched roof), wood and bamboo are used to build houses in the locality. These houses need to be repaired once a year. The yearly repairing cost ranges from Tk. 4000 to 5000 (100 ft of stone costs around Tk. 1000). The general opinion was that homes can be made more robust if bricks and cement are used as building materials. The use of stones, trees and plants can protect homesteads from erosion during floods.



Fig 2.1.4: Homesteads protected with stone reinforcements from flood wave action

FARMING

Homestead gardening is practiced in the winter these include crops such as chillies etc. Some of them raise animals. They collect fuel and fodder such as dry leaves, twigs and stems for cooking, along with cow dung.

Rats are pests, as they destroy substantial amounts of crops in the fields and pose as a huge problem. Increase in tree coverage for protection against flooding and storm surge have added to the greenery in the village.

Education / awareness

Most of the people of the village have studied up to class five. They do not listen to local or national news and are thus unaware of issues such as climate change. In fact, they also miss out on local developments and do not know about the programs or projects that have been implemented by the government within the TH area. However, they are interested to know and learn about climate change and disasters.

Ecosystem knowledge

Natural forest cover has increased, leading to an improvement in the natural environment, as result of awareness and education provided by various organisations such as: CNRS, IUCN, GOUS and LEAF. The most important natural resource of the *haor* according to the villagers are the fish and trees. They do not have nurseries and are not trained in nursery development and management techniques. The villagers are interested know more about nurseries.

Historical information

Floods among the most extreme natural disasters took place in 1974, 1988 and 2004. The worst natural disaster (in terms of extent of damage/loss of life/property etc.) was the flood of 2004. The floods impacted the lives and livelihoods, affected fisheries, farming sectors, resulted in loss of homesteads, livestock worth Tk. 100000, according to the participants of the village. No formal coping mechanism apart from storing food, oil, dry foods for children and building false roofs above the flood water level are usually practised by the people. Aid provided by the government was minimal, most were taken by corrupt authorities, and they received only biscuits at one time. Better protection from such disaster events can be provided by building embankments and flood protection walls, plantation of trees etc.

The current coping strategies in the locality include framing the house with bamboo, to protect it from erosion and wave action. Boats are bought or hired during the rainy season, depending on people's purchasing power. There are no flood shelters in the area.

Transport

The only available transport here is boat or the other choice is to set off on foot during winter season. The yearly transport cost for hiring a boat is Tk. 1800- 3600/household and a fixed cost of Tk. 8000 is incurred by boat owners. They think that government intervention is necessary to overcome the problems of commuting.

Crop and Disaster Calendar

The participants were facilitated to prepare a calendar of the local agricultural products and disasters related to the Bangla calendar. They have listed a number of crops that are affected by disasters. According to the informants, early flood (mid March to mid May) severely hampered *boro* production. On the other hand hail storms (mid February to mid May) also hamper their crop production. The people of this locality cannot grow crops from mid May to mid October, due to floods and inundation.

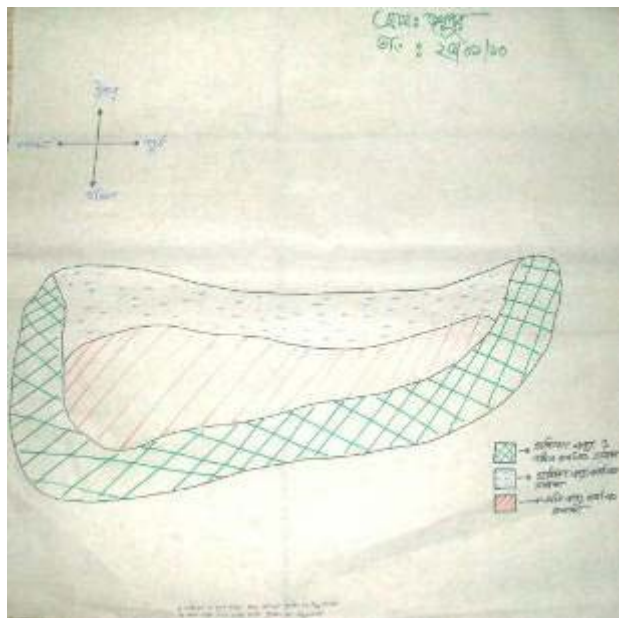
Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Chaitro (Mid Mar- Mid April)
BRRi Dhan 28*	→							→	→	→	→	→
BRRi Dhan 29*	→	→						→	→	→	→	→
Chilli	→							→	→	→	→	→
Coriander								→	→	→	→	→
Bean								→	→	→	→	→
Potato								→	→	→	→	→
Onion								→	→	→	→	→
Garlic								→	→	→	→	→
Disaster	FF+HS +C	FF	FF	FF	FF	FF					FF+HS +C	FF+HS +C

* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone

The participants drew a disaster map and located vulnerable areas of the village by highlighting different types of disasters. The major findings are:

- South, south east and south west part of the village is vulnerable to erosion and is flooded almost every year.
- Normal flood inundates northern part of the village almost every year.
- Height of central area of the village is higher than periphery, which is the worst affected part of the village.



Problem ranking and possible solutions

Ranking	Problems	Possible solutions suggested by the participants
1.	Transport facilities damaged due to flash flood	No suggestions
2.	Houses damaged and crop production hampered due to flash flood	a) Dredging of adjacent river and making embankment b) Constructing protection wall surrounding the village c) Making protection structure by stone and water hyacinth d) Planting swamp trees like <i>Hijal</i> and <i>Karach</i>
2.	Out break of different types of diseases such as diarrhea, cholera, fever etc. during flood and after recession of flood water.	a) Ensuring availability of doctor and medicine
3	Crop (Rice, potato, chili, coriander etc.) production hampered due to hail storm and cyclones	No suggestions

2.2 Village: Jayosree

Union: Dakhsin Sreepur

General Information

The total number of participants, including male, female and other occupational groups was 27. There are about 260 voters in the village and the village covers an area of 10 acres. The nearest hospital is eight miles away in Tahirpur and there were no temporary disaster shelters. Government established high school and primary school was half mile distance from the village. There is a primary school in Goabaripara and there are approximately 100 school going children (girls and boys) in the village.



Fig 2.2.1: Fishermen and Farmer group gathered in the local school for FGD

Occupational Migration

There is no job available during the rainy season in the *Haor* area. Half the year they have nothing to do and hence migrate elsewhere. Primary causes for occupational migration includes landlessness, poverty, lack of fishing permits, natural disasters, etc. Migration due to occupation very low, around 12% of the total population migrate to big cities like Sylhet, Chittagong and Dhaka to work in construction, as soil carriers and brick breakers in construction sites, hauling soil, working in garments, pulling rickshaws, coal collection, etc.

Income

Some of the main sources of income among the households are agriculture/farming, fishing, small business, day labour etc. Average monthly income per household ranges from 3000 to 10000 Tk., and they are mostly single income households. Only around 4% have more than one income earning individual. No occupation or income generating opportunities for women are there, apart from raising livestock. Gender disparity is commonly seen; women earn 60-70 Tk. per day as a day labour, whereas men earn 150-200 Tk. per day. It was reported that income level does not meet spending needs, particularly for food which can be as high as 8000 to 10000 Tk. per month. Thus, they are unable to make any savings for their families.

Microcredit

Women in the village can access microcredit through ASA; this improved their overall financial condition as invested in buying livestock, cattle to be raised for milk and selling. There are also informal loans given out by the elites and villagers often borrow from them. However, the credit that people get is not sufficient to meet their needs and they are of the strong opinion that microcredit repayment schemes are not fair.

Policy

The government doesn't have any interventions at the village/union level to address vulnerabilities resulting from climatic events (like flash flood). NGO's work in the area providing emergency aid, but no preparedness programs in place for disaster events. Moreover, there is no vulnerability reduction strategic plan in place for this village. In terms of policy planning and relief distribution, people's general reflections are strongly negative.

Health Security

No existing task force or emergency medical service. Groups from "Shabuj Chata" come in monthly for vaccination along with other groups that speak to women regarding health and livelihood. Villagers have to travel 7-8 miles to get to a hospital in Tahirpur and in the rainy season, it takes 2 hours to get to the hospital by boat. On foot, it takes 3-4 hours to reach the medical centre. There is a local pharmacy and a "kibiraj" or local healer who provides health advice for common ailments. People have limited knowledge about the herbal and medicinal plants and are interested to learn more about it. Common diseases include common cold, fever, diarrhoea pneumonia, malaria, dysentery, gastric and night blindness. The frequency of getting sick varies from household to household, according to their financial condition. There is no medical service exclusively for the pregnant women.

Nearest source of fresh water is from a tube-well five miles away, thus they depend on surface water sources (haor), which is unhygienic. People drink *haor* water without boiling it most of the time. The diet consists mostly of rice, and leafy vegetables, with occasional mashed potatoes, pulses and fish. On an average, they only eat 2 meals a day.

Occupation and Adaptation

FISHING

Fishermen don't always have radio or television and use mobile telephones to communicate news of impending disasters. Also, they use indigenous knowledge and word of mouth to spread news of possible disasters. No early warning campaigns or programs are in place.

Most of the fishermen use rented boats, hired for Tk. 20 to 30 per day. They use different types of fishing gears and nets, called 'goro jaal', 'fara jaal', 'patni jaal' etc. According to them, fish populations have reduced since the implementation of RAMSAR principles, lack of proper security, illegal fishing etc. The following species have become less abundant than before: Katol, Rui, Ghonia, Shoal, Boal, Gojar, Gagoj and species such as Chitol, Pangash, Moha shoal have become extinct from the area. Other than fish, turtles and 'Shushuk' (dolphins) species have also disappeared over time.

In general, the villagers prefer the current system of co-management, as the previous leasing system provided no opportunities for locals to fish and gain income.



Fig 2.2.2: Subsistence fishing being carried out by a local fisherman

HOUSING

Homesteads are protected by planting Hijal and Karoch and bamboo, to provide a natural barrier. During floods, false roofs (Macha) are constructed inside the homes, as a coping strategy. Women store dry foods and prepare portable stoves for disaster times.

The yearly repairing cost for houses is Tk. 1500 to 3000. The construction materials are mostly bamboo, tin, *chhon* (hay) and wood and so people need to renovate their homes once a year. The villagers are not very clear about dams or flood protection walls, but are keen to know about it.

FARMING

The common varieties of rice crops grown in this area are: BR 29, BR 28, *Boro*, *Shada*, *Boroi Bichi*, *Shail*, etc. BR29 is the most productive variety with 40-50 mound/acre yields. Seeds are bought from the local bazaars, which can be difficult. Farmers store local seed varieties at home for planting at a later time.

Flooding is a huge problem during farming season as submersion of land results in stagnant fields. *Boro Bichi* is well adapted to floods, since the stalk is taller than other varieties and does not get submerged in the flood water easily. Vegetables such as chillies, lao (gourd), kumra (pumpkin), onions, garlic etc. are grown in winter. People grow vegetables in their homesteads for their own consumption.



Fig 2.2.3: Winter vegetables being grown for personal consumption

Ecosystem knowledge

According to the locals, their most important natural assets are fish, forests and birds. Land is also an important resource, as it is scarce. They do not think that migratory birds effect fish populations. Some important fish breeding grounds in the haor are Rupa Bhui and Alamer Duar. There are a number of vegetations that are associated with fish breeding, namely Nol, Khagra, Chyala and Jaol. More fish are caught in the winter due to low water levels.

Historical information

The greatest flood occurred in this area in the year 2004. Every year, in the Bangla months of Chaitra and Boishak (March-April), there are hail storms. The major effects of natural disasters are that houses get damaged and plants are washed away. People put frame of bamboos around the houses to protect it from erosion. They build temporary platforms high above the roof during floods. They buy boats and those who cannot afford it, rent them for movement. A 2 feet high belt of soil is built around the houses for protection.

Rainfall intensity has increased over the past few years and flooding takes place every year with increased water levels. People of the village have expressed their need for a multi-purpose disaster shelter, for better adaptation to extreme events.

