

Climate change and gender perspective: Adaptation and Mitigation

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Summary

The study explored the scenario of vulnerabilities (Social, physical, psychological and economical) of women to climate change and incorporated their indigenous knowledge in disaster management and risk reduction in the Northwest Bangladesh. Bangladesh, especially the northwest region, is likely to be on the front line to survive the most severe impacts and extreme climatic events. People, in this region, have a high reliance on climate-sensitive natural resource sectors for agriculture based livelihoods and incomes. Women in this area play an important role to combat disaster that has not been explored much in government and non governmental documents. The Study examined the gender gap of Disaster Risk Reductions (DRR) and Climate Change Adaptation (CCA) approaches. The findings of the research would be able to bring out some strategies and action to reduce women's vulnerabilities to climate change through gender mainstreaming by analyzing their experiences and need assessment.

This study carried out in Gaibandha, Rangpur, Nilphamari, Kurigram and Lalmonirhat of Northwest Bangladesh. However, Upazilas, unions and villages were selected according to a set of contingency indicators, in order to accommodate diversity and differences in adaptive strategies and capacities between regions and groups, the selection of the research sites followed four criterias (Poverty, Ethnicity, Flood or drought areas)

Findings

1. The study found that rape, sexual harassment and wife beating are the common phenomenon of the disaster period.
2. Women in disaster prone areas experience various kinds of social problems (dowry, family crisis, polygamy, early marriage, call of marriage, stopping education, disputation of social relation, displacement etc) and harassments.
3. Diarrheas, Cholera, skin disease are the common for all the people regardless of sex and age during natural disaster. But women suffer from different types of diseases. But the women who were in the house and took shelter in the tang they also faced difficulties about sanitation. Due to the over flow of water inside the house, the sanitation system breaks down and the water mingled with garbage smell bad. Since women were busy with water, the gangrene took place in their hands and legs. Some women also suffered from arsenic during the crisis. Fever, asthma, Jaundice, Coughing, breathing problem were also very common among women. They had to keep their children in the lap and do the job carrying the children, their physical condition became worse and they felt pain in the whole body.
4. Most of the girls of her age group suffered from white discharge.
5. It is seen in the study that 50 women from five districts faced the experiences of miscarriage in this time.
6. The aged women easily went down with fever, diarrhea, skin diseases. In the field areas, more than ten women stumbled and had their arms broken

- in that situation and they suffered a lot. Besides, feelings helpless, the aged women often lost their mind.
7. . Common reactions to disasters are shock, disbelief, anxiety, sleep disturbances and impaired personal relationships Long-term effects – found between two and four years after the aftermath – can include alcoholism, depression, child and spouse abuse, psychosomatic complaints and severe anxiety.
 8. Women face more vulnerable situation economically than the in the disaster period.
 9. During flood and other disaster periods women faced different kinds of problems. Poor women suffered from lack of food, clothing and feeding the cattle. They are the responsible of collecting fuel, water and vegetable to survive the family.
 10. Some traditional signs as Temperature and humidity, Direction of wind, Cloud (color and type), Rainfall (location and type, River water (color and flow/ current), Animal behavior (ant, frog, birds, cows), Curve of river bank (*Kachhar*, Traditional method for prediction (aurum leaf) and symptoms about excessive rainfall, flood, flash flood and river bank erosion are gathered from different categories of women.
 11. During and after the flood, flash flood, food insecurity is a main concern for the locales. The women used scaffold as a safe place to preserve rice. They also preserved dry fish, *chira*, *muri* ect. and store fodder for domestic animal. Landless people could not store any food and they borrowed money for buying food grains during and after flood. They make *Algha Chula* and *Guchi* for the crisis period. The women's indigenous knowledge about ethno medicine works very well in that period.

Recommendation

The study recommends the followings

For Government Policy

1. Government would give more concentration on the separate toilet facilities in the all shelter home and floating people during the disaster.
2. Government could collect the knowledge of the women to know the situation and incorporate these while developing the policies.
3. Govt would create the source of income for the men and women during the disaster.
4. Any kind of violence during the period would be considered as crime and appropriate punishment should be given by the governments to the criminals.
5. Government would establish one stop medical centre in the disaster area for twenty four hours and specially gave more attention to the women's health.
6. Special caring would be taken by the government for the security of the adolescence girls, differently abled women and old women.

7. Within a medical team, a psychaist and a psychologist should be incorporated in these areas.
8. A pregnant and lactating woman deserves the special care in these times.
9. Government need the advices of the community people and takes up the strategies they mentioned.
10. Government would set up separate shelter home for the men and women to avoid the violence that often happens in the disaster period.
11. Relief would be distributed according to the gender ratio instead of household survey. Men and women's need would be measured differently and relief should be distributed on the basis of the need. And it would be ensured that both men and women could have access to the relief.
12. Information would be given to the women since most of them are in the house and hey can take decision according to the information received.
13. Beside relief, govt. could do various activities to help the people, as to strengthen the indigenous technique to survive in the periods.
14. Government could sanction more boats to rescue people in the flood areas.
15. Government could provide saline and fresh water to the women specially.
16. Relief should be distributed equally irrespective of caste, class, ethnicity and gender.
17. Government could help the people to rebuild their houses.
18. In the study it is found that women became economically, socially, psychologically and physically. The vulnerabilities could be measured first and assistance should be provided on the basis of the effects.
19. Government could take action to continue schooling at any cost and give more concentration on education.
20. Government could also have the responsibilities to provide medication to the cattle and other domestic animals.
21. Government also could extend service delivery like as birth control pill and other necessary items.
22. Local government could take more responsibilities along with relief in the disaster prone areas.
23. Government could check that where as all latrine has light and all doors can be locked in the shelter home.

NGOs

1. NGOs working in these areas could take up the women's knowledge when they develop a policy for disaster.
2. They could provide first aid to the people who become victim of the disaster.
3. NGOs could also offer fresh water and saline to the women and assist the government initiatives.
4. NGO could take the initiative to provide the information of disaster if they came to know any.

5. NGOs also could help the people by giving toilet facilities in the shelter home or they also could offer different shelter home.
6. They could postpone their macro credit program during the time; it is hard for the people to continue the installment of the credit since they do not have any source of income.
7. NGOs may offer some occasional employment opportunities to the flood victim to overcome the economic crisis.
8. NGOs representative can be a part of local Salish in the disaster period.

Midterm Responsibilities:

Government

1. Government could take the responsibilities of the disaster victim round the year on the basis of their need.
2. Relief program could be continued for long time.
3. Government could set up the medical team to check up the health condition throughout out the year instead of crisis time.
4. Government could set up alternative source of drinking water which could be available for the women.
5. Indigenous medicine plant could be preserved and women's knowledge regarding medicine should be recorded.
6. Government establishes an information centre to deliver the messages regarding the weather and have access to their right.
7. Women's informal source of information (gossiping on the yard, and the bank on the pond would be properly documented.
8. Government could take the initiative to uplift the home stead to protect their house from the flood.
9. It is also government responsibility to supply the seed to the people after the disaster without any cost.
10. Government could help the people to plant more plants to protect them from the river erosion.

NGOs Activities:

1. NGO could do various program like as, motivation and offer sustainable source of income for the women.
2. They could provide gender sensitive program to the male and female of the disaster prone areas.
3. They could sanction small amount of loan to the women with that they could manage to buy the necessary things.
4. The people (both male and female) could be more aware through the NGOs activities.
5. Sexual harassment and violence against women could be properly addressed and social awareness regarding these social crimes should be increased through different programs taken by NGOs.
6. NGOs also could take the responsibilities to deliver the information for round the year.

7. They could make the joined program with the local government for the betterment of the people.

Activities (Long Term)

Government

1. Government would have to develop a gender sensitive policy by including women's indigenous knowledge and their opinions.
2. Women's agency should be given priority over the disaster period.
3. Government could provide proper knowledge and training to the people of these disaster areas.
4. Some initiatives like as alternative source of income, continuing of education should be taken in the early period of disaster.
5. Reserve water system could be developed by government to supply drinking water in the crisis period.
6. Government could search for the local source to collect food and other necessary things rather than bringing from the capital.
7. Government could give the khas land to the people in these areas to create the source of income or residence.

NGOs.

1. They could increase the number of shelter homes for the teenaged girls and the women.
2. They could provide disaster management loan to the women fro long time.
3. They also could develop a long term gender sensitive disaster management policy along with government and ensure the involvement of women with their agencies.

Chapter - 1

Introduction and Methodology

1.1 At a glance:

The study explored the scenario of vulnerabilities (Social, physical, psychological and economical) of women to climate change and incorporated their indigenous knowledge in disaster management and risk reduction in the Northwest Bangladesh. Bangladesh, especially the northwest region, is likely to be on the front line to survive the most severe impacts and extreme climatic events. People, in this region, have a high reliance on climate-sensitive natural resource sectors for agriculture based livelihoods and incomes. Women in this area play an important role to combat disaster that has not been explored much in government and non governmental documents. The Study examined the gender gap of Disaster Risk Reductions (DRR) and Climate Change Adaptation (CCA) approaches. The findings of the research would be able to bring out some strategies and action to reduce women's vulnerabilities to climate change through gender mainstreaming by analyzing their experiences and need assessment.

1.2 Background Thought

Climate change is a global phenomenon, with impacts that are already being experienced on human level. It is recognized that it is those who are already the most vulnerable and marginalized experience the greatest impacts (IPCC 2007), and are in the greatest need of adaptation strategies in the face of shifts in weather patterns and resulting environmental phenomena. At the same time, it is the vulnerable and marginalized who have the least capacity or opportunity to prepare for the impacts of a changing climate or to participate in negotiations on mitigation. As women constitute the largest percentage of the world's poorest people, they are most affected by these changes. Children and youth – especially girls – and elderly women, are often the most vulnerable. Women generally are at greater risk during disasters and their aftermaths because of multiple factors. Most importantly, women are more likely than men to live in poverty. When Hurricane Katrina hit, 25.9 percent of women in New Orleans were living below the poverty line compared to 20 percent of men.¹

Recently a report of UNFPA stated that impact of climate change will be most upon the poor women of poor countries despite the fact that their contribution in this change is very little. According to The State of World Population 1.5 billion poor women will be in the forefront among the probable affected.

¹ Gault, Barbara, Heidi Hartmann, Avis Jones-DeWeever, Misha Werschkul, and Erica Williams. "The Women of New Orleans and the Gulf Coast: Multiple Disadvantages and Key Assets for Recovery Part I. Poverty, Race, Gender and Class." 2005. Institute for Women's Policy Research. Publication No. D464. Washington DC.

The disasters those take place in Bangladesh affect women most. During this period women's household activities increase to a great extent. They have to invest more time and energy in preparing food and accumulating water, fuel wood, twigs and leaves. Female children have to be involved more in domestic affairs and drop out of school. It has been evident from studies that at that time child marriage increases a lot. While the disaster takes place women try to take the children to safe zone on one hand and preserve the household things on the other. All those are very insurmountable for them. A number of women die in doing these. At that time as young children don't want to leave the lap; mothers have to move along with them. For this both women and children suffer from miseries. Very often those cost their lives. Whenever any sort of natural disaster (particularly in flood and cyclone-affected areas) in any part of the country visits, it poses health threat for pregnant and lactating women and aged women. Usually, aid for family planning and reproduction health reduces and the rate of pregnant mortality increases. Due to the climate change fertility of land has been damaged to a great extent and it would continue in the future. As a result crop yielding will be reduced. Then more women will be suffering from malnutrition. The cause is obvious. In such a patriarchal country like Bangladesh the unequal distribution of food, comparatively less access to the fundamental right as that of food and owing to social ideology the quantity of calorie for women will be reduced.

1.3 Engendering climate change

Gender affects climate change policies in various ways. It is widely known and accepted that disasters affect women and men differently. These effects have also different impacts depending on culture and socio-economic contexts. Changes in the climate can incur different burdens on men and women, and mitigation measures are not necessarily gender-neutral. In adaptation policies, it is imperative to take the gender aspects of climate change and mitigation into account². Whenever needed, strategies should be developed to redress gender-specific problems or imbalances. In addition, adaptation measures may themselves have gender aspects that need to be taken into consideration as well.

Traditional food sources may become more unpredictable and scarce as the climate changes. Women's specific knowledge of maintaining biodiversity, through the conservation and domestication of wild edible plant seeds and food crop breeding is a key to adapting to climate change more effectively. Climate change may exacerbate existing shortages of water. Women, largely responsible for water collection in their communities, are more sensitive to the changes in seasons and climatic conditions that affect water quantity and accessibility that

² According to the IPCC (working Group II), mitigation and adaptation are both necessary parts of the policy response to global warming. Mitigation measures are measures that reduce global warming. Adaptation measures are measures that reduce vulnerability to global warming.

make its collection even more time-consuming. The gendered dimensions of water use and management are fairly well-documented. Women and girls generally assume primary responsibility for collecting water for drinking, cooking, washing, hygiene and raising small livestock, while men use water for irrigation or livestock farming, and for industries (Fisher 2006; Khosla and Pearl 2003). These distinct roles mean that women and men often have different needs and priorities in terms of water use.

A decline in food security and livelihood opportunities can cause considerable stress for men and boys more broadly, given the socially ascribed expectation that they will provide economically for the household. This can lead to mental ill health in some cases. It has been recognized that men and boys are less likely to seek help for stress and mental health issues than women and girls (Masika 2002), meaning that preparation for, and responses to, climate change need to be sensitive to gender differentials in healthcare (including mental) seeking behavior. Stress is likely to be heightened after disasters, particularly where families are displaced and have to live in emergency or transitional housing. Overcrowding, lack of privacy, and the collapse of regular routines and livelihood patterns can fuel anger, frustration and violence, with children (especially girls) and women most vulnerably (Bartlett 2008).

1.4 Why gender analysis is important in addressing disaster?

Women's position in society and the relationships between women and men affect their lives before, during and after a natural disaster. Experience shows that natural disasters affect women and men in different ways. Gender analysis allows the evaluator to provide answers to the following questions: What are the capacities and vulnerabilities of women and men prior to and after the disaster event? How differently are women and men affected by a natural disaster and to what extent? What are the different roles that women and men play in ensuring the survival of themselves, their families, and communities in the face of disaster?

The role of women is central to face the climate change in the Chars (reverie islands) and coastal areas of Bangladesh. Usually the male members of the family go to towns and cities in search of work. It appears that during the time of natural disaster women stay on the spot and take care of elder ones and children. They strive hard in sheer crisis to overcome the situation.

The change of climate has been affecting the environment throughout the world. It has been letting people migrate, uprooting and mounting pressure on limited resources. In different parts of the world natural disaster as a consequence of climate change has been influencing the increase of violence against women. They have to face rape, sexual harassment and different other human distresses. Women become victim of violence at home and refugee camps. And apart from these there are some other difficulties.

The women of Bangladesh adapt different strategies to cope with this situation. They try to stock food, fuel wood and domestic animal feed. Along with rebuilding household they take part actively restructuring different other things. It should be noted here that in 2005 Bangladesh has formulated NAPA (National Adaptation Programme of Action) and is on its way to implement it. The point is that here women have been shown as the victim of climate change but the participatory management of women has not been pushed to the fore. Before disaster, during the period of disaster and to encounter disaster the role of women in circulating the indigenous knowledge and the management of indigenous is denounced.