Transport

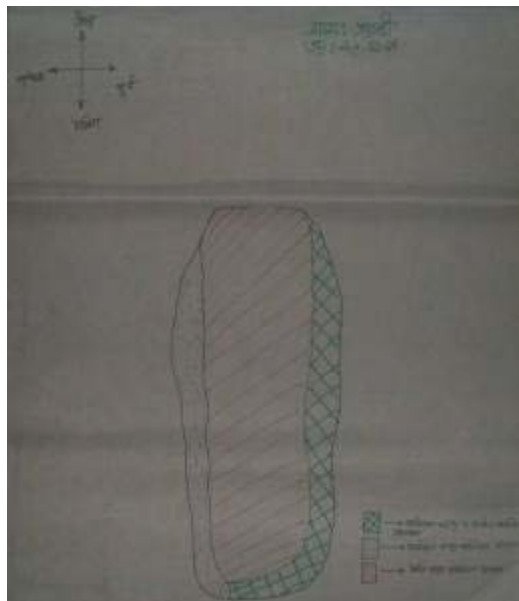
Transportation on waterways is most common in this area and people travel by boat. People spend on an average, Tk. 1,800 to 3,600 as their yearly transportation cost (for rented boats) and up to Tk. 8,000 (for boat owners). Communication takes up a long time for them and they are of view that the Government should intervene in this sector.

Crop and disaster calendar

Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Choitro (Mid Mar- Mid April)
BRRl Dhan 28*	→							→	→	→	→	→
BRRl Dhan 29*	→							→	→	→	→	→
Mongol*	→							→	→	→	→	→
Chilli	→						→	→	→	→	→	→
Ladies finger	→	→									→	→
Bean							→	→	→	→	→	→
Bitter gourd	→						→	→	→	→	→	→
Coriander							→	→	→	→	→	→
Onion							→	→	→	→	→	→
garlic							→	→	→	→	→	→
Disaster	FF+HS +C	FF	FF	FF	FF	FF					HS+C+D	FF+HS +C+D

* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone, D= Drought



The participants drew disaster map and pointed vulnerable areas of the village, prone to different types of disasters. Findings of the map can be summarized as:

- Northern and eastern part of the village is vulnerable to erosion and goes under flood water every year.

- Normal flood inundates western part of the village every year.
- Middle and southern portion of the village is affected by severe flood.

Problem ranking and possible solutions

Ranking	Problems	Possible solutions suggested by the participants
1.	Damage of House hold due to erosion during flood	<ul style="list-style-type: none"> • Making embankment • Constructing protection wall surrounding the village • Planting HIjal, Karach and Haor bon (Special type of plant) to protect the village from afal (High wave action)
2.	Out break of different types of diseases such as diarrhea, cholera, fever etc. during flood and after recession of flood water.	<ul style="list-style-type: none"> • Assuring availability of doctor and medicine during flood and post flood. • Need assistance from GO and NGOs to ensure proper sanitation. • Assuring drinking water availability during flood and post flood situation
3.	Crop production hampered due to drought (Mid March – Mid April)	<ul style="list-style-type: none"> • No suggestion
4.	Unavailability of drinking water during flood and drought	<ul style="list-style-type: none"> • Need more tube well in the village
5.	Boro production hampered by early flash flood	<ul style="list-style-type: none"> • No suggestion
6.	Crop production hampered due to cyclone and hail storm	<ul style="list-style-type: none"> • No suggestion

2.3 Lama Gao, Dakshin Sreepur

26th January 2010

General Information

There were a total of 36 participants in the group, both male and female. The population of the village is around 1,800 and the number of voters is 1,300 approximately. The people consulted had mixed professions, namely fishermen, part time farmers, small business owners, pharmacy owners, vendors and housewives. There are 500 households in the village.

There are two primary schools (government and private) in the adjacent village of Golobar, which is ½ km away. All village children go to school and compared to some other villages in the haor, the literacy rate is higher.

In the village there is no hospital or disaster shelter. The nearest hospital is about 7 to 8 km away. There are 6 local pharmacies which provide medicine for common ailments such as cold and fever. There is also a local *kabiraj* or herbal healer; villagers seek advice from him as well.

Occupational migration

Only a small percentage migrates for work to Dhaka, Sylhet and Chittagong. Mostly poor and landless farmers migrate during the monsoon, for alternative jobs in construction, hauling soil, brick breaking, and working in garments and pulling rickshaws in bigger cities. Gender disparity exists in case of wages as day labourers.



Fig 2.3.1: Focus group discussion being held with mixed group

Income

Average income per household was found to be around Tk. 2000 to 5000, with most families having single income earners. Women have no source of income as there is no work available for them; however they are interested in small businesses and cottage industries.

Microcredit

The villagers have micro-credit access run by the Community Based Sustainable Management of Tanguar Haor project and CNRS locally called '*Baro (12) takar Shamity*'. The system provides loans for setting up shops and for buying fishing gears and boats. However, people suggested that the repayment period for the loans as well as interest rates should be made more flexible. Often, during crisis times, they borrow from the local money lenders or elites or '*mohajon*' which entails very high interest rate.

Policy

No disaster preparedness programmes or campaigns take place in the village. The govt has no interventions at the village or union level to address vulnerabilities resulting from climatic events. This village has no vulnerability reduction strategy plan. People have negative impression about policy planning from organizations or individuals.

Health Security

There is no presence of health security taskforce or committee or working group, such as "*Sabuj Chata*" working for health care in the village. Children have to be taken to hospital for vaccination; the nearest hospital is situated in Tahirpur. It takes a whole day to reach the hospital and get treatment. Medicines or doctors are not available in this area. Pneumonia, malaria, diarrhoea, dysentery, gastric and TB are the common diseases here. The frequency of getting sick varies from household to household, according to their financial condition. There is no medical service for the pregnant women.

There are five tube wells in this village which are the main sources of drinking water. People don't grow herbal or medicinal plants and they have no knowledge about them. There is a local '*Kabiraj*' who collects plants from the haor and provides treatments.

The villagers have to buy vegetables, as they cannot grow them. Each household spends around Tk. 6,000 per month on food. Sometimes, to meet their needs, they take loans from local Chairman and cover food costs. A typical diet consists of 2 meals a day on average, with rice and chillies. Occasionally have small fish like meni/icha/tengra and vegetables, and mashed potato.

Occupation and Adaptation

FISHING

All fishing boats are self owned and fishermen think that these can be improved the longevity of these boats by applying tar coating. Only a few people have fishing permits (around 2-3) and others are keen to be a part of the co-management system introduced in their area.

Most fishers have cell phones, but radio or television is not very popular as a medium of receiving disaster related news. Often, the fishermen don't listen to weather forecasts and even when they do, they still venture out to the haor for sustaining their livelihoods.

Indigenous knowledge is often applied to interpret bad weather and impending disasters. People are not clear about the adaptation techniques and livelihood strategies to respond the changes in climate.

Overall fish population and species biodiversity have reduced in the Haor due to illegal fishing and inadequate security arrangements by the guards and Ansars. According to the people interviewed overall fish population have decreased during the last ten years or so. A number of species such as Chitol, Boro Boal, Boro Rui have become endangered, along with turtles. In stream vegetation such as Nol, Khagra associated with fish habitats have also reduced. The fish species abundant now are mostly small like Meni, Chanda, Lati and Ghoinna. The important fish breeding grounds in the haor include Alamer duar, Roa Beel, Baloer Doba. Although fish catch is higher in winter, due to low water levels, fishing during that time is restricted.

HOUSING

Currently, people live in houses constructed of bamboo, tin, *chhon* and wood. Every year, they have to repair their house, which costs around Tk. 5,000 – 10,000. Wave action and persistent flood waters damage their households and surrounding area. Often they plant trees around the homesteads for more stability and to reduce wave erosion.

The villagers opined that building embankments and flood protection walls will help reduce the damages and these should be made in a way that does not obstruct fish movement. People adopt two coping strategies currently: firstly, they put a bamboo frame around the house to protect it from erosion and during floods, and secondly, construct a high platform where people can stay.



Fig 2.3.2: Homesteads protected with stone reinforcements against wave action and flooding

FARMING

The farmers harvest about 12 to 13 rice varieties such as BR 29, 28, Mongla, Shail, Boro, Lal Dhan. The source of irrigation water is haor and they use pumps and dig canals when water levels are low in the winter. Some of the families raise animals and they also grow vegetables in their homesteads for own consumption.

Ecosystem knowledge

Most important natural resources of the Haor, according to the people are the fish, forest as well as the migratory birds.

Historical Information

Two of the major floods in the area occurred in 1988 and 2004. During this time the village was badly affected, with lack of food and shelter. The major effects of floods and hail storms are that houses are damaged and crops get washed away.

Transport

Boats are most common form of transport and the yearly transportation cost is Tk. 1200-1800 for every person. Travel by boat is time consuming and locals think that govt intervention is necessary in this regard.

Crop and disaster calendar

The participants were facilitated to prepare a calendar of the local agricultural products and disasters responding to the Bangla months. According to the informants, early Flood (Mid March to Mid May) sometimes severely hampers boro production. On the other hand, drought from Mid March to Mid April affects Boro rice and vegetable production.

Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Choitro (Mid Mar- Mid April)
BRRi Dhan 28*	→							→	→	→	→	→
BRRi Dhan 29*	→	→						→	→	→	→	→
shail*	→							→	→	→	→	→
Mongol*	→							→	→	→	→	→
Bean								→	→	→	→	→
Potato								→	→	→	→	→
Bottle gourd							→	→	→	→	→	→
Chili	→	→							→	→	→	→
Onion								→	→	→	→	→
Garlic								→	→	→	→	→
Disaster	FF+HS +C	FF	FF	FF	FF							FF+HS +C+D

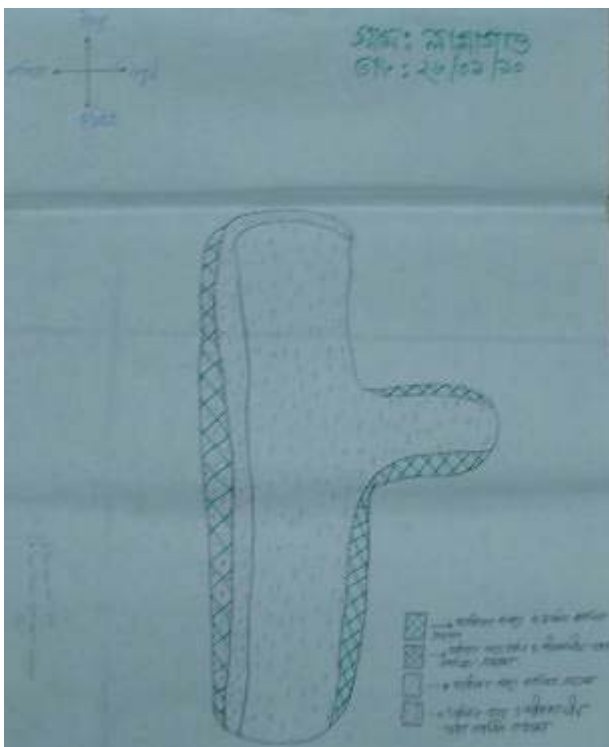
* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone, D= Drought

The participants drew disaster map and findings of the map are given below:

- North east and south east side of the village is affected by soil erosion due to *afal* (high wave action).
- North and West sides of the village are exposed to flood and erosion and often affected by drought during winter.
- The entire village gets inundated by floods almost every year.

Ranking	Problems	Possible solutions suggested by the participants
1.	Boro rice production hampered due to early flash flood	<ul style="list-style-type: none"> • Repairing the embankment at Nazarkhali
1.	Residence of rural people damaged during flood and people have to migrate other places	<ul style="list-style-type: none"> • Constructing protection wall around the village
1.	Boro rice production hampered due to drought	<ul style="list-style-type: none"> • Retain water by making embankment
2.	Break out of diarrhea due to flood	<ul style="list-style-type: none"> • Reactivate health centers at union level
2.	Crop production hampered due to cyclone and hail storm	<ul style="list-style-type: none"> • No suggestion



2.4 Ramshingpur, Dakshin Sreepur

26th January 2010

General Information

There were a total of 25 participants, both male and female. The predominant occupation in this village is fishing or farming. The total population is about 600, with 180 households. There are two primary schools, one government primary school and 1 temporary school, with about 200 students, and more girls than boys. There is no hospital and disaster shelter in the village.