It has already been noticed that women can assume a disaster before its arrival. Everyone will find cows, goats, fowls and dogs in most of the Bangladeshi household. As women feed them, so they are supposed to be in intimate relationship with those pet animals. They can realize the connotation of their behavior at first. We know that the animals notice the change in the Nature and it changes their behavior. Women can notice the change of sound in the wind. They can anticipate natural disaster before with the change in the color of the water. Also they can notice the change in the nature seeing the color of the leaves.

But women's knowledge is not confined only within assuming the disaster in advance. They encounter it with their own understanding. In this regard three things are prioritized. The first one is agriculture, then comes food deficit and the third one is ethno-medicine. All the women want to preserve seeds and equipments for cultivation at first. They let those sink in the pond. Also they deposit fuel wood. The branches of tree, wood and jute sticks are thrown into water. Along with they preserve dairy feed. In some places furnaces are made on higher plane.

Some women plant different trees to reduce the health-risk in the aftermath of disaster. They plant Nim tree. Nim leaves help to protect them from dirty water borne skin disease. In some places people eat sour leaves to get rid of mental disease. Apart from these, land becomes saline and barren when it is submerged by water. There women plant a kind of tree named Gypsum which absorbs salt and make the land fertile.

Women's indigenous knowledge is utterly important to face the challenge in the aftermath of disaster. Some of the women collect wood, bamboo and branches of tree to use those as fire wood. They make boats and ferries with banana trees to collect necessary stuffs.

Women disseminate their Indigenous knowledge in their various gatherings though it is not acclaimed in the academy. When they sit beside the pond then they usually discuss these things. Their knowledge is transmitted while they hang around and comb hair. But this indigenous knowledge doesn't reach greater public sphere.

Surprisingly little research has been conducted on the gender aspects of climate adaptation. Since climate adaptation has a high degree of international interdependence, if gender inequity aggravates climate problems in many countries, more direct effects can be predicted in our own country. At our present stage of knowledge, much emphasis must be placed on identifying gender issues so that they can be dealt with adequately. The vulnerability of women and men can differ due to differences in how they are affected by climate change and to differences in their adaptive capacities.

Until now, the vulnerability of women has not been focused or politically it has not been brought to the fore. The reason lying behind this is that women know the tactics of adaptability to cope with the change. Also they know the consequences. As organizers, leaders, and the responsible ones, women always tried to reduce carbon dioxide. But In the climate policy change, women's experience, tactics of adaptability and the aspects of gender are yet to be explored and acknowledged. So it is necessary to adapt a gender-based attitude in the climate change strategy paper, financing and project.

1.5 Specific objectives

The study has four specific objectives:

- 1) To identify the sectors of vulnerabilities (mental, physical and social) experienced by women in pre-, Post- and disaster situations.
- 2) To explore indigenous knowledge of women in adapting to the impacts of climate change and what role the knowledge can play in disaster management.
- 3) To analyze the existing model of DRR and CCA and to identify gender gap in these models.
- 4) To map a gender mainstreaming approach in addressing climate change and vulnerabilities of women.

1.6 Selection of Target Areas

This study carried out in Gaibandha, Rangpur, Nilphamari, Kurigram and Lalmonirhat of Northwest Bangladesh. However, Upazilas, unions and villages were selected according to a set of contingency indicators, in order to accommodate diversity and differences in adaptive strategies and capacities between regions and groups, the selection of the research sites may follow the below criteria:

- Poverty zone
- Ethnic areas
- Flood or drought areas

1.7 The number of the respondents:

The study aimed to gather information of 150-200, but finally it was able to reach at 330. However it could not maintain the similar number of informants from the various areas.

1.8 Selection of Study Population

The data for this research has been collected from the general communities of the two target areas with special focus on some marginalized social groups such as: (1) Women in various age groups and situation (girls, adolescence, pregnant and lactating, elderly and disabled) (2) Ethnic Women (3) Women in various socio economic status (3) Women in various religious group

1.9 Methodology

The proposed study was based on a qualitative frame of analysis, with both secondary and primary data and information.

1.10 Tools and Techniques used in Data Collection

In order to get insight into the problem field, pre-existing knowledge base in the relevant fields of indigenous knowledge and disasters as well as understanding of the selected districts of this study, an attempt was made to review the available secondary sources of information. A substantial number of the secondary materials, literatures and information, collected from visiting different organizations and browsing internet resources, were appraised to conceptualize and problematize the research issues, concepts and concerns. These included an assessment of the study areas by natural or physical, socioeconomic and demographic characteristics.

1.10 Pre-testing the Questionnaires

The checklists thus developed as data collection tools have been pre-tested in two field site of Kurigram and Rangpur Sadar. The researcher conducted group discussion, KIIs and in-depth interviews to receive the response of the purposively selected respondent representing different stakeholders as well as crosscutting categories of women, PWDs, occupational minority groups, religious minority groups and the like. Besides incorporating the experience of one day fieldwork, the tools and selected techniques developed for this research were finalized gradually.

1.11(a) Focus Group Discussions and Participatory Learning Workshop

Focus Group discussions (FGDs included ten or more participants) and participatory learning workshops (PLWs involved 12 to 20 participants) were conducted to collect as well as validate data during the fieldwork of this research. The participants were selected through multistage cluster sampling and stratified random sampling as discussed. The research has involved 10 informal Group Discussion sessions and not conditioned by such procedural rules as in the case of a formal group discussion. This technique used to identify and verify the socio-economic condition of vulnerable people, their feelings and condition during climatic disaster, indigenous knowledge, their present condition, the role of different stakeholder to reduce their vulnerability.

The GDs and PLWs provided the context of applying other tools for developing consensus and for getting an indication of how pervasive the coping response in the local context. Identifying the potential coping strategies available at the local vicinity and collecting information regarding coping, hazard, social and vulnerability profile remained as the thematic issues of discussion. Besides, information on local patterns and processes of coping, including respective hazard responses, prices and marketing of local production and etc. were also explored in these discussion sessions.

The FGDs and PLWs included different group of people. One FGD only conducted with the adolescence girls, one dealt with elder people. A FGD was specially focused on Mahato people (an ethnic group in Bangladesh)

1.11 (b) Questionnaires:

Along with FGD and PLWS, the study depended on questionnaires survey. 60 questionnaire survey has been conducted in five the field area of five districts.

1.11(c) Key Informants Interview:

Key informants were interviewed to gather information on problems, hazards, perceptions, feelings, opinions and thoughts. Reflective, interpretative and decisional questions related to each coping response were discussed with the key informants depending on the research objectives and questions set Key informants included Upazila and union level government and local government personnel, staff of the NGOs operating in the area and any other agencies being stationed at the local level. 10 key Informants interview were conducted from the above mentioned areas. The members of the Union Parisad, Local doctors, female members, local leaders were interviewed.

1.11(d) Case Study:

Four Case studies from different age groups and conditions have been conducted from the field areas to understand the trauma of disaster they have experienced and the strategies they followed to adapt the situation.

1.11(e) Narrative analysis:

It is a method of tool of oral history method. To know the types and duration of mental trauma, narrative analysis method has been followed.

1.12 Data Processing

The nature of qualitative data, especially in this research, required a context specific analysis along with a less structured approach. Therefore, the recorded outcomes of this research were rather unstructured in nature, and the analysis of the collected qualitative data was not a mere simple task or straight-forward process. Screening, content analysis and narrative analysis were applied as approaches to interpret the collected data and to invoke meaning of the material assembled. The recorded findings of the participatory methods, as deployed in

this research, had to be categorized to generate meaning as well as to make sense of qualitative findings.

The initial screening process organized and sorted out primary data according to its components and the topics of inquiry that allowed the research team to examine, compare, conceptualize and categorize data³. This was mostly done during our stay in the field or else, in some cases, immediately after the fieldwork i.e. after interviews and focus group discussions had been transcribed. Early screening was, so to speak, preferred to maximize the advantage of respective contexts to categorize data and to perceive the social reality in terms of those contextual categories. The researcher explored the possible linkages and relations between different categories of data. Content analysis during screening and sorting were performed as mechanisms to categorize, organize and record primary qualitative data for further analysis and interpretation.

Different models of narrative analysis⁴ were engaged to analyze qualitative data in this research. The researcher considered narrative analysis as complementary to semi-structured interviews, allowing for the uninterrupted flow of information. Some proponents of narrative analysis see it as a truly participatory and empowering research methodology insofar as it gives respondents the venue to articulate their own viewpoints without any structure restricting their expressions on a particular subject. Notes and transcription of semi-structured interviews were analyzed to interpret the findings of an activity process concerning emergency response regarding disabilities.

1.13 Quality Ensure

The study emphasized the need for achieving and maintaining the highest level of quality possible throughout the performance of the research. All collected, accepted and analyzed data in this research underwent specific quality control assessment. All data were critically assessed during and after collection to ensure the quality of the data. These assessments included independent performance audits, data processing audits, as well as external review of the tool and templates used to collect the data.

All data reporting were extensively reviewed to identify all problematic and missing data points. At large, the data accepted for processing passed through extensive screening process for quality assurance based on interpretative and diagnostic analysis on the following criteria, e.g. 1. Precision, 2. Accuracy, 3. Representativeness, 4. Completeness and 5. Comparability.

³ Strauss and Corbin, Basics of Qualitative Research: Grounded Theory Procedures and Techniques, p. 61

⁴ Four models of narrative analysis can be distinguished: thematic analysis (emphasis on what is said compared to how it is said), structural analysis (emphasis on the way a story is told), interactional analysis (emphasis on the dialogue) and performative analysis (emphasis on performance such as gestures used). See Riesman for details.

1.14 Methods of Data analysis

1.14 (a) Data Entry:

SPSS software was used to entry the data collected from questionnaire techniques to determine the relevant information worked as supportive data. But this was only followed to entry the quantitative part of the questionnaires.

1.14(b) Data Analysis:

It is noticed previously that two types of data were collected. Most of the data in this research was qualitative. The study focuses on the vulnerability and impact of flood, river bank erosion and flash flood on the PWDs, female headed households, sex groups, occupational minority groups, religious minority groups, landless and land owner and their coping strategies. For this reason qualitative data was gathered rather than the quantitative data.

The purpose of qualitative inquiry suggests that the process of data collection is not an end in itself. The culminating activities of qualitative inquiry are analysis, interpretation and presentation of findings. The challenging task of the research team thus is to extract the sense from the massive data reducing them to sizable forms, identifying their significance and constructing a framework for communicating the essence of the messages they contain.

We have a few agreed methods for qualitative data analysis. These are applied in drawing conclusions and verifying the sturdiness of the problem. But no formula can determine the significance and no method can replicate the researcher's analytical thinking process. These are some of the problems. It does not mean that no guideline was followed in analyzing the collected data. Definitely guidelines and procedural suggestions are not rules of which some are discussed here.

1.14(c) Interpretation of Interviews

Regarding open-ended interviews, cross case study or cross interview analysis for each question was done. Answers from different people were grouped together.

Variations in individual characteristics were the primary focus of the study and hence individual case analysis was done first by using data so collected. Then cross-case analysis was done by showing variations in answers to common questions to represent individual traits.

1.15 Limitation and Experiences

Limitations

1. Since the time for the study was not missive enough to reach such areas, the study could not reach all the experiences faced by the people in the disaster period.

2. Sample Size– because of limited time and resource constraints– remains relatively small vis-à-vis the geographic coverage restraining the extent of confidence in generalizing the statistical analysis and to capture variations and diversities on the ground. However, the qualitative tools and techniques were largely used in reducing such limitations.
3. It was not possible to collect enough data from one of the most vulnerable groups such as children and hearing impaired respondents and the people who suffered mostly.

Experiences:

The study houses the experiences of people of different Socio Economic Status and various groups. Most of the cases the respondents were very interested to express their opinion. The informants belonging to age group 12-20 were shy at first but when they were asked separately in a group they opened up about their vulnerabilities that differ from others. In some groups, the informants thought that it was a great opportunities for them to ask for some external help i.e relief or other assistance. The researcher was in great but painful experiences when she wrote down the pathetic story of a pregnant mother's pain during the disaster time. It was also very much pathetic when the young girls described their traumatic experiences of near- to- rape situation in the school when they went for having shelter during the flood.

Undoubtedly, it was very hard to document the narratives of the women when the researcher sat for the report.

1.16 Mapping the chapters:

The first chapter of the report houses a lot of things such as, introduction, background though, aims and objectives, detailed methodologies, process of data analysis, field area and the types of respondents. The second chapter highlights the socio economic status of the informants. The next, underscores the violence against women in the disaster situation. Chapter four accommodates nature of vulnerabilities that women are facing in pre-post and disaster situation. Chapter five explores the extra workloads of women in the crisis period. Woman's agency on decision making in the vulnerable situation has been depicted in the chapter six.

The nature of natural hazard has been portrayed in the next chapter. Chapter eight and nine particularly deal with the women's indigenous knowledge and its implication. Gender based relief politics has been discussed in the chapter ten. The gender gap existed in the Disaster Risk Reduction and Climate Change Adaptation policies are exhibited in chapter eleven. The prospective gender mainstreaming approaches and suggestions are depicted in the final chapter. Besides, relevant references are included here.

Chapter-2

Violence against Women

The violence against women in the time of disaster was practiced severely. The informants in the field areas were reluctant not to disclose their experience. They kept it as secret and if revealed, it destroyed the 'honor' of women. But it is found in every field area that rape is the common phenomenon during the disaster-driven crisis.

The crime of rape, perhaps more than any other violent offense, avails itself of the vast human vulnerabilities associated with natural and human-made disasters. Obviously the type of disaster, the degree of disaster preparedness and emergency planning, the efficiency level of social control agents' operations, as well as the extent of communities' disorganization and destruction and relative length of recovery time have an influence on the nature of criminal opportunities associated with a specific disaster.

Several disaster researchers have argued that much disaster research has taken a gender-neutral stance or otherwise treated female and male differential responses and behaviors to disasters as "dichotomous survey variables in disaster research" (Enarson and Meyreles 2004; Fothergill 1998; and Fothergill 1996, 33). Early critiques of gender bias in disaster studies have focused on the clear omission of women's special disaster-associated vulnerabilities (e.g., victimization patterns; domestic violence; obligations related to the care of children and elderly family members; evacuation and geographical displacement; economic, racial, and age disadvantages; psychological strain; and male dominance of law enforcement and other disaster management officials at upper and lower levels, etc.).

2.1 1 Rape

The case of rape was also happened in that time. Among the five areas, in the two fields the women were raped and they faced the situation in the school where they went for taking shelter. But it is observed that in all field areas the matter of rape was a fishy matter and some of them said that it was a very common thing in the shelter home and other places but nobody wanted to give the specific information and added that the girls were part of their societies, so they should not disclose their incidents to others.

The Up members, especially the women members acknowledged the information and they did a traditional dispute resolution (Salish) to do justice. But it was very difficult to prove the rape since the rapist was not taken in the scenes. Another was committed by the side of a pond when a sweeper teenaged girl went there to have a bath when her house was under flood water. Her parents also made

complain against that occurrence but the opposition was so powerful that they did not get any justice.

Case: Sefali, a girl just crossed the age of thirteen was raped in the street when she went to wells to collect drinking water for the members of the family. The family of the girl took shelter in the school where they experienced serious water problem. They were in the school for fifteen days. Azad, a boy from neibours village teased the girl while going to school. The girls never reacted or responded towards it. But two years before the incident the parent of the girls informed that the boy often stalked the girl and he coerced them into marry the girl at any cost. Since he failed to do that and he was looking for having the chance to take revenge. The time came. The girl's family took shelter in the school building with others of the village when their houses went under water. They did not have places to take bath and to excrete. Furthermore, it was the girl's duty to collect water from nearby ponds to cook and help her mother.

It was near 3 p.m. The girl with some of her friends went to the pond to collect the water for her family members. While returning to the shelter home, the boy blocked her way and threatened her and forcedly tried to touch her body. The friend of the girl shouted and they left the place with fear and informed others in the shelter home and asked other persons to help the girl.

The girl's parents denied accepting the girl. But they sent the girl to their relative's house and they informed that to the member of Union Parishad. Finally a *salish* was taken place but they could not do anything in favor of the girl. The female member of the Union Parishad stated that since it was not rape, they could not force the boy to marry the girl. If she was raped, it would be easy for them to settle the problem.

The parents of the girl arranged marriage for the girl with the higher price as dowry since everybody knew that she had lost her `honor'. Since then, every year they had to pay a big amount of money to the girl's husband and their family.

2. 2 Beating the Wife

The study found that the ratio of the beating of wives increased in a good number during the crisis period. Men became jobless and lost all of their options to get money but they always wanted food from their wives. Most of the time their wives also could not manage the food and then they started beating wives for not having food.

The male informants of the research suggested that if government could offer job or other sources of income at that time, the male wouldn't have got carried away.

2.3 Sexual Harassment:

The case of sexual harassmt occurred in every field area. Most of the informants stated that during the flood they most of the time use to wear wet

dress and the males of their village or other villages sometimes teased them and told bad thing to them.

Dhanswari Rani of Taluk Sahabazpara village of 5 No Balapara Union, Rangpur expressed her experiences as a victim of sexual harassment during the time of river erosion. She said, we did not have the space to take bath and toilet. . We used to go to the houses of other people and we could not manage the time and place to change our dress. We had to return with our wet dresses. Some boys from other villages would start laughing to see us and pass bad comments.

Another girl complained," *I samoyto panir karone amra savhabikvabe chalaphira korte parina, pajama onek samoy hatur upore uthate hoi, tokhon chelera nana kotha bole*"

Chapter -3

Vulnerabilities of Women

(a) Social Vulnerabilities

The research was to investigate the vulnerabilities of women in four categories i.e social, mental, economical and physical or health. The hazards come to women during the pre disaster situation. When women fathom that there is a possibility to face the disaster they feel nervous to think about the vulnerabilities of them especially young women of the family. The study noticed several types of vulnerabilities that women are generally facing.

Social Vulnerabilities:

Women in disaster prone areas experience various kinds of social problems and harassments. Some of them will be discussed in the following sections.

3.1 Dowry:

Most of the cases in the disaster time, the amount of dowry is higher than the other time. Though in the areas, dowry is very common, this increases during flood or drought. Among the 11 focus groups, around 200 respondents, 22 of them suffered from extra dowry.

3.2 Family Crisis:

Family structures of the studied villages in two different districts are pretty similar. Like any other villages in Bangladesh, there was presence of both extended and nuclear families. However the presence of two-parent nuclear families was higher. Over time, various factors such as changes in family land ownerships, growth of market, and population growth etc. created a demand for nuclear families.

In most nuclear families, it is the male member who is expected to be the provider of bread and butter for the family. During flood, when males become jobless it is difficult for the family to survive. Field data suggest at times of flood, it is the women who take more responsibilities to run the families. In the context of male dominance and authority in rural households, males lose their control over women and family incomes due to his being joblessness during flood. Data suggest that family feud between husband and wife is also common at times of flood. As many women mentioned their husbands become impatient during flood and fights with them on issues mostly for bad and late cooking.

After flood, seasonal migration of male members is of another concern for women. Although temporary, women have to uphold more family responsibility to protect children in absence of their husbands. Besides, the women of nuclear families, the young women and girls becomes significantly vulnerable and feel highly insecure during the absence of the male members of their respective households who are on temporary migration. Every informant informed that during the time of crisis, quarrel and misunderstanding between the families

members happened due to the uncontrolled situation. The temperament of the every member was not stable since there was a scarcity of food in the house, and they could not feed their children at all. They used to blame each other and thus led a quarrel and family violence in the households. Most of the women said that they were beaten by their husbands in the time of crisis. They also blamed their husbands for not doing anything in that time, because they did not have food to eat.

3.3 Polygene:

The informants said that during the season of disaster the male member of the family often went away from the often and they easily went to another place for the shake of collecting work and then they got married again and never returned. Among the five districts the 33% male got married second time only for this reasons. The left the family members and tried to blame the women for the worse situation in their life.

3.4 Early Marriage:

The study explored that due to the disaster the ratio of the early marriage of these areas were very high. The informants said that since the dowry is so high and especially the time of crisis they were very worried about their teenage girls and they were scared of their security. Only for this reason, they try to marry their girls off. Age of the most of the girls in the field areas were under 16.

3.5 Call Off Marriage

The informants said that some of the proposals had been called off due to the disaster. One respondent told that her marriage was almost fixed. But when their house went under water and they were taken to the shelter home, the match maker once came to them and said that the bride groom's family was not interested to take her as a member because they considered her as unlucky. The news made her very upset and brought her an uncertain situation. She added that if any fixed proposal did not work out finally, it was very tough to arrange another marriage for a girl in the society since everybody came to know the story. It happened three years ago. Now most of the people in their village treated her as over aged girl because most of her juniors had already got married.

3.6 Crisis of female headed household:

Households headed by women take on special significance in the context of male-domination. In many societies the culturally appropriate arrangement is to acknowledge men as publicly accountable and thereby de jure heads of households. Such recognition does not deny the strong influence and occasional open domination of women in the household. Nor does it deny the important role of women who maintain the home front while their men are away at work or war. Disproportionate numbers of woman-headed households arise throughout the world in association with unstable and irregular employment possibilities for men.

While this under- and unemployment pattern is often associated with male migration for work, recurrent male absenteeism in it does not produce woman-headed households. Regular and adequate remittances serve to maintain conjugal bonds and nuclear family households (Wiest, 1973). Ironically, absentee earnings can reinforce the male breadwinner role and the continued dependency of women (Wiest, 1983). An extensive engagement in the market economy is likely to be accompanied by barriers to the organization of women, once again illustrating the inappropriateness of blaming "tradition" for the absence of women's organizations (Arizpe and Aranda, 1981). Nonetheless, the search for income sources often fragments the household, and typically removes the productive men (Rathgeber, 1991:6). The incidence of women-headed households is clearly linked to this phenomenon, as well as to war. Especially in societies with strong patriarchal ideologies, a woman abandoned is a woman scorned. Most are left with meager resources, and often with the burden of dependent children. Many are forced by rural poverty to migrate to cities. They enter the labour market as domestic servants (Leon, 1984). Disproportionate numbers of woman-headed households in male-dominated societies signals poverty, destitution, and home times despair (Westergaard, 1983). With appropriate assistance in the form of credit, political support, and consciousness-raising education, woman-headed households can become the target for a new empowerment of women. Such households can become a significant and constructive challenge of male-dominated patronage that often excludes women from participation in community decision making (Martin, 1990; Wiest, 1994).

3.7 Regarding shelter:

The study found three categories of shelter homes. Women, in most of the cases, took shelter in the school building and the mosques. But women opined that in the schools they seldom found light in the bathroom. The Mahato Women said that nobody suggested them to go anywhere, and they went to the Church and took shelter on their own.

Besides, the sweeper women were not permitted to take shelter in the school; they stayed in the open platform or khash land as they were considered 'untouchable'. They slept on the ground and felt insecure. The women in Kalamati, khandia gachi, Lalmonirhat district, informed that they usually slept in the open road and some of them went to the other people's house.

The women suggested that the government should ensure secured place for women and incorporate separate shelter home system for the disaster affected women. The government should also give more concentration on sanitation system and the availability of drinking water for women.

3. 8 Stopping the Schooling:

The informants stated that in time schoolchildren cannot go to school because roads are overflowed and people take shelter in the school building and it takes 3-4 months to start school after the flood. Some of the teenage girls dropped out after the long vacation.

3.9 Disruption of social relations

Crisis is compounded many fold when social relations are destroyed or threatened. Crises destroy normal support systems. Disasters may result in loss of lives, in physical separations for varying periods of time, in forced relocation, and in permanent separation of some community members. When the social order is profoundly upset by a disaster, survivors are anxious to restore it. At the outset, a cooperative spirit often prevails. Surviving community members initially gain strength and perspective in sharing their frustrations, sorrows, and joys. Domestic groups of distant kin or even unrelated persons arise to form basic units of cooperation and sharing. After the Yungayavalanche (Oliver-Smith, 1986:100) kinship of the remotest kind provided a basis for the formation of a household under the protective roof of a tent. After the immediate impact, however, it is common for people to attempt to reconstruct the old social order. This often means a restoration or even strengthening of the old alliances and advantages of some over others. The urban survivors of the Yungay avalanche were seriously threatened by the breakdown of an established order, especially with the threat of an essentially equal distribution of aid. It was not long before they outwardly proclaimed their superiority over the peasants (Oliver-Smith, 1986:150ff).

3.10 Displacement:

The natural disaster causes internal displacement for women in many cases. Some families in five districts said that they sent their young girls, pregnant women and old women to kin's house or other places for uncertain time to ensure their security. It is recoded that some families also displaced more than five times due to continuous river erosion. And whenever women are displaced, they experience differently.

(b) Health Hazards

Health has an important significance to assess the vulnerability of people during and post flood situations. The prevalence of diseases is high at times of flood. Especially when the flood water recedes, many water borne diseases such as diarrhea, dysentery and other skin diseases spread. Among others, women and children have a high prevalence of being affected with water borne diseases. People rely heavily on their traditional knowledge of treating these diseases. Most people know about oral saline and they buy saline packets from the local market. Many mentioned that if needed, they also knew how to make saline at home. Use of traditional healers is very common. However, in case of emergency they seek modern medical treatment from the nearby hospitals. Physical presence to hospitals during flood is a real challenge for them. It is very difficult to arrange boats and *vhuras* during flood to carry critical patients to and from hospitals. The persons with disabilities (PWDs) even face more challenges to having physical access to modern health facilities during flood. In addition, lack and high cost of medicines also are problems for many at times when they barely can feed themselves.

They are exposed to many diseases at times of flood. The sufferings from diseases are something which cost them heavily. Most of them cannot afford the cost of treatment if the diseases require to be treated in modern health facilities. Lack of transport, infrastructure and quality health care facilities makes their life very risky during and after the flood.

3.b.1 Women's especial Diseases:

Diarrheas, Cholera, skin disease are the common for all the people regardless of sex and age during natural disaster. But women suffer from different types of diseases. Since most of the cases, they do not have any fixed place for taking bath and sanitation they usually try to have little water which lead to urine infection. Women are forced to wear wet dresses since they have no space to change it and they have to work with these. It is recoded that the main problem of this situation for the women was lack of proper sanitation facilities. Women who got shelter in the school or other places like mosques and Union office buildings found very little scope for using toilet. But the women who were in the house and took shelter in the tang they also faced difficulties about sanitation. Due to the over flow of water inside the house, the sanitation system breaks down and the water mingled with garbage smell bad. Since women were busy with water, the gangrene took place in their hands and legs. Some women also suffered from arsenic during the crisis. Fever, asthma, Jaundice, Coughing, breathing problem were also very common among women. They had to keep their children in the lap and do the job carrying the children, their physical condition became worse and they felt pain in the whole body.

3.b.2 Teenaged Crisis

The teenage girls mostly suffer in this period. Mansura, a girl from Lalmonirhat stated that she felt very nervous at that time. She added that most of the girls of her age group suffered from white discharge. They opined that they had pain in their legs, they could not eat properly and they were nauseated then. They faced problems in menstruation period during the flood. They could not go to toilet and due to lack of water it was difficult for them to wash the napkin and dry it up.

The miscarriage rate is also so high in the field areas during the crisis period. It is seen in the study that 50 women from five districts faced the experiences of miscarriage in this time.

The research group communicated with the village doctor of Kalamti, khoniagachi of Lalmonirhat district. Dr. Assaduzzam, a village doctor stated that some women especially pregnant and lactating ones became mentally imbalanced during the time. Dis menstruationis also very common among the women at the age group of 13-50. He also opined that the ratio of miscarriage and abortion are so high.

3.b.3 Women's food

Similar to these, since women had workload and they did not have enough food for the family, most of the time they waited for the access food. When every member had a square meal, the leftover was for the women. Sometimes women had to go without food. Their health became weak and they experienced malnutrition. Due to burden of work and lack of sufficient food some women became paralyzed. Six adolescence girls informed that they passed through the situation of bleeding.

3.b.4 Drinking Water:

Women are the ultimate victim of the unavailability of drinking water during the crisis period. They said that the NGOs sometimes, though inadequately, gave them some tablet to purify water. They first try to save their family members (husband and children) from the diseases with this drinking water. Due to shortage of drinking water they drank ordinary polluted water that was available to them and easily developed jaundice and water borne diseases compared to others.

3.b.5 Saline:

The number of saline was inadequate in the field areas. The informed related that members of the Union Parishad, NGOs usually gave them Orsaline and women made saline especially for the family members but they did not care much about themselves. Their health became weaker and being deprived of necessary salt and water.

3.b. 6 Birth Control

Another important finding came from the research that birth control pill was the only method to control birth and women are commonly linked with it. But in flood situation they were not able to have birth control pill and the pregnancy rate was so high at that time.

In addition, women also felt nervous and helpless. Since their work has been increased, and they had to work with the water for long time, it was also seen that they had pain over the body and sometimes it continued for a long time. They needed to carry all the loads to a secured place when they came to learn that the water was increasing.

Case:

Sukuri, 35 years old women of Purba Satnai Kolony of Dimla, Nilphamri district narrated her sad story. The incident happened 7 years ago. She was pregnant. She was not aware of the water. Suddenly she saw that their house was full of water. Her mother in law just pushed her to take the seat on the Tang. And then she joined her. It was the time to release the baby she was completely blocked by water. Her in-law advised her to take shelter in their made 'Dharna'. Three days passed. Everybody in the area left them but she could not do that since she did not get any help from anybody. Only in law and she were inside the house. It was very tough for her and in law, since they could not manage any food for them. Even she could not drink pure water. The water they had was poisonous and dirty. Her mother in law was the only person who just told her to keep her patience. Her mother in law also did not leave her. They were inside the house with water for three days without any food. She cried her eyes out and looked for the help. But everybody shared more or less the same situation. Who would come to her aid? She just received the situation as a fate. She requested others to send the message to the Up members.

It is commonly practice in the field area that they asked for traditional attendants when they needed any help during pregnancy. But due to unavoidable situation they could not find any 'Dai' for her case.

Her husband was able to send some food by Vhela after three days. But with in this time her physical condition became worse. She was too weak to move. Three days went by, and then she lost her consciousness and bled for such a long time. Including her husband, everybody in the village went to the school to take shelter. Even her mother in law couldn't come to her assistance. At last she gave birth to a stillborn baby who floated in the water without setting its eyes on her. The two persons were very upset and her mother in law just prayed. She even did not see her baby. She was near to death because of nonstop bleeding and weakness when the message was sent to the Union Parishod and they came and brought her to the hospital.

Finally with the help of members of the Up she was taken to the hospital and she remarked that she never forget the experience she has ever achieved. She lost her baby and it took a long time to have a good health again.