Occupational migration

In this area people have no job during the rainy season and almost over half of the year they remain unemployed. Around 50% of the total population migrate for work as day labourers to Dhaka, Syhet and Chittagong during monsoon season.



Fig 2.4.1: Focus Group discussions being held with women and children group

Income

The male is the head of the household and during the rainy season most of them do not have any income. The average income of each household is about Tk. 4500 per month; however this does not meet costs of living and often they end up borrowing from informal money lenders such as the 'mohajon'. A loan of 1000 tk has a high interest rate with payments as high as 100tk per month or 1500tk after six months.

Microcredit

In this village people get micro credit from different NGOs like Grameen Bank, ASA and CNRS and BRAC, which especially provide loans to the women. They used their loans to set up shops, buy fishing nets and boats. Around four women of this village have successfully utilized microcredit and opened up small businesses, earning up to Tk. 4000 per month. However, the general impression of people regarding microcredit is that the repayment cycles are too short, with high interest rates and this often pushes them further into the downward spiral of poverty.

Policy

No government organisations or structure is there at present, to tackle disasters or post disaster situation. Due to the geographical remoteness of the haor area, villagers think that they do not always receive relief or aid sent for them. There are no existing shelters in the area and during floods, they take shelter in Tekerhaat.

Health Security

Children get regular vaccination from the government. The nearest hospital is in Taherpur and it takes 2 to 3 hours to reach there on foot and one and a half hour by boat during the rainy season. There are more than 3 pharmacies locally and people buy medicine from there, along with consulting the herbal healers or '*Kobiraj*'. The most common diseases in this locality are diarrhoea, malaria, pneumonia, fever, dysentery and gastric. One of the biggest problems reported during the discussion is that often pregnant women have miscarriages or even die on the way to the hospital.

Occupation and Adaptation

FISHING

Around 60% fishermen in the village have their own boats and they catch fish both for selling and their own consumption. People in the village have access to TV and radio, but they don't listen to the news or weather forecasts.

Villagers here have noticed changes in species composition over the years. Fish species such as *chitol*, *kali baush*, *rani*, *nanid* and *mashul* are extinct now. Wetland vegetation, namely *Nol* and *Khagra* that are also directly linked to fish productivity have also declined.

HOUSING

Houses are made of bamboo sticks, tin, *chhon* and wood and protected by planting trees around the compound and tying bamboo poles for reinforcement. These cost about Tk. 2000 to 2500 every year.

Flood protection is also done at a village level, by using stones to protect the homesteads and villages from wave action. This is more sustainable than any other solution, but the costs are as high as Tk. 30000 to 50000 for repair, rebuilding and maintenance after every major flood.

FARMING

The most common varieties of rice cultivated here are BR 29, BR 28, Mongla, Shail and Boro. Some people raise animals such as cattle and ducks and use cow dung later as a source of fuel.

Ecosystem knowledge

Land is considered to be the most important resource in this village. The villagers realize that biodiversity loss is a major problem and that they have no medicinal plants that grow in their locality.

Historical Information

The greatest disasters took place in this village in the year 1988, 1995 and 2004. Coping strategies practiced here are storing food, building false roof or “Macha” above water level, etc.

Transport

Boat is the only form of transport in this village.

Crop and Disaster Calendar

The participants were facilitated to prepare a calendar of the local agricultural products and disasters regarding to the Bangla months. There they listed number of crops with their period of production and showed how production is hampered by different types of disasters. The people of this locality can not go for cultivation from mid May to Mid October due to inundation.

Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Choitro (Mid Mar- Mid April)
BRRl Dhan 28*	→							→	→	→	→	→
BRRl Dhan 29*	→							→	→	→	→	→
shail*	→							→	→	→	→	→
Bean								→	→	→	→	
Potato								→	→	→	→	
chili	→						→	→	→	→	→	→
Radish								→	→	→	→	
Amaranth	→	→						→	→	→	→	→
Onion								→	→	→	→	→
Garlic								→	→	→	→	→
Disaster	FF+HS +C	FF+C	FF	FF	FF	FF					D	FF+HS +C+D

* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone, D= Drought



Fig 2.4.2: Disaster map being drawn

Ranking	Problems	Possible solutions suggested by the participants
1.	Boro rice and other crop damaged due to early flash flood	<ul style="list-style-type: none"> • Dredging of canal and constructing sluice gate • Constructing embankment
2.	Residence of rural people damaged during flood	<ul style="list-style-type: none"> • Constructing protection wall around the village • Developing swamp forest
3.	Damage of crop and houses due hailstorm and cyclone	<ul style="list-style-type: none"> • No suggestion
4.	Crop production hampered due to drought	<ul style="list-style-type: none"> • Arranging deep tube well for people
5.	Out break of diarrhea due to scarcity of drinking water during flood	<ul style="list-style-type: none"> • Need training on making saline and other medicine. • Need more tube well

2.5 Mujrai, Uttar Sreepur

27th January, 2010

General Information

The total number of participants in the group discussions carried out in the village was 24, composed of fishermen, farmers and housewives. The total population is about 300, with 100 voters and 37 households.

There is no hospital in the village or a disaster shelter. There is one temporary primary school with 30 to 35 students, around a mile away from the village. The nearest hospital is in Sreepur and is 2.5 miles away.

Occupational migration

Around 30 people migrate for work to Sunamgang and Sylhet, as reported by the participants. Since there are no available jobs in the rainy season, they do small businesses and work as day labourers for stone breaking.

Income

The most common occupations are fishing, day labour and selling the coals collected from the haor while fishing. Average income of the villagers has been recorded at Tk. 4000 - 6000 per household per month. The male is the head of the household, but majority of the families have 2 income earning members. However, income is significantly less during monsoon, when the land is submerged and unsuitable for farming.

Microcredit

About 50% of the women are given microcredit through ASA, BRAC, and CNRS. They invest the money for buying livestock and poultry for raising and selling. They think repayment period and interest rates are okay.

CNRS has started a *Shamity* or cooperative in the village, which is locally called 'Baro (12) takar Shamity'. The system helped the local people and they have set up small businesses and invested in fishing gears.

Policy

During the 2004 flood, the villagers received relief amounting to 8kg of rice per family. They also received some aid from the government to repair their houses after the disaster.

Health Security

In general, the villagers (per family) have to spend Tk. 2000 to 5000 every year on medical costs. Although the government provides healthcare for pregnant women and vaccination for children, it is not adequate to meet their needs. Common or frequent diseases include diarrhoea, fever, etc. There is a Health Clinic named Sripur Health Clinic and it takes an hour to get there on foot.

There is only one tube well, which is the source of fresh drinking water. They eat three meals a day; the diet consists of mainly rice and fish, as vegetables are not readily available.

Occupation and Adaptation

FISHING

Fish diversity have largely reduced in the haor area and a number of fish species such as *Chitol*, *Pangash*, *Pabda*, *Boro Icha*, *Gulsha*, *Ayer*, *Elong*, *Rani*, *Nanid*, *Bacha*, *Gaura*, *Kajoli*, *Filon*, *Nali*, *Chirail* and *Mashul* have become almost extinct. Fishermen mainly use 'shuta jaal', 'Dhorijaal' and 'Lorijaal' to catch fish. All fishermen own boats which cost about Tk. 3,000 – 5,000 to operate.

There are 3 or 4 radios in the village and they listen to the news regularly. Use of radio and TV and word of mouth are the most common means to communicate signals of upcoming disasters.

HOUSING

Wave action during floods hit the strongest from the northern side, bordering the river Maram. Homesteads are protected by planting trees and flood protection walls made of stones. The protection wall requires regular maintenance and especially after a flood, repair and rebuilding costs can be as high as Tk. 50,000. People have suggested that building side walls and embankments can help reduce flood damage in their village.

FARMING

The farmers usually cultivate the following varieties such as; BR 29, BR 28. Farmers reported that, the attack of rats in the paddy field has been a huge problem for the last 5 years, destroying almost all the yield. They seek advice and assistance to control the pest attack in future. In late autumn, they grow vegetables in their homesteads for consumption, but during other seasons they need to buy them from the market.

Fuel is collected from the forest (dry leaves, stems etc) and cow dung is also used as fuel. In monsoon, fuel collection is difficult and they buy them from the local markets.

Education / awareness

The people in this village are well aware of the benefits of education not only do they send their children to the schools, but also hire private tutors for them. The tutor is paid 50tk for each Class-V student and 20tk for Class-I or Class-II student.

Ecosystem knowledge

Tree cover and forests have reduced significantly according to the villagers. Since the ban imposed on hunting birds, population of migratory species have increased. 'Kachhim' and 'Shingra' (*paanifol*) which were once common in the area are now on the verge of disappearing.

Historical Information

Two of the most severe floods occurred in this area in the years 1988 and 2004. Floods seriously affect their livelihoods; damaging their livestock and fodder. The people store away dry food items like *chira/muri* (puffed rice) and fuels for use during floods.

Transport

The only transportation available is rudimentary boats, made locally for movement.

Crop and Disaster Calendar

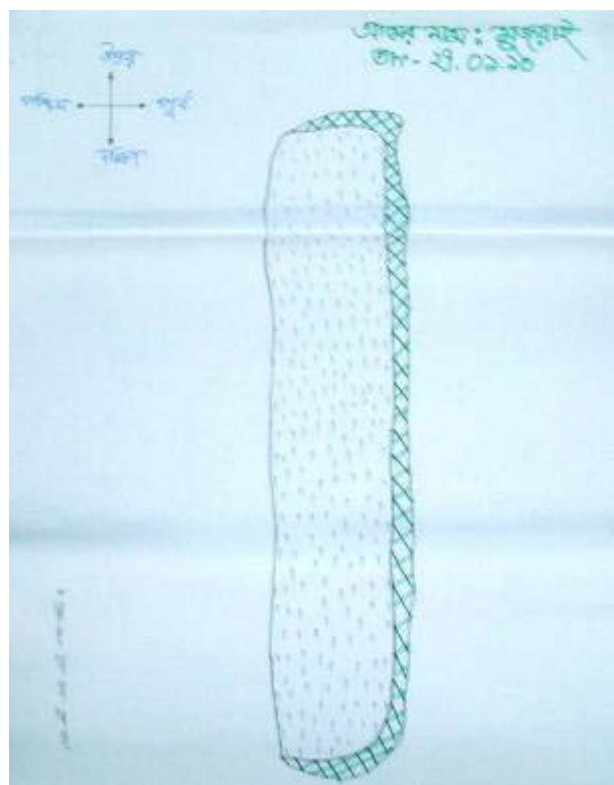
Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Chaitro (Mid Mar- Mid April)
BRRi Dhan 28*	→							→	→	→	→	→
BRRi Dhan 29*	→							→	→	→	→	→
shail*	→							→	→	→	→	→
Coriander								→	→	→	→	→
Chili	→							→	→	→	→	→
Tomato								→	→	→	→	→
Potato								→	→	→	→	→
Egg plant								→	→	→	→	→
Bean								→	→	→	→	→
Disaster	FF+HS +C	FF+HS +C	FF	FF	FF							FF+HS +C

* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone

Ranking	Problems	Possible solutions suggested by the participants
1.	Residence of people damaged and Boro rice production hampered due to early flash flood	<ul style="list-style-type: none"> • Embankment is necessary to protect crop from flood • It is necessary to construct protection wall in east, north and south part of the village to protect village from erosion.