3.b.7 Sufferings of Aged Women:

The study also found that during the crisis the aged women suffered a lot. They could not move anywhere. If they wanted they had to depend on others. They easily went down with fever, diarrhea, skin diseases. In the field areas, more than ten women stumbled and had their arms broken in that situation and they suffered a lot. Besides, feelings helpless, the aged women often lost their mind.

3.b.8 Differently able Women:

Likewise, the differently able women's experiences are worse than that of other women in the field areas. A women stated that one differently able girl was sexual harassed in the shelter home by her very close male relatives who also took shelter in the same place. The girl could not express all the violence since she was dumb. But her relatives understood by following the girls' symbolic presentation of her sorrows. They added that the family who have differently able child was tenser than other during the crisis period. The differently ble child was mentally shocked and they felt helpless. They cried and shouted with fear and they thought that they were more insecure in this time.

The informants said that they preferred to go to hospital (community hospital) when they faced any health hazard.. Only two FGD's (Gaibandha and Rangpur Sadar) said that the doctor never came to see them. They depended on traditional medicine (indigenous medicine) or went to hospital. The Mahato women told that they were in medical care since in most cases they took shelter in the Church. People in the church arranged this for them. Conversely the sweeper never got medical facilities from doctors. They said when they would go to doctor, the doctors never touched their body and used to say, what is the problem with you, tell it from the outside'. But they received good behavior and advices from the sales-person of medicine shops. They added that no NGO gave them any saline or medicine during this situation.

(c) Trauma

Many psychological studies substantiate the argument that behavior cannot be analyzed without considering the effects of the social environment in which it occurs and which shapes it. In the context of concerns with mental health, the term "psychological" is often dominated by the connotation of need for mental health care linked to emotionally disturbed people. Departures from "normalcy" as manifestations of abnormal stress levels can produce stress responses similar to that associated with persons who are classified as mentally ill in some societies. One common but erroneous notion is that women, more than men, are prone to nervousness and hysterical attacks. Consequently, they are more likely to be labeled as "mentally disturbed patients". The term "psychosocial" draws attention to the large number of contextual variables involved in a stress response, and not only to the survivor's emotional behaviour. Dubious classifications of behaviour should be avoided, and efforts should be made to appreciate the context of disaster and emergency related responses. One of the well known characteristics of unusual environments is stress and its effects on people. Stress is variable but always present in different phases of an emergency or disaster. Unusual situations, such as in emergencies or disasters, in themselves become powerful stressors that lead people to experience stress (Mocellin, et al., 1991). Women experience the greatest stress due to their multiple responsibilities and generally inferior social status. It is well known that "stress weakens a woman's resistance to disease and adversely affects her ability to undertake essential economic and family activities" (Kelly, 1989).

Stress can be defined as a state of physical, psychological or behavioral imbalance elicited by an inadequate individual capacity (or inadequate psychological resources) to cope with environmental demands. Stress is felt when people "strive to retain, protect and build resources ... what is threatening to them is the potential or actual loss of these valued resources" (Hobfoll, 1989:516).

. Common reactions to disasters are shock, disbelief, anxiety, sleep disturbances and impaired personal relationships Long-term effects – found between two and four years after the aftermath – can include alcoholism, depression, child and spouse abuse, psychosomatic complaints and severe anxiety (Gist and Lubin, 1989). Frederick (1980) recognized that natural and human-induced disasters are not comparable from a survivor's view point; survivors will react differently depending on the emotional phase they experience, the degree of psychological symptoms, and the social processes they encounter. Maximum social and psychological disruption results from disasters or emergencies which are abrupt, uncertain, and unpredictable, occur during nighttime, are of prolonged duration after their initial impact, do a broad range of physical damage, lead to death and injury, and expose victims to death and badly injured people.

With this social and health vulnerabilities, it is again women who are the sufferer of mental trauma. The research focused the issue of trauma of being a victim in the disaster period. The women who had traumatic experiences during the disaster period couldn't forget the experiences and when they recalled this they seemed very upset. It is a very common picture that in every crisis, there are some people who fall a victim to trauma. They bear this trauma for the rest of their life because their experiences are essentially different from that of male's.

3.c.1 Emptiness:

It was reported that in the study that especially the adolescence girls were senseless and they felt 'blank' (*Sunno*). They felt some irritating pain in the legs and always felt insecure. They were in such traumatic situation that they could not hear anything properly; they just started shouting when they saw water. For this reason, they could not eat properly and even could not talk accurately. The sense of insecurity created stress and the lives turned to them as very much unexpected.

The aged women also experienced 'mental disorder' due to the unbearable vulnerabilities. Small girls also did not behave as usual. The pregnant women who suffered most could not forget the tragic incidents that are happening every year. One woman narrated that her two children just died in the water and then when she saw the water she was changed and said many things, apparently without rhyme or reason, and started crying. She was mentally imbalanced for last five years and still she cannot take it easy.

Everybody knows that she behaves differently when there is a possibility for flood or over flowing to happen. The symbols of mental disorder of teenagers and the older are higher than other age groups.

3.c.2 Over stress:

The women confessed that they could not work properly because of being over stressed. They did not know how to overcome this and they felt very nervous. For this reason they beat their children sometimes and fall out with each other.

3.c.3 Psychology in the shelter home:

Among the five field areas, women mostly take shelter in the schools but some of them also are offered shelter in the churches and some of them did not go anywhere for shelter. But this is very common that teenaged in every where feel insecure since the shelter home is mixed home for every body. And especially every women they feel tension regarding their bathroom and toilet. They also scared about the sexual harassment that happen in the shelter home and they were in tension, could not sleep properly because they were tensed and wanted to return home with in a very short time.

Case:

Another case can be presented here. This is about a girl named Ragani from the sweeper community of Rangpur Sadar. The girl said since she was a sweeper, no body from the Bengali society wanted to mingle with her. During the flood, they took shelter in a platform, not in the school given by municipality. It was not a home, no roof, no room; they just got the space to sit. Suddenly three boys from Bengali community came with motor cycle and passed very bad comments towards us.

We did not say anything since we were in very bad condition. After two days we stayed in that open space. I went to the nearby pond to have shower, one of these three boys forcefully pressed me follow him and did very bad things that I could not want to share. I was senseless for three or four hours. My parents heard the story and rescued me with the help of a Bengali Women. Then she went to commit suicide when she came to know that she was pregnant. She wanted to make complain against it but she did not get enough support in favor of it. Finally a Bengali woman saved her life and brought her to the hospital and made an abortion. I was in the hospital for three days, because I could not move. The Bengali women then again asked me to stay her home for some days and she fed me like her daughter.

She was only twelve years old that time. Even she could not understand many things. She did not know how woman becomes pregnant even she never thought that she could be raped by Bengali Muslim people. Muslim people never talked with heart with them. They always talked with them when they needed their help to make their house clean.

But still now she could not do any thing properly. She always thinks that what a life she has! When again flood came this time, she did not leave, everybody left the area but she said 'I do not want to go, if death comes to me I will die here'. And she says still now I am bearing the pain of my incident and I hope nobody will be affected like me.

Her mother informed that it was not the first time, during this season, many girls of their community faced difficult situation, though in the normal time no body wants to get in touch with them.

(d) Economical Vulnerabilities

Women face more vulnerable situation economically than the in the disaster period. Among the informants, most of them are landless. They women do not have any land from their father or mother's side. They have no control over the land and do not have the authority to take the decision about land. However the Mahato women only cultivate the land as a day laborer since they have no land of their own.

Only a few women have the homestead and they are the persons who always take care of the land. But only 5 women have their own land they cultivate various types of vegetables of their own. They do not need to take the decision from their husband to do that. They said, they plant vegetables for the need of family and some times they sell it to the neighbors and requests the young body to help them by selling this. They just have the control of few land surrounded by their homestead and finally they lost it due to uncontrolled disaster. They also informed that they do have money of their own most of them time. They get micro credit from the several NGOs but they do not have the right to use it. They hand over the money to their husbands or other male members of the families. As a good home manager, women try to add more money to buy many necessary things for the household and family members. But due to the flood they lost all of their production and also lost their possible money.

Similarly women also use to sell hens and duck's egg and most of them have the poultry. They take care of them and when these are very cheap they try to busy this and they often sell eggs and hens to the villagers. They give the money to their school going children for having Tiffin or they buy bracelet, necklace and earring. They informed that the flood destroy all their ways of extra income for the families.

Likewise they make the 'Pati' by the leaves of date trees when they are free or they sometimes sell it when they are in crisis. But when the flood occurs, all the production was lost with the water and they lost their sources of income. Meanwhile some women collect extra fuel to sell in higher prices during the crisis. But when the disaster appears the try to protect them but if failed, then their all hope for income went in vein.

Moreover women frequently sell their ornaments, extra crockery to recover the economic hardship of the disaster.

Chapter- 4

Workload of Women

During flood and other disaster periods women faced different kinds of problems. Poor women suffered from lack of food, clothing and shelter. Unemployment men often sat idle or moved elsewhere leaving their household members behind. It was women, the household based workers, who took responsibility for protecting their houses, children and other members of the family, livestock and other belongings. Traditional gender specific work such as carrying water, cooking tending children and animals became extremely difficult for women during flood conditions when their lives were at risk. Especially while traveling during floods *sari* was like a death trap for women. Often there was no alternative because there was no man around to help, and even if there were, they did not assist women's work because of the powerful ideas of gendered division of labor.

During the crisis, women's gender –assigned tasks, especially procuring food and cooking and providing drinking water, storing fuel and child care were such that they had to bear more physical burden than men did. In the most of the areas, men's normal activities such as agricultural or most of the non-agricultural work outside home remained suspended during floods. In the shelter home women faced problems of cooking, shortage of fuel, felt insecure and failed to maintain *pardah*, insufficient toilet facilities, living in fear of snakes, frogs, mosquitoes and other insects, transport problems, problem's of water collection and many others also visited them regularly. Women's assets such as milk cows, poultry, trees, kitchen utensils were particularly vulnerable to flood. During flood the gender division workloads for women, especially in the poorer categories were insurmountable.

4.1 Nature of Work

Disaster created acute problems for some types of activities such as cooking, cleaning, procuring drinking water and tending small children and animals. Because of the strong gender division of labor, women performed these activities and it became difficult for them to carry out these duties under flood conditions. Women's daily household activities were extended by extra responsibilities to protect their households, family members and other belongings. Owing to the lack of resources, poor women faced greater flood problems than women in middle and rich households. Women reported shortage of food and other essentials, resulted from increasing prices and consequent decline in affordability. They had to eat unusual food and adjust consumption patterns because of this.

The study areas are low-lying land. Plinths of most houses are about two feet high. During the flood almost all the houses go under water. Most houses are made of bamboo pillar, jute stick fence and hemp/ tin on the top. However, those who cannot afford the tin also use other available cheap materials. When the flood water recedes, these bamboo pillar and jute stick fence are of no use as

they get damaged and people require new materials which are difficult for poor people of the areas to afford.

The houses of these groups are most vulnerable because of its poor construction materials (jute stick fence, bamboo pillar, hemp roof). Due to flood, the houses are completely destroyed. However, as they do not have enough money to rebuild their houses, the sufferings for a place to live are very common to this group of people.

In addition, the women headed households also lack extra labor necessary for building/rebuilding a new house. Likewise, the poor construction materials of houses are damaged due to flood. They have no physical ability to repair their house as well as they have no money to have laborers repair these.

During flood, their mobility becomes limited and they remain in the households what they are not used to. When and if, they leave their house in the morning they come home at night. Most males mentioned that they became bored and worried about how to run their families at that time. They used to go to nearby market centers to find ways to fight this situation. With no money in the pocket, sometimes they did without their lunch.

Social gatherings for women during afternoons in the yards were common in two villages. They informed when they had leisure times, they would come to the yard to gossip, talk and have fun. However, during flood when they had waist-deep water around them it became impossible. They mentioned that they remained worried about their children's safety and became more vigilant to protect their houses from venomous snakes and other poisonous animals.

The tasks women in the field areas performed before, during, and after the disaster, the problems they faced, and the coping mechanisms they developed, were related to women's gender identity. The strong gender division of labor forced poorer women to do certain tasks for their household's coping which led them to compromise with *Purdah*. Women, especially in poorer categories, often acted as men did in making platform, cutting bamboo, making bamboo bridges, protecting crops and livestock's and engaging in income generating activities.

4.2 Food Preparation

In the field areas, the kind of food consumed, the sources of food, for instance, own gardens, market, stores, food as wages, the amount and the frequency of food intake varied according to Socio-Economic category even when there was no flood. During flood, there was a great difference in the kind of food, the amount and the frequency of food preparation and the source of food among women in different socio economic categories. The food supplies of the poor, undernourished and malnourished at the best of times, were further reduced during the floods. It was women who had the responsibility for adjusting the household food consumption.

Researchers (Islam, 1977; Currey 1981; Ali, 1984; Abdullah and Wheller, 1985) have pointed out that there are considerable seasonal variations in food availability in Bangladesh and people have devised various means of adjusting to the lean periods. Women's work is closely related to agricultural production, family food and income generation and that is why the burden of food shortage falls upon them.

In the field areas, most of the poor households did not have reliable and stable sources of food during floods. Women in these categories played a vital role in acquiring food from many sources. Poorer women reported that seasonal food shortage was a normal part of their lives at certain times of the year, becoming worse during a severe flood. Women in poorer categories were more responsible for family food procurement. When there was a shortage, these women tried to manage food through their own efforts by gathering edible or wild plants and small amounts of low quality food such as rotten or discarded vegetables or accepting rice gruel from well-off women. Poorer women reported that they tried to save a handful of rice and other food throughout the year to use during the flood season. Some landed women said that they did not have large amounts of land as did middle or rich households and they stored part of their crops for lean years.

Destitute women said that they did not have any land and only maintained their livelihood by a hand-to-mouth existence. Women were asked whether during disaster, they cooked any food, which they would not eat in a normal year. A majority of the women in poor categories said that they did. Women informed that during the crisis the normal pattern of food consumption in their households changed. The price of staple food items became so high that it was beyond the affordability of the poor. They cooked *khesari* or *kalai dal* (kind of inferior pulse) mania or cheer paddy, which they considered to be animal food; curry with fen (rice gruel) and *chhatu* (flour normally made of barely or chickpea or maize); *kura* (the red powdery coating of rice under the husk); lumps of flour burnt in the fire, one handful of rice with lots of water and chili, fried broken bits of grain and different aquatic plants. They cooked in many ways, which were different from flood-free cooking categories. They suffered from food shortage and women commonly sacrificed their own meals for their husbands and children.

4.3 Women and water collection:

The collection of water during disaster caused great problems for women. Women were responsible for collecting and storing water. In the field areas, almost all the tube wells went under water and poor women had to take considerable risks to procure drinking water from great distances. Women had to walk through chest-high water or swim to collect fresh or clean water. Women helped each other to get water from tube-wells using special techniques. They put their buckets under the flat nozzles of tube wells and started to pump. When they saw that the color of the water was different from the flood water, they

raised the buckets. They rarely succeeded in totally keeping off flood water and used *alum* for purification. Another demanding, and less successful, method was to hold a plastic bag over the submerged nozzle of the pump. Poorer women did not have enough fuel to boil water of *fitciri* to purify it with alum.

4.4 Collection of Fuel:

It was Women's duty to collect fuel during disaster. With the addition of their preparation of making *Guchi*, they made tang by bamboos where they gathered various types of materials ie various braches of trees, *Guchi* and other wood, bamboo for the crisis time.

Besides, the women who had pond with her house broke the branches of the trees and threw these to the pond and then collected from the pond. During disaster, they also collected the floating bamboos, broken wood, parts of different things, broken trees and used these as fuel.

4.5 Responsibilities of Children, elder people and Differentlyabled:

During the crisis, it was also women's duty to take care of the children and the elder member of the family. In the last 10 years about 100 children died just for flood. It was women's first duty to look after the babies and keep them off the water. They had to feed them. In addition they took care of them when they became infected with various diseases. Razia Khatun, an informant of Balaghata in Rangpur district, said during the crisis they always take care of the all members of the family. Nilufar, another respondent informed, during the flood they had to help the old female members to wash their body and took them to discharge stools and urine. She experienced that last time, when she did not find any other option for her mother in law. With the help of other women they made a hole next to the shelter and just carried her mother in law to the place. It was a very tough job for her since she was in a bad condition with her children.

4.6 Family Health Care:

There were some general flood related diseases, such as diarrhea, viral fever, jaundice, skin diseases, conjunctivitis and swelling of limbs. It was evident that without any healthcare facilities from government or other organizations during floods, it was women who provided health care for the sick. Only women had knowledge about certain medicinal trees and they used herbs, roots and barks to cure family members from different types of diseases in a flood-free time. Poorer women took pains to collect medicinal herbs from distant places during the floods despite social restrictions. Men, on the other hand, rarely did such work because providing herbal treatment or nursing was not their gender-assigned role. Men in poorer categories also did not have the resources to get modern treatment. It is revealed that the cost of modern treatment forced some of the poor to sell assets and thereby caused further deterioration in their economic condition. However, most of the women, in spite of their own sickness and other activities, tried their best to cure sick family members themselves in order to avoid the cost of modern treatment.

4.7 Re-establishing Sangshar (Family)

As a part of the excess load of the family during the flood, women used to reestablish the family. They tried to drain the water out of their home and made home as before. They also cleaned the whole house when water went out. They said that family members got sick more at that time than during the flood because of contaminants and filth. They try to rearrange the structure of the house, clean the fence and reorganize the house and *Goal Ghar*.

4.8 Feeding the cattle:

Women bear almost one third works in the vulnerable situations. Furthermore they feed cattle and raise cattle, goats and poultry. Livestock also suffer a lot and they are affected by life-threatening diseases in that time. This is woman who again is responsible to take the steps against the diseases and look for the medication.

4.9 Making *Vhela* and Small Bamboo Bridges:

Women in the vulnerable situation made *vhela* by banana trees and used that as a mode of transportation when all means failed. They used it to carry small children to the safer places and collected food and fuel from other places. Some families in the field area also stated that they resumed their lives on the *Vhela* and continued this for three days when they lost everything.

In addition, they also created small bridges by the branches of trees, bamboos and wood they collected from the water to solve the transportation problem temporarily.

Khideza, a respondent, told that the women needed to go to various places to survive, they created the bare minimum and they frequently went outside to find the materials to cook and feed the children and the cattle.

Chapter-5

Women's Agency on Decision Making

The study emphasized on women's agency on decision making in the family and outside the family. In the field areas, some of the informants were involved in NGO's Federation and other Women's group. Women's group solidarity was seen very strong in these areas. Though women bore almost all the burdens during the crisis period, they depended on the men's decision because of the patriarchic ideology existing in the society. But it is also an interesting finding of the research that women could establish their agency and took the lead when taking a crucial decision was necessary.

5.1 Where to go: Notion of Sisterhood

From the women's narratives regarding their experiences, it is explored that in most of the cases, they, especially those who lived river eroded areas, took decision when the male persons were absent in the house. Women tried to manage everything and take decision to save her and the family members. They sometimes wanted suggestions from other women rather than men because they thought that women can understand women's problem better than men. And they tried to manage food from the neighbors' house before men returned to the area.

5.2 Public-Private

However, they said they needed to depend on men in some cases. To inform something to the Up members and bring the medicine for the sick person they asked for men's help. It does not mean that women could not do so but they did not want to go by leaving their children since there was a possibility to loose them. In addition, they tried to manage leaves and vegetables by going here and there by *Vhela*. They were allowed to take the decisions related with food, shelter, home nursing, taking care of the cattle, reorganizing the internal asset in the household. But the decisions related with public spheres were always taken by males i.e, buying vegetables and food items, and the selection of food items and uses of relief items.

The informants also opined that they wanted to give their opinion on some issue but because of patriarchic ideology, they could not do that perfectly. It is also happened that when they found that their decision have not been considered properly, or ignored altogether, they stopped giving decision and preferred keeping silence.

5.3 Reproductive Health and Sexuality

They did not have any freedom regarding reproductive health and sexuality. Women needed to get permission from their husband and in laws when they needed to commute a distance like going to hospitals. Women's choice regarding

sexuality never counted positively. Similarly, during the disaster they could not make any decision on this.

5.4 Prioritizing Men's decision

The rebuilding of the house is also a matter of men's choice since it involves men's effort. As a part of the reestablishment, women went to NGOs to get some loan by following the husband's decision. Women informed that they could easily sell their goods, mostly inexpensive ones, but when they intended to sell the valuable ones, they needed to take permission from their husbands. For instance, to overcome the crisis, when they in need of selling the cow, goat etc. the decision came from the males first and they never asked the females to know their decision regarding these though the women

It is another important finding in the study that women always consider men to be a source of knowledge but men very often consider this unless the matter of women comes. The informants told that though they were confident enough about some of the knowledge but they had to ask the male members of the society to legalize their decision as a correct one.

5.5 Women in Men's World

The use of natural resources is totally depended on male's decision in the family in the pre and post disaster though women preserve the seed and ensure food security for the family members. In some cases, women's decision reflects the patriarchic ideology. For an example, using the drinking water, women feel that it is her duty to save others rather than herself and she offers drinking water to everybody and if something is left only then she drinks that.

5.6 Marriage:

It is a very common phenomenon found in the research areas that the parents arrange marriage for their girl under the age of 18 because of the disaster. But one UP member said that it happened due to the pressure of the women (mothers). But the informants said that now because of the influence of NGOs, Women became aware of it. In a very few cases women's decisions are taken into consideration and in most of the cases the said, '*chelera ai bishoye bhalo bujhe, cheleder sindhantoi amader sindhanto*'

Chapter-6

Indigenous Knowledge of Women to Predict Disaster

Women have unique perspectives on community danger and safety. There is no uniform or universal “women’s view” on risk and disaster. Being a woman means different things in different cultures, and these cultural differences matter in a crisis.

Until all studies of hazard and disaster are gender sensitive, we won’t have the knowledge we need about the world as it is. And until we look at disasters through women’s eyes, we won’t know enough about half the world’s population in disaster situations.

In the study areas, most people, especially younger people are dependent on modern device such as the radio for weather forecasting. Although they may not have their own radio, they collect information about early warning/ weather forecasting from various social gatherings at the nearby market centers. The UP members said when they have information that the water is increasing in the pond they informed that to the ‘Moulovi’ in the mosque to circulate it, they used mike to disseminate the news among the people. Sometimes they also went to the villages to warn people. The UP members in Khanigachi Union, Lalmonirhat said that they have some information via mobile phone from the weather department of Dhaka and they circulated it to the people. They did training on disaster management and they got into the system in their mobile phone.

Data gathered during group discussions and interviews suggest that younger people are not aware about indigenous/ traditional early warning symptom or prediction system. Most of the young people mentioned that they are not interested to learn as they can easily get the information from other modern technologies such as the radio. Attitude of younger generation is reflected in their comments as one young school-going girl said, *“nani dadider kachh theke esob shikhar ar ki dorkar, radio tei to ekhon sob boley.”*

Elderly people in the village by using their traditional knowledge system can predict weather situation beforehand and can determine the nature of flood and can prepare themselves to minimize the risks of floods. Most cases, their predictions are almost similar to the modern forecasting what they gain from the radio. There are little variations in the traditional knowledge system across different social categories. Thus, all vulnerable categories of men and women (landless, land owner, women headed household, PWDs, occupational minority groups- tantee, fisher women, religious minority groups- Hindu) predict early warning in similar ways.

In addition, women who are very much associated with the nature because most of the time they stay at home and feed the cattle, go to the river and pond for various reasons, understand the changing form of the nature when it appears to change. They can easily understand the changing attitude of animals and birds,

different water color and the sound of wave. Their prediction, in most of the cases has been proved to be correct.

6.1 Indicators

Some traditional signs and symptoms about excessive rainfall, flood, flash flood and river bank erosion are gathered from different categories of social groups. The sign and symptoms are discussed below.

6.2 Temperature and humidity: During the Bengali months of *Jyaishta* to *Ashwin* when the outside temperature is high, the women use this as a sign of early warning for the immediate rain and flood. According to them the high temperatures followed by heavy cloud will cause flash flood within few days. To quote in their own terms “gaye jodi gorm batas lagey tailey 2/ 3 diner moddhey ghono megh hobe abobg breishti hobey.” This traditional knowledge of early warning is widely practiced among the women.

6.3 Direction of wind: Another important sign of early warning of flood used by the women is the direction of the wind. It is believed that if the wind flows from South-East to North-West, heavy cloud will be formed in North-West corner of the sky which eventually will bring heavy rain-fall.

6.4 Cloud (color and type): The color of the clouds also works as an important sign of predicting the flood. The heavy clouds with dark or dark ash color are deemed to cause heavy rainfall. If the dark cloud covers the large part of the sky and do not move somewhere else, means that the cloud is very angry and can cause a gloomy weather which may result in downpour for at least 4 to 5 days. This type of rainfall usually causes flash flood within the next 8 to 10 days.

6.5 Rainfall (location and type): It is also believed that if the heavy rainfall continues for 2/ 3 days in the hilly area of the border between India and Bangladesh, flash flood will most likely to occur in adjacent areas which includes the studied areas. This heavy and continuous rainfall in the areas increases the water level of the local rivers which in turn causes flood in the areas within very short time.

6.6 River water (color and flow/ current): The color of the river water also used as a sign of flood among the women. When the color of river water becomes dark and hazy, they predict that the water of the river is going to increase which causes flood and river bank erosion in the studied areas. In addition, when the river becomes very rough, the community believes that the river bank erosion is almost certain.

It is observed that most of the elderly women heavily rely on this sort of knowledge.

Women in most of the field areas opined that they understood the causes of flood and other intervention of nature. Most of the areas are low land.

The women in Balapara Union, Rangpur Sadar, described the situation in this way that water in the river was flowing against the wave of the river. They heard the '*Uthal-pathal*' sound of the water.

6.7 Animal behavior (ant, frog, birds, cows): It is very important to mention that the behavior of certain animals also provide some clues to predict the flood. As the women described, when ants as a group come out with their food and egg from the soil, the women mentioned that this behavior is a sign signifying that it is going to rain. Apart from the ants, the behavior of frogs also gives them certain clues which help them predicting the flood in the areas. As some respondents mentioned that when they hear the 'cry' of the frogs together, they become certain that within 2-3 days it is going to be raining. As the respondents mentioned that "frogs cry when they see cloud in the sky" which make the community believe that flood is certain.

The informants opined that they heard different sounds from the birds. When the cows would hear the sound of the water; they started running to and from.

6.8 Curve of river bank (*Kachhar*): Generally *kachhar* the curve of the river bank are broken.

6.9 Traditional method for prediction (arum leaf): 'Water in arum leaves' is a method which is widely used among the women in predicting the nature of the rainy season. Some arum plants with leaves are selected for this testing. From the selected plants, 12 leaves with their stalks are separated. Then, each of the selected leaves is named after the months of Bengali calendar. So, each leaf will represent a month of the year. The selected leaves are tied with ropes. Next morning the designated person undoes the leaves and measures the amount of water collected in each of the leaves representing a month. There is always a designated person/s in the community to perform this job. They perform this job at night known as (*gashi rat*) of the *Ashwin* (mid September to mid October).

Their knowledge about the cause:

6.10 Their knowledge about the cause

In most of the cases, women know the causes of flood and other disaster. They said because of the bridge (known as *Dalia Bridge*) the flood occurs every year. When water cannot cross the bridge, it flows against its waves that cause the flood in this area. They added that Hossain Mohammad Ershad, ex-president of Bangladesh, made the bridge to protect his areas but most of the areas of Rangpur was under the flood.

Chapter-7

Women's Indigenous Strategies to Survive

Flood is the most severe hazard in these area and most of the time the impacts are cumulative and the effects are magnified at the local level. In order to cope with the regular flood, flash flood and river erosion, women attempt to address risk problems *ex ante*. There are some good community practices concerning *ex ante* risk management which more often includes enterprise diversification. Using off-farm income to offset risk from farming is one way to diversify. Flood and flash flood destroys the agric field and crop most severely and in a short time. Indigenous knowledge, in different study areas, has proven to help contribute to the community's ability to mitigate the impact of regular flood and flash flood events. In general, the indigenous knowledge of housing pattern reduces the vulnerability of floods. They plant different grass and plants in the river banks for the protection of community properties. Women prepare dry fish and grow different vegetables around homesteads for reducing the vulnerability. These practices ensure food security in char areas.

7.1 Housing

The houses in the areas are always over flooded by the water, so the community people adopt 'raising plinth' mechanisms for the protection of homesteads. As many people live in the '*char*' which is low-lying flood plain area, the houses are built on high lands. The height of the homesteads is generally 5-6 ft. high from the beds of the *char* land.

The method is easy and safer for emergent period for shelter, and this type of houses are worth replicating in other places where vulnerable people become helpless at the time of hazard. Go-NGOs can help the poor make the structure.

During flood, the local people try to set up strong pillars and scaffold for their houses. This is a common preparation strategy of the people for upcoming flood. Both male and female were participating in this type of house repairing works. After flood they also borrow money for repairing their house. The raw materials are locally available and the method is easy and safer for emergent period for shelter. Go-NGOs can help the poor people to make the structure.

But it is found in the study that women were involved in remaking most of the things inside and outside the household.

7.2 Goal Ghar

Local people, specially women are more concerned with their domestic animals, sometimes more than their own lives, for the domestic animals are main means of livelihood to many of them. This complexity is only addressed by their innovative mechanism i.e. making scaffolds around some space somewhere in the homestead has greater implication to their socio-economic life.

Making scaffold by raising three feet high some space measuring (10 x 10 sq. ft) on homestead is one of the mechanisms for domestic animals and family

properties from the flood. They put all the domestic properties together with the domestic pets on the raised scaffold when there is the flood. When the flood water recedes, they use this place as plateau for spreading the creepers of gourd or pumpkin, bean or cucurbitaceous plants which give them another very valuable crop of vegetables.

Some selected space at a safer side of the homestead is raised three feet high with mud from around and the place supplied with soil becomes a ditch which is again used as a factory and storage of bio-fertilizer (locally called '*vehr*'). Bamboo poles are fixed vertically around the raised soil with a space and then the bamboo sheets are horizontally placed along the poles and tied up with the vertical bamboo poles. It takes only one day for raising the stand and another for the shed/roof (locally called '*macha*'). This is done mostly by the domestic labor or by hiring labor for a short time. Flood also damages scaffold partially. Thus, every year, minor repairing is necessary which roughly requires one-third of the total cost of making a scaffold.

This is an innovative practice which would be a replica for other flood-prone areas through which domestic animals and properties could be saved. The measure they take against flood by raising scaffold at some corner of the homestead is innovated by the people themselves and is an attempt to meet the challenge of the time as per their intelligence and need. Even at the time of gradual rise of flood water and if the farmer is not willing to be evacuated to the shelter, the measure may be of use.