Ranking	Problems	Possible solutions suggested by the participants
2.	Break out of different types of diseases during and post flood situation	<ul style="list-style-type: none"> • It is necessary to ensure availability of medicine and doctor.
2.	Crop production hampered due to cyclone and hail storm	<ul style="list-style-type: none"> • No suggestion
3.	Scarcity of drinking water due to flood	<ul style="list-style-type: none"> • It is necessary to increase the number of tube well in the village
3.	Transport facilities become worst during flood	<ul style="list-style-type: none"> • No suggestion



2.6 Patapuka, Dakhhin Sripur

23rd February 2010

General Information

A total of 26 people from this village were consulted during the FGD and they were from three different occupational groups, farmers, fishermen and women. About 80% of the total population of the village are farmers and the remaining 20% includes fishermen and small businesses.

In this village, there is only 1 government primary school, with 400 students, 250 of whom are girls. The reason for higher school attendance by girls was attributed to the fact that boys often have to help their family in the agricultural field or businesses from a very early age.

There are no *Madrasas* or local markets and there was 1 hospital in the past, which served as a disaster shelter. The participants requested for a ‘multi – purpose school cum disaster shelter in their village’ for their overall socio-economic improvement and security.

Occupational migration

The small and landless farmers and fishermen often lack the capital to sustain their activities and natural disasters and corruption hinder their developments. A good number of people migrate to Chatak, Sylhet, Volaganj, Chittagong and Dhaka during monsoon, for alternative jobs in construction, hauling soil, brick breaking, and working in garments, pulling rickshaws in bigger cities.



Fig 2.6.1: FGD being held with women and children group

Income

All households are dominated by male and they are the sole decision makers in the family. The average income per household ranges from Tk. 500-1200 (per month). It was shared by the informants that the income is higher in winter and summer than monsoon. The main sources of income among are agriculture, fishing, trading and day labourers. The income earned is meagre and hence they cannot save any money after meeting their subsistence household needs.

There are disparities among the wages of men and women labourers. Housewives are engaged in tailoring and sewing and are really interested to start their own business, like poultry farms, duck farms, etc.

Microcredit

People of this village take loans from different agencies such as BRAC, Grameen Bank, IRA and ASA for business and agricultural activities. CNRS has also started a *Shamity*, which is locally called 'Baro (12) takar Shamity'.

They obtain loans from Tk. 3000 to 4000 and repayment is on a weekly basis (collected every Monday). For every Tk. 1000, there is an interest rate of Tk. 100 and this is perceived to be very high by the borrowers. The villagers, with the help of CNRS have created a 'cooperative society' to go for self help credit program, to improve their livelihoods.

Policy

No relief was received during disasters events; they were usually stolen or taken illegally by the village authorities and never reached the villagers. No government interventions in addressing vulnerabilities or emergency aid are received.

Health security

No existing task force or emergency medical service. Groups from "*Shabuj Chata*" come in monthly for vaccination along with other groups that speak to women regarding health and livelihood.



Fig 2.6.2: Vaccination being given at the local school

People from this village have to travel 5-7 miles to the nearest hospital in Tahirpur and it costs Tk. 100 per person on a motorcycle in winter. Common diseases include diarrhoea, common cold, fever, stomach pain, cough, pneumonia, gastric etc. At least 2 times in a year they suffer from common health problems. Villagers want additional services such as free medicines and consultations for expecting mothers.

Only source of pure drinking water source is a tube-well, which is not sufficient to cater to the needs of the huge population of the village. They have to depend on surface water, when the tube well is not functional and this is risky and unhealthy. They eat two meals a day on average; this includes rice with chillies, small fish (*icha, titni, potka*) and sometimes vegetables if it is available in the winter.

Occupation and Adaptation

FISHING

Along with reduction in species composition, the following are extinct from the area: *Nanid; Moha Shol, Pangash, Bacha, Boal, Baush* etc. They sell all of their fish catch and occasionally keep some for their own consumption. According to the villagers, fish populations are declining due to illegal fishing and overfishing. They consider the current co-management system better than the previous leasing system.

People here listen to radio and watch TV and get news of floods or other disasters.

HOUSING

Currently soil and bamboo is used to build houses. These costs around Tk. 1,500 per house. In order to protect homesteads from flood and wave action, they use stones, trees and plants as natural barriers.

FARMING

The farmers of the village cannot grow more than one rice crop in a year due to inundation of agricultural land for 5-6 months. They mainly grow *boro* season rice such as BRRI *dhan 29*, BRRI *dhan 28, Shail, Mongol*, etc.

During winter when the land becomes dry, they cultivate some vegetables like red amaranth, bottle gourd, etc. Farmers of this village depend entirely on chemical fertilizers and insecticides and it is difficult for them to get access to these agricultural inputs in the rural areas. The farmers also shared their observation that the productivity of land is decreasing day by day due to excessive use of chemical fertilizers. Therefore, they need training on bio fertilizer and Integrated Pest Management (IPM).

The farmers have no access to agricultural land during monsoon, they are also interested in alternative methods of cultivation such as floating gardens, using the hydroponics technology and locally known as *baira*. They have requested for more outreach and training from the Department of Agricultural Extension (DAE) at the union level.

Historical Information

In this village, normal floods hit every two years. Floods of unnatural extent and magnitude occurred in 1974, 1988, and 2004. They recommended that better protection from such disaster events can be provided by building embankments, planting trees to create a green belt, etc.

Adaptation to disasters

The people of this locality have to face different types of disasters like flash flood and hail storm. Early flash floods occur during Chaitra-Boishak and destroy the paddy. The flood water levels rise from *Asar* to *Vadro* and this damages people's houses. Often they have to relocate temporarily from their village due to erosion and waterlogging.

Following the floods, outbreak of different types of water borne diseases affect humans and livestock alike, causing death and morbidity. Women, children and the elderly are the worst victims and it is almost impossible to take pregnant women to the hospital or health clinic due to poor communication network.

People adapt to floods through their own means, making flood protection walls (made of stones), planting trees and weeds around their houses to protect it from high wave action (afal) and storing dry food like rice and chili for the lean times.

2.7 Antarpur, Uttar Bangshikunda

24th February 2010

General Information

A mixed occupational group of 15 people participated in the FGD that was carried out in the village. Most of the people in this area are fishermen and there was 1 woman who was a graduate. Total population of this village is approximately 800, with about 250 voters. There is no hospital in this village. The nearest hospital and primary school is in the adjacent village of Nawabpur, which is about 1 km away.



Fig 2.7.1: FGD being held with a mixed group of villagers

Occupational migration

Similar to other villages in the haor, during the rainy season people have almost no work here and they migrate to Dhaka to work in the garment factories. They also migrate to other parts of the country such as Sylhet and Chittagong, for alternative jobs in construction, hauling soil, brick breaking and rickshaw pulling.

Income

The average monthly income of the households is about Tk. 5000-7000 and for day labourers it is about Tk. 100-150 per day.

Microcredit

Almost 80% of the people in this village depend on loans or microcredit. The sources of micro credit are ASA, BRAC, Grameen Bank, ERA and the Community Based Sustainable Management of Tanguar Haor project.

Health security

There is no hospital in this village, but ‘*Shobuj Chata*’ and government vaccination programmes provide health services to them. Diarrhoea, malaria and pneumonia are the most common diseases that occur in this village.

The villagers are not aware of the use of medicinal plants and go for allopathic treatments only. Their diet consists of rice and chillies and occasionally they have fish and vegetables.

Occupation and Adaptation

FISHING

Almost every fisherman in this village owns a radio and they listen to weather forecasts. People are of view that the overall fish population has decreased over the past few decades. Fishes like *puta*, *pangas*, *Rani* and *Katla* have become extinct. Wetland vegetations such as *Nol*, *Khagra* that are associated with fish habitats have also become less abundant.

HOUSING

Normally, homesteads are protected by planting trees and bamboo around the homes. People think that their houses can be made more robust by raising the plinth and using cement to the mixture. Every year, after the flood waters recede, they spend around Tk. 2,000 – 5,000 for repairing their homes. They also store rice and food before floods, in the *macha* or false ceiling of their homes.

FARMING

The main cropping period for rice is from the Bangla months of *Kartik* to *Falgun* (January – February). They normally harvest 12 to 13 rice varieties of rice, including both local and indigenous varieties as well as HYV. The varieties grown by them are BR 29, BR 28, *Mongla*, *Shail*, *Boro*, *Lal Dhan* etc. Pest infestation is a major problem here and an insect named *Mazra* affect crop yields.

Historical Information

Heavy floods occurred in the following years in the area: 1974, 1988 and 2004. During this time the villagers were badly affected with lack of food and shelter. They recommended that a ‘multi-purpose shelter’ could be constructed in their village, which could serve the purpose of a disaster shelter, a growth centre, a place for selling farmers’ agriculture produce and so on. This shelter, according to them, could also help villagers from surrounding villages, as they can also come here to trade or take refuge during disasters.



Fig 2.7.2: Plantation of Hijal trees

Transport

Boat is the only form of transport in this area.

Crop and Disaster Calendar

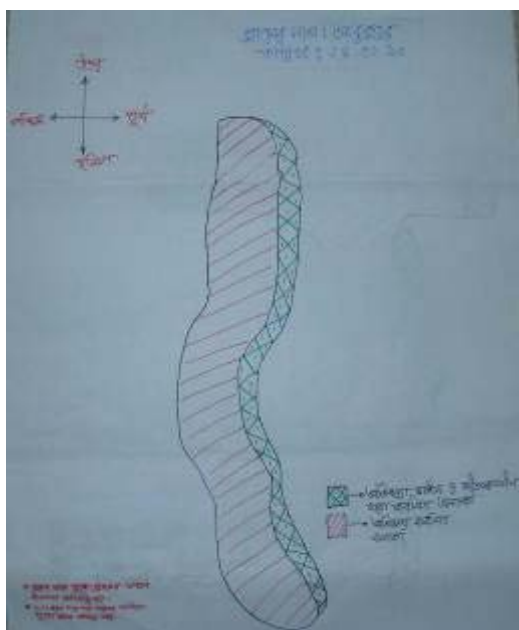
The participants were facilitated to prepare a calendar of the local agricultural products and disasters related to the Bangla months. There they listed number of crops with their period of production and showed how production is hampered by different types of disasters.

Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Choitro (Mid Mar- Mid April)
BRRi Dhan 28*	→							→	→	→	→	→
BRRi Dhan 29*	→							→	→	→	→	→
Gochi*	→							→	→	→	→	→
Potato							→	→	→	→		
Bean							→	→	→	→	→	→
Egg plant							→	→	→	→	→	→
Bottle gourd							→	→	→	→	→	→
Chilly							→	→	→	→	→	→
Garlic							→	→	→	→	→	→
Onion							→	→	→	→	→	→
Disaster	FF+HS +C	FF	FF	FF	FF						D	FF+HS +C+D

* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone, D= Drought

Ranking	Problems	Possible solutions suggested by the participants
1.	Boro rice production hampered due to early flood during Mid March to Mid May	<ul style="list-style-type: none"> • Embankment is necessary to protect crop from flood
2.	Crop production hampered during Mid March to Mid May due to cyclone and hail storm	<ul style="list-style-type: none"> • People have no idea on coping mechanism
3.	Damage of houses occurred due to erosion during flood (mainly mid June to mid August)	<ul style="list-style-type: none"> • It is necessary to establish protection wall and shelter centre.
3.	Scarcity of drinking water and irrigation water due to drought	<ul style="list-style-type: none"> • It is necessary to raise the height of embankment surrounded the beel • Drought tolerant crops should be introduced • Deep tube well can solve the problem
3.	Death of human and animals due to flood is a problem	<ul style="list-style-type: none"> • Need instant treatment facilities with in the locality



2.8 Nobabpur, Uttar Bangshikunda

24th February, 2010

General Information

The group consulted here was composed of farmers and women, a total of 20 participants. In this village, there is one primary school with 300 students. There is one village doctor (paramedic) and one pharmacy in the local market. The nearest hospital is in Tahirpur, which is 15 km away. There are approximately 1000 voters.

Men are mainly involved in agriculture; apart from that they are more or less engaged in fishing. Obstacles related to occupation included landlessness and natural disasters.

Occupational migration

A small percentage of mostly poor and landless migrate during the monsoon for alternative jobs in construction, hauling soil, brick breaking, and working in garments, pulling rickshaws in bigger cities such as Dhaka or Chittagong, Tangail and Sylhet.