7.3 Food Security

During and after the flood, flash flood, food insecurity is a main concern for the locales. The women used scaffold as a safe place to preserve rice. They also preserved dry fish, *chira*, *muri* ect. and store fodder for domestic animal. Landless people could not store any food and they borrowed money for buying food grains during and after flood.

7.4 Seed Storage

Seeds stored for years are not similar in crops and types. If farmers found new types of seeds in the market then, they used the seeds for cropping the same on as little as 20-25 decimal land to prove its efficacy in productivity. Later on, if found satisfactory, farmers stored the seeds for adaptation in next season of farming. Storing the seeds of a particular variety depends on how much land or how many acres were going to be cultivated with the particular seed in the next sowing season. Men and women both perform to collect the seed.

Farmers select plants from which they are going to collect seeds even when they are in the field. Generally, well grown plants and their fruits are selected. Then farmers ensure their maturity in the field. They cut them and bind them in bundles separately and then dry. Before thrashing is done they isolate any other

variety of paddies. During thrashing, farmers dash the plants twice or thrice against some log so that only the fully matured seeds are separated and the seeds thus collected are dried carefully in the sun for two or three consecutive days, each day for 5/6 hours. Whether the seeds are ready to be preserved or not is tested by putting them under the teeth and pressing by teeth. If they make heavy sound on cracking, the farmers understand that they are properly dried and they put them in the storing bags or pots.

The storing has many ways. Some store them in poly bags. Putting the seeds in the bags, they keep some space above the seeds and then close the open end carefully so that humidity or moisture cannot damage the seeds. Some put them in earthen pots clean and dry and then close the opening first with some stubs and then with some mud and then dry it in the sun. The selection of bags and pots is also done very carefully. They put them in dry and cold places where no insect or moisture can enter. They use *neem* leaves to protect the insects. Before sowing, they take the bags or the pots from the store and then take the seeds out and again dry them for some time in the sun.

Gourd, pumpkin, sweet pumpkin, different leaves like spinach, red leaf and *palong shakh* seeds are the main vegetables which the local people cultivate and try to store the seeds.

Farmers select the maiden fruits of the plants for seeds and from all of the preliminary fruits, the best one or two are earmarked for seeds and they never cut them until they are properly ripen and the creeping stems are dried up. In doing this, they remain watchful if there is any leakage or scratch around the body of the fruits. If this kind of defect is found, they avoid it because they think that this may lead to rotting of the seeds. They have other signs of fruits being ripened. When fruits are ripened, their bulk undergoes change in color or the bulk becomes hard. Then they take them from the plants and cut the fruit to take the seeds out. The seeds are then put on a winnowing platter to dry them in the sun, the seeds are not washed because, as the farmers opine, washing may take away the nutrients of the seeds in it. The drying process continues for 5 to 6 days. The seeds can be stored for a year.

Eventually, dried seeds are kept in air-tight bottles. They seal the bottles by themselves. The bottles are placed in dry places. Every 15-20 days they reexamine the bottles to make sure if there is any fungus in the seeds. When they find seeds are in a good shape, they go for drying them under the sun. The seeds of vegetables are very susceptible to many insects and funguses. So the farmers take extra precaution to avoid that damage.

As a nation, we are struggling to meet our seed requirement for cultivation. For the purpose, these mechanisms will be a great opportunity regarding ensuring quality seed demand. GOs and NGOs can take initiative to ensure quality seeds and improve technology in existing and potential areas so that it may meet nutritional food security.

7.5 Preservation of Food

Sidol (dry form of mixed vegetable and fish), dry fish and dry vegetable are some of traditional practices to food preservation for the difficult time. Below are the descriptions of some food preservation. Sidol is very popular food among the local people. Dry small fishes, *kachu* (arum of any type) and turmeric are needed for preparing *sidol*. At first the arums are cut into small pieces to dry them under the sun placing them on their tin roofs or on a mat in the yard for 5-7 days.

They generally prepare this *sidol* in the winter. But throughout whole year one can prepare this *sidol*. *Sidol* can be preserved for about six months. These are to be dried in the sun strongly for 7-8 hours after every 10-15 days. *Sidol* is not an independent food but is an element to take with rice. It is taken with rice as sauce just like the curry to increase the taste.

Anybody can join the food processing activity for consumption or subsidiary income even by selling them. But it is essential to remember that food quality of sidol can be kept for a short time. The fresh fish and the entire process need to be done carefully. If these are processed and preserved correctly, sidol can help people at risk during the adversaries.

7.6 Mustichal

Women in the field areas gave the information that they collected the Mustichal collectively as a part of their food preservation for the crisis time. They practiced it for a long time. Some of the informants who were bit well off compared to others, having land, tried to make rice from paddy and collected rice from others to ensure the food for the family.

7.7 Fish

When the prices of fish are cheaper or when women have some leftover fish, they try to store them by drying them in the sun. '*Chang*' is the local name given to the high scaffold prepared by bamboo for drying fishes in the locality. In an open space of the house, where there is no tree around this '*chang*' is prepared. This ensures that the fishes dry quickly under the sun. They use *chatai* (mat) over the '*chang*'. Sometimes, they encircled old nets around and over this scaffold for the safety of the dry fishes and the nets are used to prevent crows or other birds snatching away the fishes.

At the beginning of the dry season, family members especially the children catch different fishes early in the morning from the nearby water bodies and rivers. Fishes like *puti*, *tengra*, *chanda*, etc are caught comparatively in larger quantity in these regions. Generally, women and children do the work of preparing the fishes before drying. They clean and wash the fished accordingly. Later, drying process are done taking mostly by women. Children help female and male members in supervision of the drying process. While drying if the sun goes down early and if there is possibility of rain, all the family members help to take the fishes inside home from the *Chang*. The fishes that are dried before 7-10 days are ready to

preserve. Generally fishes dry up within 7 to 10 days and if the sun is extremely hot it takes 7 days for the fishes to dry completely. Otherwise, it takes some more days.

7.10 Other Efforts

The places near homesteads are left alone and now women are growing vegetables there. As a source of household food, women and sometimes men spend some time for homestead gardening. From the homestead gardening they try to fulfill the household's food demand. In the flood time the plants die but the women store seeds as backup to grow again after the flood. The local people mainly produce vegetables, spices and some fruits in these homestead gardens. They produce tomato, spinach (*palong*) *lalshakh*, *puishakh*, bendy, beans, *karala*, radish, *cholashakh*, *jinge*, *lalmi kathoa*, onion, garlic, ginger, turmeric, pepper, gourd, pumpkins, beans etc.

They generally select a space for gardening in the premises and protect the garden by raising fences around so that poultry or cattle heads cannot get in. They make small seedbed at a corner of the garden. When in the month of *Katrik* (Mid October-Mid November) dew begins to drop at the end of the night, red-vegetables and spinach seeds are sown. In *Agrahayan* (Mid November-Mid December), onion, garlic, tomato, cabbages are sown in the plots. At this time the plots are not needed to be ploughed and only making a slight hole inside the soil to make it productive. Sometimes they germinate the saplings of pepper, gourd etc in the beds and when they are about two/three inches long, they are shifted to the beds of the garden.

On the fencing of the garden around, *puishakh*, *karala*, *jinge*, and cucumber are sown along. These are creepers and are well placed along the fencing. They grow over the soil too but they like aerial growth. Along the fencing inside of the garden a row of bendy, *patshakh*, and pepper are also sown.

Besides, vegetables can be grown on scaffold in the house. Generally scaffolds are made with bamboo and branches of trees. Thus, over the scaffolds and roof of houses gourds, cucumber, sweet pumpkins are grown. Besides, papaya is also sown. Banana plants are sown but as banana plants cast shadow, they are planted at distance.

Initiatives for women's more involvement in homestead gardening can increase household income and women empowerment. If the technology of homestead gardening is improved, or, if the technology packages of improved varieties of different crops are made available to the women, the production will surely be bounteous and all will be encouraged to be involved in the practice.

The practice ensures the increase in the home economics, secures family nutritional status to maintain good health of the children of the family. For poor people this is source of income from the cottage and the lawn is a good means to save themselves from the clutches of money lenders in the lean time of work.

7.11 Water

People do not get fresh drinking water during flood as many tube wells remain under flood water. Consequently, people practice different strategies like storing and collecting water purifier, preserve water in a big container, collect fresh and safe drinking water from neighbors to cope with supplement their need of water. The people mainly raise the plinths of the tube wells so that flood water cannot submerge them.

Having the experience of tube wells being submerged on flood time, the villagers began to raise the base of tube wells high enough, not to be reached by the sudden rise of water level. As it cost money, poorer households rarely do so. Generally a tube well of well off family give support the neighbor families who lack safe water source in proximity of their dwelling. The heads of these tube wells are generally raised 2 ft above the water level recorded previously, which was perhaps the most devastating of all such events during last several decades. The goal of the initiative is to reduce the health vulnerability to natural hazards, especially flood. The initiative aims at ensuring supply of water for domestic purpose and drinking of people of the area during flood season.

During flood people can neither move to collect water nor can they get safe drinking water nearby. Moreover, they remain logged by flood water which is polluted and spreads water borne diseases. At this crisis moment, this tube wells can provide safe drinking water. So it can be replicated in other flood prone areas in Bangladesh. The density of such tube wells need be much but a few can serve the best at the time of emergency. A design integrating the convenience of the use in the lean time and that at the emergent period is critical may be designed by some innovator. GO-NGO endeavor may come forward to solve the problem and make it easy for population at risk.

7.12 Fuel

Rural people use mud stoves for cooking and they regularly use pieces of dry wood, jute sticks, and shrubs, branches of trees, straws and the agricultural wastes collected at the harvesting time. After drying them in the sun, these can be used as fuel. During flood, they face acute crisis of fuel. So, women of the area take initiatives to preserve fuel to deal with the crisis. Women of the area make movable *matir chula*/ hearth to use during flood.

People of the study areas take many initiatives to preserve fuel. Among others, using cow dung as fuel is the most popular. Most families of the areas use this technique to preserve fuel. These practices have been known to be followed from 4-5 generations in this area. The goal of the initiative is to reduce the vulnerability of the natural hazards, especially flood and flash flood. The initiative aims to ensure the demand of fuel and to cope with the growing demand of it with the growth of population.

They select a place in the kitchen measuring about 6 ft in length and 4 ft in breadth and make a platform 2 ft above the floor of the shed to preserve fuel. Above the platform they preserve fuels like jute sticks, sticks with cow dung, dried shrubs and whatever they use for cooking in the time of crisis. They can accommodate about 15-20 maunds of fuels on this platform. This amount of fuel is sufficient for a family of 5-6 members for two months.

To make the wooden made platform, they cut the bamboos accordingly. Then they fix the bamboo pieces in the earthen floor as poles comprising generally 6 in all sides which has 2 ft inside the floor and 3 ft above it, 2 ft above which the cross wise horizontal pieces of bamboos are tied with the poles tightly and then a scaffold above the frame is made by fixing other sheets of bamboos cutting into two halves lengthwise. Above this platform thus made there remains 1 ft length of the bamboo poles which help to protect the contents to be kept on it.

Besides, they made '*palla*' by jute stick (*patkhori*) about three feet above the ground to avoid the flood water. It is seen in the area of Dimla where water is most common round the year.

7.13 Alga Chula

Woman of every household prepare one or two movable *Chulas/alga Chulas* at the time of flood. These chulas are placed on scaffold for cooking. This movable *Chula/ alga Chula* are made by mud on plastic, plate or a piece of tin. Sometimes, the time between the bengali months Magh to Chaitra is the suitable to prepare the movable *Chula/alga Chula* due to availability of mud from the bed of dried pond or water bodies.

7.14 Cow dung

The women make a separate place, generally a convenient sized ditch for preserving the fresh cow dung on daily basis. Then, the women of the family make soft mould of the cow dung at their leisure time by adding water and other ingredients to the dung in a separate ditch. They take a handful of the mould, make round of it like a ball and then throw against some flat vertical platform, especially against the walls of the houses and against the big trees and they remain there for $\frac{3}{4}$ days. If there is enough sunshine it is dried up for use. They collect them and make ready for using them in the stoves and preserve by putting them in stacks and keeping them on the scaffold one after the other.

The shape of preserved cow dung varies; it can be ball shaped or linear which look like a two-three feet long jute stick. The entire exercise is done by the women folks of the farmers' families. Sometimes, they take the help of the children. There is flood during *Ashar* to *Aswin* and they cannot prepare the dung for cooking and they collect the cow dung for the manures.

The fuel needed for the bulk of the population for cooking has not been considered as a huge problem yet. This is an area where attention must be given

because of various genuine reasons. The straws, stubs, grasses, leaves of trees and other such stuffs that were used previously as fuel are now disappearing due to tremendous pressure exerted by the population explosion. The fuel preservation process and alternative fuel like dried cow dung need to be promoted in the rural area.

Time is up to give proper attention on the cooking fuels of the rural people and the government of a sovereign country is to pay attention to the issue, and if not, the environment will be spoiled, agric productivity will be lost and people will face extreme trouble for cooking food.

7.15 Guchi

The local people have cows or buffalos in every house and cow dung is also available in every house. So, women have taken initiative to use *ghuchi*, a ball shaped moulds which is very popular among the women of this area is prepared from the cow dung. 10-12 *ghuchi* are sufficient to cook the food for 5-6 members. Now about 80-85% families of the area use *ghuchi* for cooking their food. Moreover, the *ghuchis* to be used in the tea stalls and hotels are available for buying in the area.

A hole is dug in the yard for making *ghuchi*. The size of hole is 1 cubit deep, and 1.5 cubits in diameter. At first cow dung is left in the hole and then required quantity of water is given to the hole. Then 1 kg of dried up paddy (a grain having substance within) or stubs are mixed with every 50 kgs of cow dung. Stubs are found easily and free of cost. So people mix these stubs with cow dung. Then they mix them well with their hands or legs by pressing them from above. Making the mixture uniform with the contents they take them out little by little and make balls of them in hands and finally throw them against the wall of the house where they stick against the walls easily. After 10-15 days these balls dry up and assume the shapes like ball-shaped moulds.

The preparation of the product *ghuchi* is easy and they can do themselves. It is environment friendly and does not cost them anything; rather they can save money from the exercise by meeting the demand of fuels otherwise. The availability of firewood has no guarantee because, this is a drought prone area and productions and plants are limited. So people have security to using *ghuchi* in cooking. People need to have cows in their home for making *ghuchi*. Otherwise, they have to collect from other people. *Ghuchi* can be a source of income for female members of the low income household.

7.16 Source of Indigenous Medicine:

Women especially in the three areas Rangpur, Lalmonirhat and Kurigram talked about indigenous medicine. The Mahato women in Rangpur district said that they know there was nothing for the women to save themselves in the crisis period. Since they were ethnic women, the UP and other NGOs never gave them any help. They said that they planted *Tulsi* tree to fight against fever and coughing

this period. They gave the leaves of *Dalim* and black berry when '*Pet nama*' starts.

They added that Nimpata is useful for the itching in the body. The cultivate Nimtree to use it for different purposes. If some one suffers from fever women suggested them to eat '*dai holdi pata*'. They said that to get rid of faintness and abnormal attitude they especially gave the '*Kamanga fuler Vorta*' to the elders and the teenage women.

Besides, they tried to plant *Mehagoni*, *Nim*, blackberry tree protect the river erosion.

7.17 Protect the Household Materials:

Poor and landless women tried to protect their asset when they heard and could assess that the flood was coming. Then they first tried to save the daily necessary items, valuable things, (save the jewellery, crockery, and beddings). The informant (especially the people who live the bank of the river) said that it took just ten minutes to be over flooded and only women took the decision to go to the safer places. At that time with children and the help of their neighbors, they tried to carry as much things as they could. Some of them succeeded in doing that. Rest of them made the Tang and saved the materials by keeping these on it. In the richer families who did not leave the house and coped with the water tried to preserve the paddy and valuable things in the households by sending these to the relatives houses and some preferred pond to throw and they collected these when everything got normal.

Likewise, they tied up the legs of the hens and ducks and also handled the cows and goats when they planned to go another place for taking shelter. They said they never left the animals while moving.

7. 18 Sale of women's assets:

The sale of assets is a common way in field areas to survive any crisis. Researchers (Chen 1983: Agarwal, 1991) have pointed out that some assets, such as jewellery, livestock and household items, are more likely to be sold than others during any natural disaster. This is very significant because these are assets. These are sold, or mortgaged by their husbands to repay loans, to educate sons or to maintain the livelihood of the households.

Assets such as milking cows or goats are not essential for agricultural production but can play a major role during crisis. Sometimes these assets are described as 'non-productive' because they can not usually produce a continuous income as land. Land or cattle which play a main role in earning are less liquid than these 'non-productive' assets. Women's asset is more easily converted to cash and are therefore the first to be disposed of to meet the immediate needs of family survival. These assets are referred to as 'self-insurance' which help to save the 'key-productive' assets of a household. The loss of key assets might result in long-term economic decline. Women or men resist changing their status from farmer to landless as long as they have other assets. Even if they had some

assets they were considered 'less valuable' or 'non productive' when they were disposed of during floods. Women's assets were used to meet the immediate needs of the households during floods when men's assets were kept for the future. Poorer women and men did not have stores of assets such as poultry and kitchen utensils. Some also had to sell their goats and milking cows whereas men's animals, which were needed for cultivation, were protected.

7.19 Common Village Resources:

Women stated that they became *shakahari* (a person who is undernourished, probably subsisting on a lean diet of vegetables) or *latapatavuji* (a person who depends on a lean diet on creepers and herbs) during floods. Due to the increased price of food stuffs most of the poor families do not have cash to buy food from the market. Women said that during their dependence on food from the common land increased greatly and, like cooking and cleaning, the collection of food from common land was women's work. When men failed to earn any money, they became helpless and did not feel it incumbent upon them to find alternative source, or food for their families. Women, on the other hand, were much more capable of collecting food items from village common land than men. *Shapla* (the stem of the water lily) was the most common one which women used as a major food item and was often mixed with others like *kolmi shak* (arum leaves), *kachumukhi* (wild arum). Some of the plants they collected were only recent discoveries. They experimented with these by preparing them as food for their families.

With little or no support from the government during floods, the women of poor households sought help from their social networks. Such support mainly came from their own and that of their husbands' kin and sometimes from the patrons and neighbors. Women were able to get more support from such relationships than men. Relatives and neighbors provided shelter, lent food, gave loans with little or no interest, provided temporary employment and helped with money, labor or materials or rebuild houses after floods. they borrowed small amount of food , money and other essentials such as rice, wheat flour, salt, oil, pulses, spices, vegetables, drinking water, fuel, stoves materials to build platforms or to raise their beds , water purifiers, medicinal herbs, money and many other things from relatives and neighboring women. Poorer women said that they received this help sometimes as a loan, charity and sometimes as a gift. Men, on the other hand, did not show such ability to provide for their households. Women said that men wanted to do something for their households but did not receive much help from their patrons, whether kin or non-kin. Women said that borrowing small things or food is not a man's responsibility and asking for help from others is below their dignity.

Chapter-8 Gender Neutral Relief Politics

The study intentionally used the word gender neutral instead of gender biased. This policy ignores the gender based need of the people when they are affected with the natural disaster. Gender blind or gender neutral are the masculine idea that technically reject the gender based need and their voice. The relief distributors said that they did not have any biasness towards male when they distributed the relief. The informants stated that the members of UP first came to them and sometimes they sent boat and other vehicles to bring the people when they were threatened with rising level of water. Only the Mahato women said that they never saw any body came to save them. They went to the nearby mission by themselves and the sweeper women also said that they never were helped by UP members though they sent '*khichuri*' for one or two days.

The system of relief distribution generally is directed by UP members and the NGOs officials. They said that UP members took some time to distribute the relief. First they made a list of the vulnerable people according to their choice. They first put the names of the males of the house hold and if there is no male in the household, they went to the female members and enlisted their names. The informants complained that the UP members did not give the relief to all. They gave 5-10 kg rice to one household. The informants in Lalmonirhat stated that the person who made the list in favor of member demanded bribe from the affected people to put their name on the list. They gave 100 taka last time.

In addition the NGOs working in those areas, distributed different kind of relief regardless of gander based need. Some of them helped them to reconstruct the house; some gave saline, tent, and tablet for purifying the water. Local NGOs also provided latrine and cash money in some places for them to reorganize household things. In Dimla, they said that several NGOs helped them since they were displaced many times.

Women added that nobody from government or NGOs came to know their needs; even they never documented their experiences with the disaster but only suggested them to keep various foods (dry food, dry fish, dry meat, fuel, candle, match etc).

Women suggested that if their needs were assessed and their experiences were taken into account, the relief would fulfill their needs. They wanted the NGOs and the representatives of government to know their needs. They told that they needed a secured shelter and an organized bathroom and toilet facilities compared to other things.

Chapter-9

Disaster Risk Reduction Programme 2010- 2012 in Bangladesh

The risk assessment showed that Bangladesh is prone to various hazards, e.g. floods, cyclones, earthquakes and droughts. These presumably will be on the increase in the near future due to increasing vulnerability and changing climate effects. The stakeholder assessment revealed that the Government of Bangladesh has made important efforts to address the issue of Disaster Management and Disaster Risk Reduction. However, although a national programme (CDMP) was launched in 2003, many stakeholders still see a low professionalism within the disaster management system. This refers also to the Implementation of DRR action plans and risk conscious land use planning. Based on the findings above it can be deduced that in the specific context of Bangladesh there is a need. To systematically integrate DRR aspects into development planning and programming at all scales (mainstreaming) given the increasing vulnerability to the impacts of the effects climate change and natural hazards.

9.1 Overall Goal

SDC will implement a specific Disaster Risk Reduction programme in Bangladesh with the following overarching goal and objectives: The goal of the DRR programme is to protect lives and livelihoods and reduce economic losses resulting from the exposure to natural disasters (including the challenges of climate variability and climate change), thus contributing to less human suffering, poverty reduction and a more sustainable and equitable development in the region. Objectives

- o Reduce existing risks from the effects of natural, environmental and human induced hazards, that mainly rural people, especially The poor and the disadvantaged are facing, to a manageable and acceptable level.

1. Prevent the build-up of new risks by rendering SDC's and other agencies' development activities resistant to the forces of nature and as such contribute to their sustainability and lifespan Outcomes
- o Improved sustainability of development activities of SDC and other stakeholders.
2. Improved resilience of communities to disasters through prevention and preparedness measures and as such, reduced economic losses/ livelihood of most vulnerable groups
- o Improved capacities in disaster management of key actors at national and community level

9.3 Disaster Risk Reduction Programme for Bangladesh 2010-2012

Specifically for the DRR programme the following Guiding Principles are applied:

- Alignment and harmonization: The SDC programme is aligned with the “Hyogo Framework for Action 2005 - 2015” and promotes its implementation as reference for disaster risk reduction efforts, in collaboration with national and

international partners. Furthermore, alignment with national strategies and systems will be sought for to the largest possible extent.

1. **Integrated Disaster Risk Management:** There is a strong need to move the focus away from merely responding to disasters to disaster prevention and preparedness activities. Integrated disaster risk management uses a multi-risk approach, includes all relevant stakeholders and considers the risk management cycle.
2. **Sustainability:** All projects shall be economically efficient, environmentally friendly and socially accepted. A demand driven project identification shall increase local and national ownership for the projects, thus contributing to their sustainability.
3. **Good governance:** Disaster risk reduction contributes substantially to decentralization and participative processes. As such, the programme supports good governance efforts.
4. **Gender focus:** A special focus is given to the needs and concerns of women before during and after natural disasters. A key factor to achieve gender equity is women's empowerment, in particular their participation in decision-making in formal as well as in informal political structures. The gender equity approach will be integrated into the programme and the project management cycle.
5. **Exchange of experiences with other South Asian countries:** SDC will contribute to and facilitate the regional (in particular countries on the southern slopes of the Himalaya- Karakoram-Hindu Kush mountain ranges) mechanisms on regular sharing of knowledge and know how in disaster risk reduction. This concerns the exchange between the SDC CoOfs, as well as among institutions and between scientists and practitioners.
6. **Knowledge Management:** The exchange, systematization and dissemination of good practices and lessons learned and the access to information and knowledge (e.g. learning platforms, "www.riskandsafetynet.ch") is of particular concern. Equally important is the use, development and dissemination of community-based knowledge in DRR. Exchange with the SDC DRR Programmes in other regions contributes to mutual learning.
7. **Visibility:** Visibility plays a positive role in the replication of good practices and harmonization. The visibility of the programme shall be intensified through media contacts and special events.
8. **Convergence of DRR and Climate Change Adaptation (CCA):** There is a significant overlap between DRR and CCA. Even though according to SDC's policies the Global Programme Climate Change (GPCC) does not work in Bangladesh as a focus country, SDC's DRR activities, need to take into account the shifting risks associated with climate change and ensure that measures do not increase vulnerability to CC in the medium to long-term in order to have an impact.

9.4 Gaps

The two policies only contents the area of needs and concerns of women before, during and after natural disaster. It is also promised that the gender equity approached will be incorporated into the program and the project manager cycle. But it is not cleared what will be nature of this equity approach? Will it ensure women's agency over the policy? And obviously what will be the steps and methods to collect the women's viewpoint on that the approach will equip well. The policies do not bother the women's experiences and their indigenous knowledge while developing.

Though the policies talks about the sustainability of the risk reduction, but this does not provide any methods that can involved women to work for it.

It is depicted in the study that no one knows anything about the DRR and CCA. Even they never heard about this. The members of the Union Parishad also do not know any thing in this regard, Only Union Parishad in Lalmonirhar district told that they have some guideline made by RDRS about the disaster management and women's vulnerabilities. They attended various workshop and training program arranged by NGOs but they did not receive any message from the government yet.

Chapter-10

Gender Mainstreaming Approaches in Disaster Management

The process of assessing the implications for women and men of any planned action, including legislation, policies or programmes, in all areas and at all levels. It is a strategy for making women's as well as men's concerns and experiences an integral dimension of the design and implementation, monitoring and evaluation of policies and programmes in all political, economic and societal spheres so that women can benefit equally, and inequality is not perpetuated. The ultimate goal is to achieve gender equality (ECOSOC, 1997).

10.1 Women as Actors for Change

Although women's social, economic and political position in many societies makes them more vulnerable to natural hazards, they are not helpless victims. Women are important agents for change and need to be further strengthened as such. Recognizing and mobilizing their skills and capacities as social force and channeling it to enhance efforts to protect their safety and that of their communities and dependants are a major task in any disaster reduction strategy. By and large, for example, African women are the backbone of the rural subsistence economy: it is their productive work that sustains families and communities. Securing food, water and fuel are key community concerns, especially in rural areas where natural disasters are more likely to devastate the very basis of people's livelihoods, since they depend more on the natural resource base for all aspects of life. Women's work in agriculture is often seen as an extension of their domestic responsibilities, rather than a separate economic activity.

Distinguishing women's agricultural work from other types of labor puts them in an economic category, which means that her participation in agriculture can be recognized in national labor statistics

Legitimizing women's labour in this way makes it easier to advocate for training and education programs for women agricultural workers, essential if women are to become environmentally sound farmers and thus engaged in vulnerability reduction to natural hazards.

There are many examples of women's informal community involvement in disaster reduction, but women are still largely excluded from formal planning and decision-making and need to be empowered to do so effectively. This is essential to ensure

Linking gender issues and disaster reduction to sustainable development
We often tend to discuss sustainable development and disaster reduction as two separate 'components'. However, fundamentally the aims are the same in both. Sustainable development is incomplete and not reachable unless disaster reduction (in particular prevention and mitigation measures) is reconsidered and

integrated as an essential element in it, and disaster reduction cannot be managed apart from development. Disaster reduction is about taking measures in advance, addressing risk reduction, involving environmental protection, social equity and economic growth, the three cornerstones of sustainable development, to ensure that development efforts do not increase the vulnerability to hazards. Gender cuts across and is built in for both disaster reduction and sustainable development.

10.2 Gender Mainstreaming in Disaster Reduction

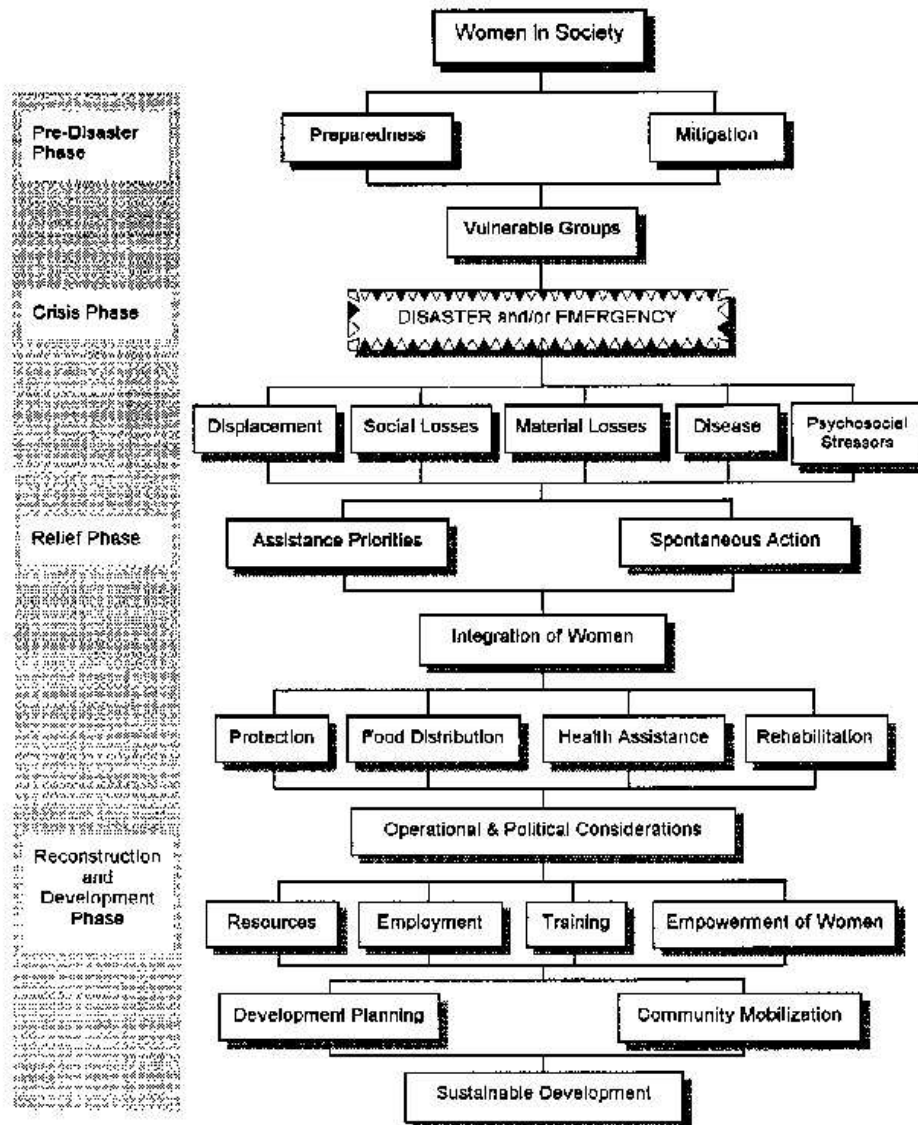
It addresses, in essence, gender equality and balance, and the methods of analysis and tools of application should therefore be the same for both processes

It is important to stress that gender equality in disaster reduction requires, above all, empowering women to have an increasing role in leadership, management and decision making positions. Caution should also be raised against implementing gender-targeted programming without full and complete gender analysis.