Income

Monthly income of the each household is Tk. 3,000 and farming is the only source of income. Women are mostly housewives and they are not involved in any income generating activities. Gender disparity is commonly seen in case of working women; females earn Tk. 60-70 per day as day labourers, whereas men earn Tk. 150-200 per day.

Microcredit

Women take loans from ASA, CNRS, Grameen Bank and BRAC and in most cases they spend the money to meet their family expenses.

Policy

No relief is normally received by them during disasters. No government interventions are there for addressing vulnerabilities or emergency aid received from NGO's. There is no rehabilitation programme or disaster shelter in this area.

Health Security

The familiar diseases here are Diarrhoea, Malaria and pneumonia. Here is no government taskforce like '*Shobuj Chata*'. For every family, the yearly medical treatment costs range from Tk. 5,000-7,000. There is a "kabiraj" or local healer providing health advice to the villagers.

A typical meal consists of mostly rice and chillies and occasionally fish and vegetables.

Occupation and Adaptation

FISHING

The fishermen use different types of nets called ‘*goro jaal*’, ‘*fara jaal*’, ‘*patni jaal*’, ‘*Thehajal*’, etc. Species like *Nanid*, *Bacha*, *Putra*, *shorputi* and *Katol*, *Rui*, *Ghonia*, *Shol*, *Boal*, *Gojar*, *Gagoj* and *mrigel* have become extinct and trees like *Hijol* and *Koroch* are under the threat of extinction. Sometimes, fishermen catch fish for their personal consumption as they can’t afford to buy fish from the market.

Radio and television is not always accessible, thus they use mobile phones to communicate news of impending disasters. They also use indigenous knowledge and word of mouth to spread news of possible storms.

HOUSING

Homesteads are protected by planting various plants such as *Hijal* and *Karoch* and bamboo, to protect the homesteads from wave action. They think that households can be better protected only if concrete and cement is used for building. As an adaptation measure, they build false roofs (*Macha*) for storage during floods.

FARMING

The varieties of rice grown here are BR 29, BR 28, *Boro Bichi* and *Shail*. *Boro Bichi* is well adapted to floods; because of its height (stalks are taller than other rice varieties). In winter, vegetables such as chillies, Lao, Shim, Kumra, Onions, Garlic etc. are also grown. Fertilizers like urea, TSP, insecticides are applied in the field. Straw, wood and cow dung collected from the agricultural wastes are used as fuel for cooking.

Historical Information

The biggest floods took place during the year 1974 and 2004. People are of view that floods do not damage their houses, since they have made the surrounding protection wall around the village.

Crop and Disaster Calendar



Fig 2.8.1: Disaster mapping

Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Choitro (Mid Mar- Mid April)
BRRl Dhan 29*	→							→	→	→	→	→
BRRl Dhan 28*	→						→	→	→	→	→	→
Shail	→							→	→	→	→	→
Potato							→	→	→	→	→	→
Chili								→	→	→	→	→
coli flower							→	→	→	→	→	→
Cabbage								→	→	→	→	→
Tishi								→	→	→	→	→
Coriander								→	→	→	→	→
Disaster	FF+HS +C	FF	FF	FF	FF	FF				I	D+FF	FF+HS +C+D

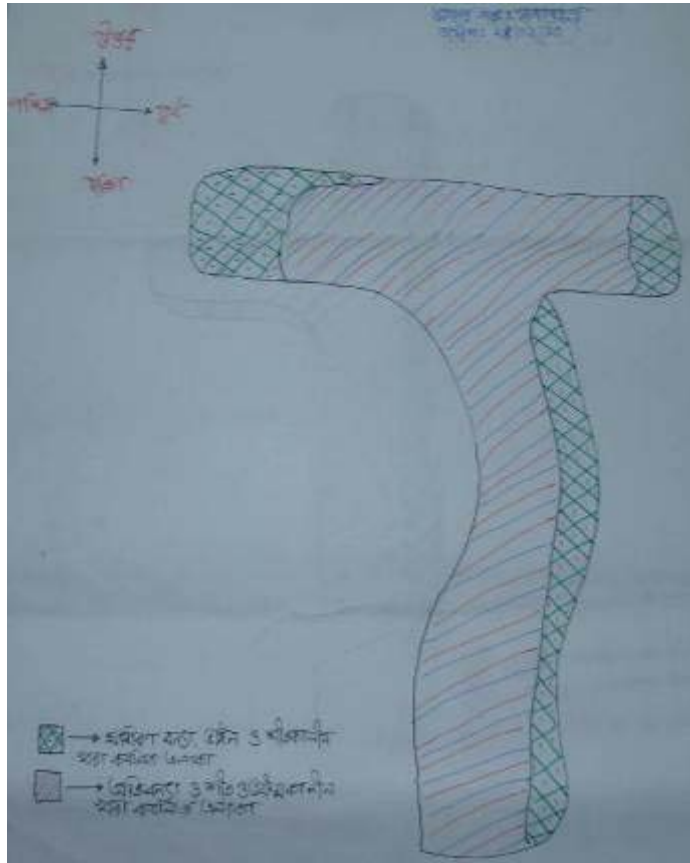
* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone, D= Drought, I= insect infestation

Ranking	Problems	Possible solutions suggested by the participants
1.	Boro rice production hampered due to early flood during Mid March to Mid May	<ul style="list-style-type: none"> • Embankment is necessary to protect crop from flood
1.	Damage of houses occurred due to erosion during flood (mainly mid June to mid August)	<ul style="list-style-type: none"> • It is necessary to establish protection wall and shelter centre.
2.	Crop production hampered during Mid February to Mid April due to drought	<ul style="list-style-type: none"> • It is necessary to install deep tube well in the locality.
3.	damage of houses and crops due cyclone and storm	<ul style="list-style-type: none"> • People have no idea on coping mechanism

Findings from the map can be summarized as:

- East and some portion of western part of village are vulnerable to erosion due to high wave action (afal) and inundated by normal flood.
- The entire village is inundated by severe flooding.



2.9 Rongchi, Dakshin Bangshikunda

24th February, 2010

General Information

A total of 37 people participated in the FGD at Rongchi. The total population of the village is approximately 1800 and 200 children go to school here (out of which 60% are girls and 40% are boys). In this village there is no disaster shelter or hospital. There is one primary school.

Occupational migration

People find no work during the rainy season here and they migrate to other places such as Dhaka, Sylhet, Chittagong and Jaflong mainly during the month of 'Ashar', to work as day labourers. These people are mostly poor and landless and migrate during the monsoon for alternative jobs in construction, hauling soil, brick breaking, working in garments, pulling rickshaws in bigger cities, etc. About 700 people migrate every year from this village alone.



Fig 2.9.1: FGD being held with women and children group

Income

Monthly income of the each household is approximately Tk. 6000. Male is the head of the family, but women also participate in the income generating activities. They help out in the agricultural fields and work in other people's homes for carrying out household chores, which fetches them a modest income.

Microcredit

ASA, BRAC, Grameen Bank, CNRS and ERA are the main microcredit service providers in this village. Women are the main beneficiaries of loans and they usually use the money to start micro business or poultry farms in their courtyards. An international NGO named CONCERN helped the villagers through one of their projects, to reconstruct and repair their homes.

Health Security

In the union this village is situated in, there is a hospital, but there are no doctors on duty and there are no paramedics as well. Child vaccination programmes are however carried out from time to time. To get to the nearest hospital, they have to travel to Tahirpur, Kalmakanda or Dharmapasha. The most common diseases are malaria, whooping cough, pneumonia and small pox.

There are no herbal healers in the village, to treat ailments with traditional remedies. However, they are familiar with the use of medicinal plants such as *Tulshi* (basil), which they consider as sacred and use to treat common cold and flu.

Rice and *dal* (lentils) is the main meal of the people here, with chillies. They depend on tube wells for drinking water.

Occupation and Adaptation

There are radios and TVs in this village. People spread the news of disaster signals through oral communication.

HOUSING

Every year floods damage the homes in this village. The annual repairing costs per house ranges from Tk. 8,000 to 10,000. Bamboos, grasses and woods are used to protect houses from floods. Their coping method also includes storing rice and food before floods. The suggestion from villagers was to build a flood protection wall to reduce the extent of damage in the village.

FARMING

BR 28 and BR 29 are the main crops that are grown by the farmers. They use urea, TSP and insecticides in the fields and get 40 kg of rice per acre yield. Haor water is the source of irrigation, which is channelled through canals dug by them. They also plant vegetables in the dry season, grow seasonal local fruits as well as medicinal plants like *neem*.

Historical Information

Heavy floods occurred in 1988 and 2004, when people were homeless and lost their livelihoods. In future, people have recommended raising the height of the plinths, so that flood waters do not inundate their homesteads.

Transport

Boat is the only transport during the rainy season and during the dry season they walk on foot.

Crop and Disaster Calendar

The participants were facilitated to prepare a calendar of the local agricultural products and disasters responding to the Bangla months.

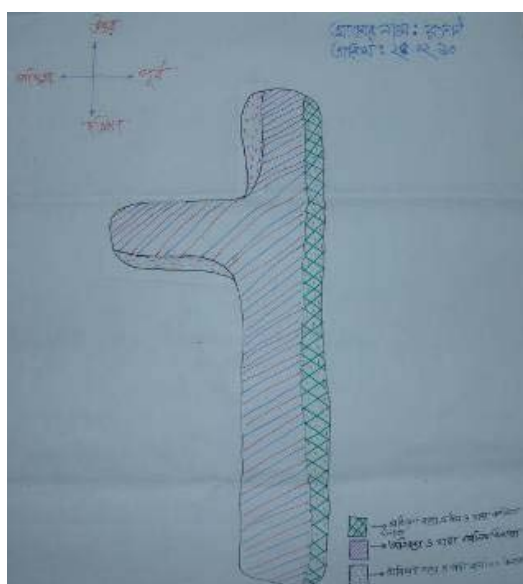
Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Choitro (Mid Mar- Mid April)
BRRi Dhan 29*	→							→	→	→	→	→
BRRi Dhan 28*	→							→	→	→	→	→
Mongol*	→							→	→	→	→	→
Anamma*	→							→	→	→	→	→
Mustard								→	→	→		
Potato								→	→	→	→	
Onion								→	→	→	→	
Chili	→							→	→	→	→	→
Garlic								→	→	→	→	→
Egg plant	→							→	→	→	→	→

Months→ Crops ↓	Boishakh (Mid April-Mid May)	Joisthho (Mid May- Mid June)	Ashar (Mid June- Mid July)	Srabon (Mid July- Mid Aug)	Bhadro (Mid Aug- Mid Sept)	Asshin (Mid Sept- Mid Oct)	Kartik (Mid Oct- Mid Nov)	Agrahaon (Mid Novl-Mid Dec)	Poush (Mid Dec- Mid Jan)	Magh (Mid Jan- Mid Feb)	Falgun (Mid Feb- Mid Mar)	Choitro (Mid Mar- Mid April)
Disaster	FF+HS +C	FF	FF	FF	FF					I+D	D+FF+I	FF+HS +C+D+I

* Rice varieties

FF= Flash flood, HS= hail Storm, C= Cyclone, D= Drought, I= insect infestation

SL. No.	Problems	Possible solutions suggested by the participants
1.	Boro rice production hampered due to early flood during Mid March to Mid May	<ul style="list-style-type: none"> • Embankment and sluice gate is necessary to protect crop from flood
2.	Damage of houses occurred due to erosion during flood (mainly mid June to mid August)	<ul style="list-style-type: none"> • It is necessary to establish protection wall and shelter centre.
3.	Out break of different diseases during flood	<ul style="list-style-type: none"> • It is necessary to establish a health clinic near to the village
4.	Damage of rice and Rabi crops due to high pest infestation during Mid January to Mid April	<ul style="list-style-type: none"> • Training on IPM (Integrated Pest Management) will be helpful to solve the problem
5.	Crops and houses damaged due to cyclone and hail storm	<ul style="list-style-type: none"> • No idea about coping mechanism
6.	crop production hampered due to drought (Mid Jan to mid April)	<ul style="list-style-type: none"> • Digging ponds and canals • Installing deep tube well



CHAPTER 3

SYNTHESIS AND INTERPRETATION OF RESULTS

In this chapter, an attempt has been made to synthesize all the information collected on various socio-economic, environmental, and other disasters related issues, described in detail in the previous chapter. The table (Table 3.1) provides a snapshot of people's vulnerability to disasters, induced shocks, level of impact and adaptation mechanisms. Further to that, the major highlights of the findings under each dimension have been presented in this chapter.

Table 3.1: Major assets of the poor and vulnerability impacts (+ = less impact; ++ = medium impact & +++ = large impact)

	Control and Access over Resources (Yes, No, Limited)	Impacts on vulnerability (+, ++, +++)
Social Dimensions - food supply - clothes - transport - health/vaccination - social safety nets/dynamics - education/knowledge - information -governance (disaster management committee) - local networks or <i>samiti</i>	Yes Yes No Limited Yes Yes Yes Yes	+ + +++ ++ + + + +
Economic and Livelihoods - money - equipment - credit/microcredit - raw materials - fishing nets/gears - boats - capital - land rights - fishing rights (permits) - skills - marketing of products - extension services from the local government	Yes Limited Yes	+ ++ +
Environmental Aspects - water - seeds - fertilizer - pesticides - water from haor	Yes Limited Yes Yes	+ ++ + +

3.1 GENERAL

Stakeholders consulted

The total number of community members consulted through FGDs was about 244. Out of which, male and female participants were 45.91% and 54.09% respectively. These respondents were representing a total population of 12,450 of the villages covered from 4 unions as listed in Table 3.2. The major occupational groups were: farmers, fishermen, small business owners, day labourers, housewives, etc. The composition of the participants is graphically represented in Figure 3.1.

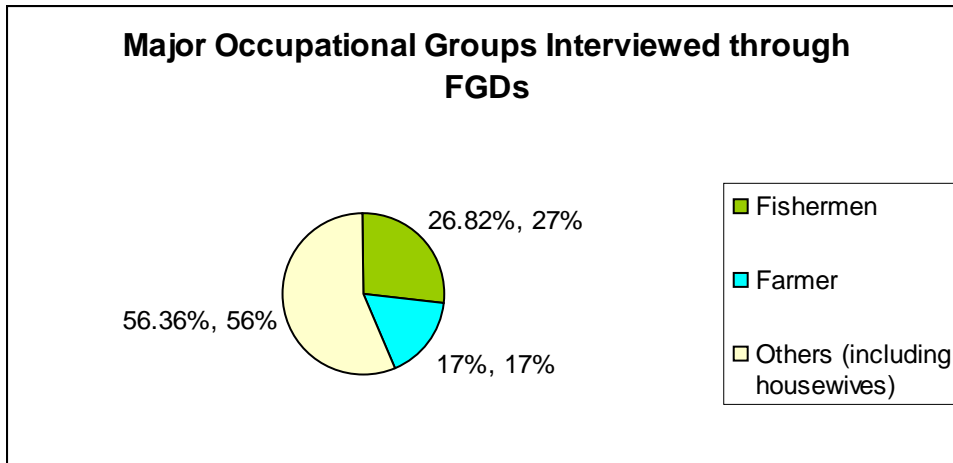


Fig 3.1: Major Occupational Groups Interviewed Through FGDs

Table 3.2: Villages covered by FGDs per Union

Name of Unions	Villages covered through FGDs
Dokkhin Sripur Union	1. Joyosri 2. Lamagaon 3. Ramshingapur 4. Patapuka
Uttar Sripur	5. Mujrai
Uttar Bangshikunda Union	6. Antorpur 7. Nababpur
Dakhhin Banshikunda	8. Rongchi

The number of school going children in the study areas was approximately 1,100, with 40% male children and 60 % female children. Almost all the villages have at least 1 primary school, which sometimes functions as a shelter during floods.

3.2 HEALTH

Although there are few pharmacies in the villages, it was recorded that there were no hospitals nearby. The nearest hospital was found to be ranging from 1 km to 15 km away, for the 9 villages visited. Although on foot this might not seem like a far distance, when the land is submerged, it is almost impossible to cover this distance with an ailing patient.

No existing task force or emergency medical services were found in the villages visited. Villagers have to travel several miles to reach the nearest hospital situated in Tahirpur, Dharmapasha, Madhyanagar and Kalmakanda. It takes a long time to reach the doctor or hospitals, as generally they use boat, motorcycle and rickshaw-van as transport and that too is costly.

At Tahirpur Hospital, BDT 150 is charged as visit fees, as informed by the local people. Local *kobiraj (boiddya)* provides medication and advice for common ailments. There are some pharmacies at the villages and basic medications are available there. On an average, each household spends Tk. 3,000-15,000 to purchase medicines; cover doctor's fees etc per year. The male members usually miss about 30 working days in a year due to sickness.

Very few villages have tube-wells and they depend on surface water for drinking and other purposes. This is often not safe and hence pushes them into the risks of being contaminated by water borne diseases.

These villages/unions have no Health Security Taskforce or committee or working group. The emergency services are not available and they rarely get anything in the emergency situations. Child vaccination/immunization provided by the Government, but they do not provide services regularly. Pre and post natal care is not available either.

The most common diseases in this locality are namely: Fever, Pneumonia, Malaria, stomach pain, cough, Diarrhoea, Dysentery, Gastric, and Night-blindness. They do not grow herbal or medicinal plants due to land scarcity but they have interest to know more about the uses.

A large cause of stomach pain and Diarrhoea can be due to drinking of contaminated water from *haor*. Night blindness is the result of malnourishment during the childhood, which can be easily associated with the living condition of the *haor* dwellers. At least 2 times in a year they suffer from common health problems.

3.3 MIGRATION

Migration is common for the people of Tanguar Haor area. Out-migration (about 12 % of the overall population) occurs primarily because of landlessness, loss of livelihoods and assets due to natural disasters, limited or no access to resources, influences of vested interest groups and commercial businessmen (fishermen), lack of capital such as boats or fishing gears, difficulty in getting fishing permits because of competition between elitist groups and local people, etc. Massive migrations also take place due to regular occurrence of pre-monsoon flash floods. Being the main disaster for the *haor* areas, it destroys crops and infrastructure and repeatedly pushes them into a state of helplessness and poverty.

It has been recorded that there are readily available jobs or alternative livelihood opportunities in sectors such as construction, hauling and mining soil, carrying construction materials, brick kilns labourer, day labourer, workers in garment factories, rickshaw pulling, coal collection, etc. However, there is no job available during the rainy season in the *haor* area. For almost 6 months of the year, they have nothing to do. Mostly poor and landless people migrate during the monsoon for alternative jobs in bigger cities such as Dhaka, Chittagong, Sylhet, Jaflong, Comilla, etc.

3.4 INCOME/MICROCREDIT

Monthly income of the households ranges from a minimum of Tk. 500 per month to Tk. 7,000 per month. On an average, the monthly income of families interviewed in the TH area is about BDT 4,050. There are large seasonal variations in income; most of the households have little or no income during the rainy season. Income is usually higher during winter, due to farm output in addition to fishing, which is the sole occupation for the rest of the year. Mainly men earn for the family and in a few exceptional cases, women also work in the agricultural fields or as domestic help.

Most of the villagers have access to some kind of microcredit system. CNRS has started a *Shamity*, which is locally called '*Baro (12) takar Shamity*'. To some extent the system helped the local people; they used these loans to set up shops, purchase fishing gears and boats, etc. But the interest rate seems high to them and the timeline of repayment is too short, so they often take loan from the local '*mohajon*', which entails higher interest rates. A loan of Tk. 1,000 can have an interest rate as high as Tk. 100 per month. This in fact pushes a lot of the people into the downward spiral of poverty, as they are unable to repayment the interests. Often, they use loans to meet their subsistence needs and are not even able to invest in a business that can bring income.

A number of microcredit service providers operate in these villages, such as Grameen Bank, ASA, ERA and BRAC, which especially provide loans to the women. In most cases, after getting loans, the women members handover the money to their husbands and they use the money then in various income generating activities. A very few women are doing businesses by themselves in the area. Women were also trained by the Community Based Sustainable Management of Tangaur Haor project in tailoring, which brought them an additional source of income.

3.5 FISHING

News and warning of disasters are mostly received via mobile communication. No existing early warning system is there for impending disasters; they use indigenous knowledge, word of mouth as warning for such events. There are radios and TVs in this village, which fishermen listen to before heading out to the water.

During flash floods, they practice '*uijja*' fishing, which is an indigenous method of fishing. CNRS has started an early warning system for the past 2 years in the *haor* area to forecast rainfall in the Meghalaya region, which causes flash floods in the Tangaur Haor.

Some of their fishing boats are self-owned, but in general fishermen use rented boats to go out for fishing. Boats that cost between Tk. 4,000 to 5,000 are rented at Tk. 20 to 30 per day, as informed by development workers in the area. According to the villagers installing engines would be a great improvement for fortifying their boats. They use the following nets/gear for fishing: Shutar jaal; Jhaap jaal; Garo jaal, Fara jaal, Patni jaal, Dhori jaal, Thela jaal and Lori jaal.

According to the people consulted in the 9 sites, fish abundance and species composition has changed due to illegal fishing by government enforced guards (Ansars) and locals. The following species of fish can be found in very low numbers: *Katol*, *Rui*, *Ghonia*, *Shol*, *Boal*, *Gojar*, *Gagoj*. Other species such as *Nanid*; *Moha Shol*; *Pangash*; *Bacha*; *Garua*; *Shilon*; *Baghai* and *Chitol* are on the verge of extinction. Among other organisms, turtles have also become almost extinct. In the wetlands, vegetation such as *Nol*, *Khagra* associated with fish habitats have reduced along

with trees such as *Hijol* and *Koroch*. Important breeding grounds for fish species in the haor are Alamer duar, Roa Beel and Baloer Doba (smaller pockets within the wetland).

In general, most of the people consider the current co-management system (being established by the Community Based Sustainable Management of Tangaur Haor project) as better than the previous leasing system.

3.6 AGRICULTURE

According to some of the development workers consulted, crop yield in the haor area is divided between the landowner farmers on a half-half basis or as otherwise agreed. Landowners do not share the costs of input; it is solely borne by the farmers.

It has been recorded that the farmers of the interviewed villages harvest 12 to 13 rice varieties, including HYV such as BR 29, BR 28 and local varieties like *Lal Dhan*, *Mongol*, and *Boro Bichi*, etc. They irrigate with pumps and dig canals to carry water from the haor, when water levels are low in the winter. They invest about Tk. 5000-15000 for fertilizers and seeds for each harvest, on approximately 2.5 acres of land. Seeds are bought from the local bazaars. No seeds or fertilizers have yet been received from the government. Farmers store local seed varieties at home for plantation in the next season. BR 29 is the most profitable variety with 40-50 mounds/acre yields, as reported by the local farmers.

Farmers are totally dependent on chemical fertilizers and insecticides. They informed that it is difficult to get fertilizers and insecticides during production period. They also shared the observation that the productivity of land is decreasing day by day. Rats as pests are a huge problem as they destroy substantial amounts of rice crop in the fields. Moreover, birds often destroy crops. They don't have access to rat poison for controlling them and are keen to learn about Integrated Pest Management (IPM).

Flooding is a huge problem for farmers, as their livelihoods are affected by the availability of agricultural land. The farmers have no access to agricultural activities during monsoon, so they are interested to avail new technology like floating gardening (hydroponics). The concerned officials of the Department of Agricultural Extension (DAE) at union level do not visit regularly and offer their services.

Homestead gardening is practiced in the winter and these include chillies, *shim*, *lao*, *kumra*, onions, garlic, etc. Dry leaves, twigs and stems along with cow dung are collected and used as fuel for cooking.

3.7 HEALTH SECURITY/NUTRITION

Food intake is not sufficient for the impoverished people in the *haor*. They suffer from malnutrition and deficiencies, which often makes them more weak and vulnerable. Women are worse off than men in this case, where they are the last ones to eat in a family and often just make do with plain rice and chilli. Even in case of children, the male child gets preference over the female child in a family and growth of young girls is reported to be stunted. The main items that the people consume are listed in the following table. It is worth mentioning that most of the people only have 2 meals a day, once in the morning and once at night. A large number of female respondents confided that they only eat once a day, especially during the lean season.

Meals	Item
Breakfast	<i>Maar</i> (rice starch), rice, amaranth and leafy vegetables (shaak), chilli, mashed potatoes, etc.
Lunch	Rice, small fish (<i>meni, icha, tengra</i>), bottle gourd (<i>lau</i>), etc.
Dinner	Similar to Lunch

Table 3.6: Food items consumed by the people

3.8 POLICY

People hardly receive any preparedness or emergency aid from GO/NGOs/other sources. No government intervention is visible for addressing vulnerabilities or emergency aid is not received from NGO's. In terms of policy planning, people's reflections of organizations or individuals are strongly negative. At the *upazila* or union level, there are no strategy plans or functional Task Force.

3.9 HOUSING

Most of the houses in the haor area are flimsy and have little protection against wave erosion and high wind. However, they can be made more robust if concrete is used as building materials. Currently soil, bamboo, corrugated steel sheet, *Chhon* (hay) and wood are used to build most of the houses. Due to poor construction materials these houses need to be repaired almost every year, following a flood. The yearly house repairing cost is Tk. 4000 to 5000. The methods for improved housing suggested by them is making flood protection wall with bricks, cement and stones around the houses. In general most of the homesteads are protected by planting *Hijal, Karoch, chailla ghash, nol khagra* (reeds) and bamboo, as an alternative to building expensive stone walls. People here build false roofs/ceiling (*macha*) during floods and water logging. They have further suggested that raising the plinth of their homes can greatly reduce their vulnerabilities during and after floods.

3.10 ECOSYSTEM KNOWLEDGE

According to the people of Tangaur Haor, the most important natural resources are its fish, forests and birds. Land is also an important resource and a scarce commodity in the wetlands where land is submerged for about half of the year. They also think that the number of trees is on the decline, largely due to deforestation and unsustainable practices. They do not have nurseries or medicinal plants in most of the villages and are eager to learn about the techniques.

3.11 HISTORICAL INFORMATION

District	Event (year)	Impacts
Sunamgonj	1987	Catastrophic flood occurred in July-August. Affected 57,300 sq km (about 40% of the total area of the country) and estimated to be a once in 30-70 year event. Excessive rainfall both inside and outside of the country was the main cause of the flood. The seriously affected regions were on the western side of the Brahmaputra, the area below the confluence of the Ganges and the Brahmaputra, considerable areas north of Khulna and finally some areas adjacent to the Meghalaya hills.

District	Event (year)	Impacts
	1988	Catastrophic flood occurred in August-September. Inundated about 82,000 sq km (about 60% of the area) and its return period is estimated to be 50-100 years. Rainfall together with synchronization of very high flows of all the three major rivers of the country in only three days aggravated the flood. Dhaka, the capital of Bangladesh, was severely affected. The flood lasted 15 to 20 days.
	2004	Affected lives and livelihoods including damage of house and crops.
Sylhet	1968	Severe flood in Sylhet district and about 700,000 people were badly affected.
	1988	Catastrophic flood occurred in August-September. Inundated about 82,000 sq km (about 60% of the area) and its return period is estimated to be 50-100 years. Rainfall together with synchronisation of very high flows of all the three major rivers of the country in only three days aggravated the flood. Dhaka, the capital of Bangladesh, was severely affected. The flood lasted 15 to 20 days.
	1989	Flooded Sylhet, Sunamganj and Moulvibazar and 600,000 people were trapped by water.

Floods among the most extreme natural disasters took place in 1974, 1988, 1995, 2000 and 2004. They resulted in loss of homesteads, agriculture, livestock and people's livelihoods and led to outbreak of water borne diseases in the affected areas. *Chaitra* and *Boishak* (corresponding to English calendar months of January and February) are the return period of natural disasters when there are storms and hail storms with high velocity winds. There are no formal coping mechanisms amongst the people, apart from storing food, oil, dry foods for children and building false roofs above the flood water level before disasters hit.

The participants from all 9 villages unanimously agreed that a multipurpose shelter cum school cum growth centre in their area could greatly reduce risks and enhance their livelihood adaptations to extreme climatic events.

3.12 TRANSPORT

Boats are the most common mode of transport in the haor. Villagers often walk long distances, when the land is not submerged under water. Their yearly transport cost varies from Tk. 1,800-3,600 (for those who hire boats) and about Tk. 8000-10,000 is incurred by boat owners. People think this type of transportation system is time consuming and risky and are of view that the government should provide better solutions to their problems.

3.13 DISASTER MAPPING

This PRA session was conducted at 9 villages, selected from 4 *upazilas* of Tanguar Haor. The goal of the research carried out was to identify the constraints faced by the haor community, due

to different types of disasters, the vulnerabilities that they face and the recommended coping strategies.

(a) Hazard Identification	Critical	Very Important	Important	Not very important
Flash Flood	✓			
Heavy Rainfall				✓
Hail Storm			✓	
Soil Erosion		✓		
Irrigation water scarcity			✓	
Cyclone				✓

Table 3.8: Prioritization of Risks

	Addressed	Very Useful	Somewhat Useful	Not Very Useful
Out-migration (alternative job opportunities)		✓		
Access to micro-credit system	✓			
Reflections about disaster management system				✓
Storage of fuelwood and dried dung cakes	✓			
Fortification of households with the use of locally available materials such as <i>nol/khagra</i>	✓			
Temporary relocation to higher areas (mounds) during disasters			✓	

Table 3.9: Existing disaster planning within the communities

Existing Coping Strategies

1. Use of indigenous knowledge.
2. Storing food, oil, dry foods and preparing special oven that can be used during disasters.
3. Building false roofs above the flood water level.
4. Fishing is an alternative income source during floods

Type of Hazard	Reported Events / Incidents 1989 – 2009	Probability of Occurrence	Level of vulnerability
Flash Flood	1	1	1
Heavy Rainfall	2	2	2

Type of Hazard	Reported Events / Incidents 1989 – 2009	Probability of Occurrence	Level of vulnerability
Hail Storm	2	2	2
Soil Erosion	2	2	2
Drought in winter	3	2	2

1= High; 2 = Moderate; 3 = Low; 4 = Very low

Table 3.10: Frequency and Probability of Disasters

Crop Calendar (consolidated)

Months→ Crops ↓	Boishakh (Mid April – Mid May)	Joisthho (Mid May – Mid June)	Ashar (Mid June -Mid July)	Srabon (Mid July – Mid Aug)	Bhadro (Mid Aug – Mid Sept)	Asshin (Mid Sept – Mid Oct)	Kartik (Mid Oct – Mid Nov)	Agrahaon (Mid Nov- Mid Dec)	Poush (Mid Dec – Mid Jan)	Magh (Mid Jan – Mid Feb)	Falgun (Mid Feb – Mid Mar)	Choitro (Mid Mar – Mid April)
BRRi Dhan 28*												
BRRi Dhan 29*												
Mongol*												
shali*												
Gochi*												
Ananna*												
Chili												
Mustard												
Raddish												
Amaranth												
Ladies Finger / Ocra												
Coriander												
Bean												
Tomato												
Egg plant												
Coli flower												
Cabbage												

Months→ Crops ↓	Boishakh (Mid April – Mid May)	Joisthho (Mid May – Mid June)	Ashar (Mid June – Mid July)	Srabon (Mid July – Mid Aug)	Bhadro (Mid Aug – Mid Sept)	Asshin (Mid Sept – Mid Oct)	Kartik (Mid Oct – Mid Nov)	Agrahaon (Mid Nov- Mid Dec)	Poush (Mid Dec – Mid Jan)	Magh (Mid Jan – Mid Feb)	Falgun (Mid Feb – Mid Mar)	Choitro (Mid Mar – Mid April)
Tishi							→					
Bottle Gourd						→						
Bitter Gourd	→						→					
Potato								→				
Onion								→				
Garlic								→				

CHAPTER 4

CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSION

Disaster Risk Reduction (DRR) is a conceptual framework intended to systematically avoid (prevent) and limit (prepare/mitigate) disaster risks with regard to losses in lives and the social, economic and environmental assets of communities and countries. The DRR study under the auspices of the project 'Community Based Sustainable Management of Tanguar Haor II' was carried out during January – February 2010, to capture people's vulnerabilities induced by climate change manifestations. The study also documented the current coping strategies and recommendations from the local level, for reducing people's risks resulting from disasters.

In total, 9 villages were covered from 4 Unions, namely Uttar Sripur, Dakhhin Sripur, Uttar Bangshikunda and Dakhhin Bangshikunda. A total of 23 FGDs were performed, where various stakeholders were consulted. The findings of this study have been presented according to the various dimensions conceptualized in the framework of the study model. In order to supplement the FGD findings, seasonal calendar of crops, disasters and ranking and scoring of options were also done. About 240 community members and field workers shared their perceptions regarding disasters and recommended a number of measures that they viewed as strategies for risk reduction.

Like other part of the haor basin, Tanguar haor is remotely placed and vulnerable to various natural disasters. Vast extent of water bodies and prolong duration of submergence has made the area remote and difficult for human settlement. This sheer remoteness and isolation has also negatively influenced the availability of other amenities like schooling and health care facilities. Additionally, migration due to lack of jobs especially in the monsoon season and too much dependency on natural resources brought added vulnerability to the local communities. Crop failure due to early monsoon flash-flood and wave related erosion to the infrastructure came out to be the major types of natural disaster and driving force for vulnerability and poverty of the area. However, it is also evident that people can see some light at the end of the tunnel; the community based haor co-management practice is in place, which ensures their right to harvest the resources. Groups have been formed and savings are growing, government agencies and NGOs are also coming with various financial and technical offerings.

Gender Sensitive DRR

Although gender analysis was not an issue, but it was felt essential that DRR is hugely gender sensitive and perception of both disaster and risk are gender sensitive.

Indicators of potential DRR impact

Indicator/s for measuring impact of a DRR initiative is highly essential and it was felt necessary that without proper indicator based evaluation DRR impact assessment cannot be completed.

Institutional support of study findings

Institutional involvement to support study findings is extremely important for any DRR initiatives. Involvement of both GO and NGOs to reduce the vulnerability of the community and to strengthening the resilience is essential.

Wider lesson-learning

Lesson-learning is an integral part of any DRR initiative, it could be cross-ecosystem, cross-society or even cross-country. Lessons, either good or bad from one initiative can be useful to another engagement. Increase the width of learning practice would definitely help to increase the efficiency.

The development process itself does not essentially decrease the vulnerability from natural hazards. Instead, it can sometime inadvertently create new forms of vulnerability, impeding efforts to reduce poverty and promote growth. Optimal solutions to secure sustainable development, reducing poverty and increase hazard resilience, therefore, need to be explicitly and aggressively sought, particularly as climate change looks set to increase the prevalence of droughts and floods and the intensity of windstorms. Such solutions can best derived by integrating disaster risk reduction strategies and measures within the overall development framework, viewing disaster risk reduction as an integral component of the process (ProVention, 2007).

4.2 RECOMMENDATIONS

A number of the recommendations that were prioritized are listed as follows:

- Multipurpose shelters, serving as disaster shelter, school, community clinic, market, etc.
- Infrastructure development such as building roads and submersible *pucca* (concrete) embankments, protection walls, etc.
- Alternate cropping practices such as early variety and floating gardens (*baira*) and training on techniques such as IPM (Integrated Pest management)
- Alternative income generating opportunities such as ‘Ecotourism facilities/guiding’ for lean season (or during seasonal ban on fish catch)
- Access to proper health care and sanitation facilities, by installing sanitary latrines and tube wells

Recommendations for facilitating coping and adaptation to disasters

	Very Useful	Useful	Not very useful
Multipurpose shelters (serving as flood/disaster shelter, school, community clinic, market, etc.) and providing accommodation for community guards and tourists, water harvest and reservoir	✓		

	Very Useful	Useful	Not very useful
Infrastructure development (such as building roads and submergible <i>pucca</i> (concrete) embankments, protection walls, dredging, etc.)	✓		
Alternate cropping practices such as early variety and training on techniques such as IPM (Integrated Pest management)		✓	
Alternative income generating opportunities such as 'Ecotourism facilities/guiding' for lean season (or during seasonal ban on fish catch)	✓		
Ecosystem based plantation such as Hijal and Karoch, reeds such as nol/khagra	✓		
Access to proper health care and sanitation facilities (latrines and tube wells)	✓		
Mound extension, in order install sanitary latrines and process the crop yields (drying paddy)			
Building mounds (killa) for livestock shelter during disasters			

Table 4.1: Feasibility of Disaster Adaptations

Future coping strategies

- Dredging of adjacent river, beels for increasing water retention capacity and making embankments.
- Constructing wave protection wall surrounding the village, with stones, *chaila* grass, bamboo, *eraila* grass, and if nothing else is readily available, then even water hyacinth.
- Plantation of *Hijal*, *Karoch* and *Haor bon* (Swamp forest) which can protect the surge of large waves.
- Ensuring proper sanitation.
- Assuring drinking water availability during flood and post flood situation.
- Re-activate community clinics at union level. Assuring availability of doctor and medicine as well as maternal/post natal healthcare
- Getting training for making oral-saline and on other medication.
- Increase the number of tube wells.
- Raising the height of the surrounding embankment of the *beel*.
- Establishing cyclone / flood centers.

- Drought tolerant crops should be introduced.
- Training on IPM (Integrated pest management).
- Documentation of local, traditional and indigenous knowledge and coping practices for facilitating adaptation

Table 4.2: Challenges for DRR in Tanguar Haor

Dimensions	Challenges/Risks	Nature of Manifestations	Existing Coping Measures
Health/Reproductive health	<ul style="list-style-type: none"> ○ Inaccessibility of health facilities ○ Inadequate medical facilities 	<ul style="list-style-type: none"> ○ Loss of income ○ Uncared/unprotected health ○ Deprived/grossly inadequate medical facilities ○ Incur more costs/opportunity costs ○ Increased child mortality and MMR (maternal mortality rates) 	Received medical care from local healers or pharmacy owners
Migration	<ul style="list-style-type: none"> ● Family insecurity/loss of properties 	<ul style="list-style-type: none"> ● Loss of livelihood or professions (traditional fishers) ● Increased costs of adaptation 	Making relatives responsible
Income	<ul style="list-style-type: none"> ● Unemployment ● Lack of institutional loans/credit ● Food insecurity 	<ul style="list-style-type: none"> ● Malnutrition ● Starvation ● Distress selling ● Failure to repay loan instalments 	Eating shingra, selling household goods/utensils etc.
Education/Awareness	<ul style="list-style-type: none"> ● Inaccessibility to schools, because roads are submerged 	<ul style="list-style-type: none"> ● Teachers cannot go to school ● Decreased competency amongst the students ● Increased costs to schools 	Hiring additional teachers as substitutes Hiring private tutors for children
Transportation	<ul style="list-style-type: none"> ● Increased costs of commuting by boat 	<ul style="list-style-type: none"> ● Restricted access to social services/detached from social networks 	Alternative communication systems such as mobile telephones
Fuel/energy	<ul style="list-style-type: none"> ● Accessing fuel wood (especially during disasters) 	<ul style="list-style-type: none"> ● Incur extra costs for buying fuel wood ● Increased risks and workload for 	House building materials (like bamboo) are used up for cooking

Dimensions	Challenges/Risks	Nature of Manifestations	Existing Coping Measures
	<ul style="list-style-type: none"> Storage of fuel wood 	females (as collectors) for collecting twigs, branches, litter etc. <ul style="list-style-type: none"> Scarcity of fodder (which is otherwise used for livestock) 	Use of fodder as fuel (straw for instance) Collection and preservation of cow dung/dry weeds
Local institutions/government /NGOs/UDMC	<ul style="list-style-type: none"> Local institutions are dysfunctional and do not provide necessary services 	<ul style="list-style-type: none"> Deprivation from social safety nets and services offered by the public and private sector 	Reliance on relatives, <i>mohajon</i> , etc.
Ecosystem/natural wealth	<ul style="list-style-type: none"> Increased dependency on natural resources/ecosystem services 	<ul style="list-style-type: none"> Overexploitation of natural resources Depletion of local species 	

ANNEX 1

CHECKLISTS USED BY IUCNB FOR DRR AND VULNERABILITY ASSESMENT IN TANGUAR HAOR (FOR USE IN FGDs)

General Information

1. Number of participants:
2. Name of occupation:
Fishermen:
Farmers:
Others:
3. Number of male(s) and female(s):
4. Number of school going children:
Male :
Female:
5. Number of centralized people (local):
6. Number of decentralized people (from outside of that locality):
7. Number of voters:
8. Size of union:
9. Number of hospitals, schools, cyclone centers:
10. Number of school-going children (male and female):

Occupational Migration:

1. Primary problems and obstacles related to their occupation:
2. Available migratory (alternative) jobs:
3. Benefits in new occupation (Migrated):
4. Number of occupationally migrated people:
5. Number of people utilizing the opportunity of alternative jobs provided at the preparatory phase of the project:

Income:

1. Monthly income of the household:
2. Monthly income before alternative jobs were available:
3. Sources of income among the family/household:
4. Head of the household (male/female): I

5. Seasonal variation in yearly income:
6. Income ratio between male and female:

Microcredit

1. Do you have access to micro-credit system?
2. Do you utilize the opportunity of credit access? If yes, how?
3. Reflections about micro-credit:
 - a) Is it sufficient enough to meet your need?
 - b) Is the repayment duration ok?
 - c) Is the interest rate alright?

Policy:

1. Does the government have any interventions at your village/union level to address vulnerabilities resulting from climatic events (like cyclones)?
2. Do you receive any preparedness/emergency aid from GO/NGOs/other sources?
If so, then specify:
3. How often are preparedness programs or campaigns carried out at your village/union? Mention the time line/gaps:
4. Does this village have any vulnerability reduction strategic plan?
5. What are these plans and which year was it first developed?
6. What changes have you noticed because of this planning?
7. What are your expectations from organizations or individuals in policy planning?

Health security:

1. Does this village/union have a Health Security Taskforce or committee or working group?
2. What are the benefits of this program?
3. What are the services currently provided by these group(s)?
4. What additional services are needed?
5. What are the emergency services available and how are they distributed?
6. Do you have any relief or rehabilitation program in your area?
7. Are there any hospitals in your village? If not, how far are the health facilities/medical centers from the village/union?
8. Is child vaccination/immunization provided by the Government?
9. Are medicines and good doctors available at/near your area?
10. What are the familiar diseases in your locality?

11. Frequency of getting sick (yearly):

12. Food consumption pattern:

Food Chart:

Meals	Hh 1	Hh 2	Hh 3	Hh 4	Hh 5
Breakfast					
lunch					
Dinner					
Calorie Intake					

*Hh=Household

13. Health costs in terms of food, drugs, doctor's fee, days missed at work:

a)Actual:

b)Required:

Occupation and Adaptation:

FISHING

1. How many people or families use radios and how often?
2. Does every fisherman listen to weather forecasts?
3. How do radio news/warnings/signals help them?
4. Do you get early warnings or campaigns about disasters?
5. Do fishermen need different/improved fishing boats?
6. What are the local arrangements for rescuing lives and saving boats that capsize?
7. What type of fishing gears do you use? What is the current fishing techniques adopted in your village?
8. Do you have any suggestions for improving design of boats?

HOUSING

1. Do you think houses can be made more robust through design modifications? If yes,
 - a) What are the known methods for improved housing?
 - b) How much will it cost?
 - c) How long will it sustain?
 - d) How often would you need to repair it? What about the repairing cost?
2. What type of house do you currently live in?
3. How often do you need to repair your house?
4. What is your yearly housing cost? (fixed cost plus repairing cost)

5. What are the current techniques adopted in your village by masons and carpenters for building stronger houses?
6. Which techniques do you think are more cost effective and readily available, for you to ensure sustainability of your housing?

FARMING

1. Do you grow rice? If so, then which varieties: indigenous or HYV? Have yield from rice steadily been declining?
2. Do you use fertilizer in your field? What type are they?
What are the alternative crops, fruits and/or vegetables that are grown as substitute for rice?
1. Are those crops profitable? Is there any seasonal aspect to their yields?
If yes, what about the seasonal distribution of their yields?

*Crop Calendar:

Grishmo		Borsha		Shorot		Hemanta		Sheet		Bashanta	
Baishakh	Jaishtha	Ashar	Srabon	Bhadro	Ashwin	Kartik	Agrahan	Poush	Magh	Falgun	chaitra
Aprl- may	May- jun	July- Aug	Aug- Sep	Sep- Oct	Oct- Nov	Nov- Dec	Dec- Jan	Jan- Feb	Feb- Marc h	Marc h- April	April- may
Summer				Autumn				Winter			Spring

2. How much do you earn per acre :
 - i. Form indigenous/HYV rice
 - ii. From the alternative varieties
3. Are you willing to experiment with alternative crops that may grow well and better in nutrition value?

Historical Information:

1. Name the greatest natural disasters like heavy rainfall and flash floods (in terms of extent of damage/loss of life/property etc) and mention the year of occurrence, for your locality:
2. Extent of damage on an average due to natural disasters in terms of income loss, health costs and property damaged.
3. What is the return period for these natural disasters?
4. Based on your experience and perception, do you think that frequency of these disasters is increasing or decreasing?
5. What are the major effects of floods and cyclones (disasters) on your lives and livelihoods (fisheries, farming, households)
6. What are the current coping strategies that you adopt?
7. What are the future coping strategies that you recommend for better adaptation to extreme events?

Transport

1. What kinds of transports are available to you?
2. What about your yearly transportation cost?
3. Do you think they are time consuming?
4. Do you suggest any modification for them?
5. Do you need Govt intervention in this sector?

Institutions:

1. Is there District Disaster Management Committee (DDMC) or task force or Upazila Disaster management Committee (UDMC) working in your union?
2. What are the functions of such committees?
3. What are the interventions that they propose or carry out?
4. Do these committees perform their roles judiciously?

1.2: Probability, Ranking and Scoring

1.2.1 Probability and Ranking of Risks

Type of Hazard	Reported Events/ Incidents 1989-2009	Probability of Occurrence	Significant Number of People Affected	Primary Costs (economic)	Secondary Costs (response)	Level of Vulnerability
Hail Storm						
Flash flooding						
Heavy rainfall						

Probability of Occurrence: Probability derived from the reported number of events/incidents for a ten-year period. Degree of probability will be ascertained as follows:

- a) 1 = High, b) .1 = Moderate, c) .01 = Low, and d) .001 = Very Low

1.2.2 Ranking and Scoring of group discussions

Each group had about 12-15 participants and the worksheet was completed in a format of 'Frequency Distribution' of the information collected.

(a) Hazard Identification	Critical	Very Important	Important	Not Very Important	Not A Threat
Flash Flood					
Heavy Rainfall					
Hail Storm					
Soil erosion					

(b) Coping and Adaptation	Have Done	Plan To Do	Unable To Do	Will Not Do
Received information on disaster				
Preparedness Program arranged earlier				
Conducted disaster exercises				
Developed Emergency Shelter by the Government				
Made arrangements to relocate to another site in case of disaster				

(c) Disaster Planning or Impact of Poverty				
	Addressed	Very Useful	Somewhat Useful	Not Useful
Alternate job opportunities (migration)				
Alternate locality (shifting to other areas)				
Alternative cropping practices				
Benefits of new/alternative occupation				
Access to Micro-Credit system				
Reflections of micro-credit system in operation				
Reflections about Disaster Management System provided				