10.3 How Gender mainstreaming approaches in disaster management can be achieved?

1. Since the nature of women's and men's vulnerability is different, both possibly vulnerabilities should be measured before the disaster takes places.
2. Women's and men's indigenous knowledge regarding disaster management should be recoded equally before developing any policy for risk reduction since they have been fighting against it for long time.
3. Women's need and their requirements should be recorded differently as they face sanitation and drinking water problem severely.
4. Women's places (such as yard, ban of the ponds where they frequently meet each other can be considered as

Table-19 Approaches in Gender Mainstreaming in Disaster Management



Challenges for Women in Disasters (Immediate)

- Loss of family members
- Issues of protection (trafficking)
- Loss of home- living space
- Cultural values may even hinder women's rescue as males may not be allowed to touch women and rescue them.

- Access to relief
- Access to health (men may not allow women to see male doctors)
- Access to information
- Cultural and religious obligations, beliefs.

Challenges for Women in Disasters (Medium to Long Term)

- Changing role of women – from care giver to head of household.
- Lack of safety nets.
- Coping with loss.
- Coping with disabilities.
- Limited understanding of women's needs in post disaster situation (i.e. reproductive health)

Challenges for Women in Disasters (Medium to Long Term)

- In relief camps, protection issues such as the location of washrooms, lighting etc.
- Physical and sexual harassment.
- Access to compensation.
- Having the right documentation (ID cards, property deeds)
- Illiteracy can be big hurdle in women's access to resources.
- Denial of girl child's right- nutrition, education, health etc.

Chapter-11

Recommendation

The study recommends the followings

For Government Policy

24. Government would give more concentration on the separate toilet facilities in the all shelter home and floating people during the disaster.
25. Government could collect the knowledge of the women to know the situation and incorporate these while developing the policies.
26. Govt would create the source of income for the men and women during the disaster.
27. Any kind of violence during the period would be considered as crime and appropriate punishment should be given by the governments to the criminals.
28. Government would establish one stop medical centre in the disaster area for twenty four hours and specially gave more attention to the women's health.
29. Special caring would be taken by the government for the security of the adolescence girls, differently abled women and old women.
30. Within a medical team, a psychaist and a psychologist should be incorporated in these areas.
31. A pregnant and lactating woman deserves the special care in these times.
32. Government need the advices of the community people and takes up the strategies they mentioned.
33. Government would set up separate shelter home for the men and women to avoid the violence that often happens in the disaster period.
34. Relief would be distributed according to the gender ratio instead of household survey. Men and women's need would be measured differently and relief should be distributed on the basis of the need. And it would be ensured that both men and women could have access to the relief.
35. Information would be given to the women since most of them are in the house and hey can take decision according to the information received.
36. Beside relief, govt. could do various activities to help the people, as to strengthen the indigenious technique to survive in the periods.
37. Government could sanction more boats to rescue people in the flood areas.
38. Government could provide saline and fresh water to the women specially.
39. Relief should be distributed equally irrespective of caste, class, ethnicity and gender.
40. Government could help the people to rebuild their houses.
41. In the study it is found that women became economically, socially, psychologically and physically. The vulnerabilities could be measured first and assistance should be provided on the basis of the effects.
42. Government could take action to continue schooling at any cost and give more concentration on education.

43. Government could also have the responsibilities to provide medication to the cattle and other domestic animals.
44. Government also could extend service delivery like as birth control pill and other necessary items.
45. Local government could take more responsibilities along with relief in the disaster prone areas.
46. Government could check that where as all latrine has light and all doors can be locked in the shelter home.

NGOs

9. NGOs working in these areas could take up the women's knowledge when they develop a policy for disaster.
10. They could provide first aid to the people who become victim of the disaster.
11. NGOs could also offer fresh water and saline to the women and assist the government initiatives.
12. NGO could take the initiative to provide the information of disaster if they came to know any.
13. NGOs also could help the people by giving toilet facilities in the shelter home or they also could offer different shelter home.
14. They could postpone their macro credit program during the time; it is hard for the people to continue the installment of the credit since they do not have any source of income.
15. NGOs may offer some occasional employment opportunities to the flood victim to overcome the economic crisis.
16. NGOs representative can be a part of local Salish in the disaster period.

Midterm Responsibilities:

Government

11. Government could take the responsibilities of the disaster victim round the year on the basis of their need.
12. Relief program could be continued for long time.
13. Government could set up the medical team to check up the health condition throughout out the year instead of crisis time.
14. Government could set up alternative source of drinking water which could be available for the women.
15. Indigenous medicine plant could be preserved and women's knowledge regarding medicine should be recorded.
16. Government establishes an information centre to deliver the messages regarding the weather and have access to their right.
17. Women's informal source of information (gossiping on the yard, and the bank on the pond would be properly documented.
18. Government could take the initiative to uplift the home stead to protect their house from the flood.

19. It is also government responsibility to supply the seed to the people after the disaster without any cost.
20. Government could help the people to plant more plants to protect them from the river erosion.

NGOs Activities:

8. NGO could do various program like as, motivation and offer sustainable source of income for the women.
9. They could provide gender sensitive program to the male and female of the disaster prone areas.
10. They could sanction small amount of loan to the women with that they could manage to buy the necessary things.
11. The people (both male and female) could be more aware through the NGOs activities.
12. Sexual harassment and violence against women could be properly addressed and social awareness regarding these social crimes should be increased through different programs taken by NGOs.
13. NGOs also could take the responsibilities to deliver the information for round the year.
14. They could make the joined program with the local government for the betterment of the people.

Activities (Long Term)

Government

8. Government would have to develop a gender sensitive policy by including women's indigenous knowledge and their opinions.
9. Women's agency should be given priority over the disaster period.
10. Government could provide proper knowledge and training to the people of these disaster areas.
11. Some initiatives like as alternative source of income, continuing of education should be taken in the early period of disaster.
12. Reserve water system could be developed by government to supply drinking water in the crisis period.
13. Government could search for the local source to collect food and other necessary things rather than bringing from the capital.
14. Government could give the khas land to the people in these areas to create the source of income or residence.

NGOs.

4. They could increase the number of shelter homes for the teenaged girls and the women.
5. They could provide disaster management loan to the women for long time.
6. They also could develop a long term gender sensitive disaster management policy along with government and ensure the involvement of women with their agencies.

Annex General Information of the Informants

The respondents of the study were mostly female including 7 group discussions with female group and 10 group discussions with male group, each group consisted of 15-20 persons focusing on the perception of the their vulnerabilities, health hazard, early warning, coping strategies, traditional knowledge regarding coping with flood, heavy rainfall, flash flood and river bank erosion. The participants of group discussions with female group aged between 15 to 65 years and with male group, 20 to 45 years. Young girls' group discussion consisted of 10 persons who are aged 12-18. On the other hand, 1 group discussion with young boy's group aged between 15 to 18 years. Along with this, the research framed 80 questions among the females on their Socio Economic Status.

2.1 Sex ratio

Table-1 Sex Ratio of the Informants

	Count	%
Female	80	100.0%
Total	80	100.0%

The adult respondents had no schooling and education, some of them can read and write their name while all the young participants had education from school. Among them, 5 were studying in class five, 3 in class seven, 6 in class eight and others dropped out after class five due to poverty. It is found that near 50% informants were illiterate, but a significant number (15%) of them read up to I-III and iv-v respectively. 4% of them passed SSC level and 1.3% went for higher degrees.

2.2 Education

Table-2 Educational Status

	Count	%
Illiterate	39	48.8%
I-III	12	15.0%
iv-v	12	15.0%
vi-viii	7	8.8%
ix-x	5	6.3%

SSS		4	5.0%
SSS and above		1	1.3%
Total		80	100.0%

A good number (near 48%) of the women were housewives whereas 29% were students. Rest of them was working as day laborer, seasonal worker and service holder.

2.3 Occupation

Table-3 Occupational Status

	Count	%
Housewife	38	47.5%
Student	23	28.8%
Day Laborer	12	15.0%
Seasonal Worker	6	7.5%
Service Holder	1	1.3%
Total	80	100.0%

60% women were married while about 29% were unmarried. 5% and 3.8% were divorced and separated respectively. But 2.5% opined that they were neither separated nor divorced. Their husband married again, and they sometimes came to them though they did not bear the expenses of the family.

2.4 Marital Status

Table- 4 Marital Status of the Informants

	Count	%
Married	48	60.0%
Unmarried	23	28.8%
Divorced	4	5.0%
Separation	3	3.8%
other	2	2.5%
Total	80	100.0%

Religion of the respondents is mainly Islam. 26% were Hindu and 19% were Christian. The Mahato ethnic people were practicing Christianity.

2.5 Religious Status

Table-5 Religious position

	Count	%
Hindu	21	26.3%
Muslim	44	55.0%

Christian	15	18.8%
Total	80	100.0%

In the case of ethnic identity, the study intentionally chose people from various ethnic identities. Though the majority of the informants were Bengali, the two ethnic groups Rabidas and Mahato were selected for the study and the number was about 28%.

2.6 Ethnic Identity

Table- 6 Ethnic Identity

	Count	%
Bengali	58	72.5%
Adibashi	22	27.5%
Total	80	100.0%

It was an important enquiry about the respondents whether they were involved with micro credits or not. 52% of the respondents took micro credit from Grameen Bank, ASA, RDRS etc. But two groups said that they were not linked with the micro credit. They were sweeper and Mahato community. They said that since they were not equal to the main streaming Bengali people, the NGOs were not working for the betterment of them. However very significant comments the informants rose that the NGOs never waived their loan when they were disaster victim. They said at this time it was very difficult to manage food for the family, how could they meet weekly loan? Still the NGOs do not consider their situation while dealing the micro credit.

2.7 Microcredit

Table-7 Taken Micro Credit

	Count	%
N0	38	47.5%
Yes	42	52.5%
Total	80	100.0%

Likewise, the informants stated that they took micro credit more than one times. About 48% of the informants said that they did it for 1-2 times where as 21.3% used it for more than seven times.

2.8 Times

Table-8 How many times did they take micro credit?

	Count	%
1-2	38	47.5%
3-4	5	6.3%
5-7	5	6.3%
More than 7	17	21.3%

5	15	18.8%
Total	80	100.0%

In the study, most of the informants were landless. Some of them had only their homestead. Very few of them had extra land to produce vegetables or crops to support their family. But they work in other people's land as a day laborer.

2.9 Amount of Land

Table-9 Amount of Land Owned by Informants

	Count	%
landless	27	75.0%
1 Satangsho	3	8.3%
2-3	2	5.6%
4	1	2.8%
3+	3	8.3%
Total	36	100.0%

Among the Micro credit users, 52.5% were male and only around 4% were female. 7.5% male and female used credit by taking decision together. Who usually use the Credit?

2.10 Micro credit users

Table-10 Micro Credit Users

	Count	%
NO	29	36.3%
Wife	3	3.8%
Husband	42	52.5%
Together	6	7.5%
Total	80	100.0%

Around half percentage of the informants said that they went to various places obeying the husband's will. About 28% of the respondents said that they could go anywhere by their choice.

2.11 Mobility

Table-10 Mobility of the Informants

	Count	%
Market	9	11.3%
Self choice	22	27.5%
Everywhere	5	6.3%
Husband's will	38	47.5%
In Laws will	6	7.5%
Total	80	100.0%

Against the mobility the informant opined that they could not move according to their wish due to values of patriarchic society. Their husbands do not allow them to go everywhere. They need permission from their husband to go somewhere even if they want to go their parent's home. A good number of the respondents highlighted the issue of religion that worked against the mobility of the women. Conversely, the Mahatos and Sweepers only showed the case of social values rather than religion or husband domination.

2.12 Obstacles

Table-11 Obstacles against mobility

	Count	%
religion	25	31.3%
Husband	29	36.3%
Society	26	32.5%
Total	80	100.0%

To know the variation of the experiences, the informants of the research were selected from different age groups. Highest numbers of the informants were from age group of 12-19 whereas about 24% of them belonged to the age group of 26-35. But around 23% respondents were over 50 years old

2.13 Age of the Informants

Table- 12 Age of the Informants

	Count	%
12-19	37	46.3%
20-25	7	8.8%
26-35	19	23.8%
36-50	7	8.8%
50+	10	12.5%
Total	80	100.0%

In the questionnaires about 34% respondents were selected who were unmarried. Highest number of informants married at the age group of 12-17. Only 1% of them married at the age of 25-30. They informed that it was a culture of the village to arrange marriage for the girl at the age of near 15. If they failed to do that it was very difficult for them to organize marriage. However, they also said that the rate of early marriage was decreased by then. They also underlined the reason that they felt insecure at the period of crisis with adolescent girls.

2.14 Age of being married

Table- 13, Age of being married

	Count	%
N0	27	33.8%
12-17	44	55.0%
18-25	8	10.0%

25-30	1	1.3%
Total	80	100.0%

Similar to marriage, the age of being a first mother, most of the cases was 13-17. Few of the informants stood at the age group of 21-25 for having first baby in their life.

2.15 Age of First Mothering

Table- 14 Age of First Mothering

	Count	%
N0	28	35.9%
13-17	39	50.0%
18-20	10	12.8%
21-25	1	1.3%
Total	78	100.0%

It was a noticeable finding that almost all women paid dowry in their marriage. In addition, they said that it was increasing day by day. Some of them informed that during the crisis period the amount of dowry used to increase because then the parents' were very worried about their adult daughters.

2.16 Dowry

Table-15 Dowry is given

	Count	%
No	30	37.5%
Yes	50	62.5%
Total	80	100.0%

Most of the women's husband did not remarry while around husbands of 13% women went for a second marriage and about 4% did more than two. They said disaster crisis, unemployment led them to leave the place and in most of the cases they had the second wife in a new place where they went for searching livelihood.

2.17 Polygene

Table- 16 Practice of polygene

	Count	%
No	23	29.1%
1 Time	42	53.2%
2 Time	10	12.7%
3 Time	3	3.8%
3+	1	1.3%
Total	79	100.0%

Nature of Hazards

The study area is highly susceptible to natural hazards and climate change impacts. These areas are exposed to natural hazards of all possible sorts, such as, floods, river erosion, droughts, cold waves etc. The (co)occurrence of these natural events are often coupled and multiplied with the high level of vulnerabilities of the individuals, households and communities resulting in disasters that further drive the country towards greater environmental degradation, hunger, poverty, social deprivation and political conflicts, and thereby withholding the socio-economic development of the country. Major hazards of the study areas are described briefly as follows.

7.1 Flood

Every year, and mostly several times in a year, the people of Northwest Bangladesh are experiencing flood. The monsoon floods in Northwest Bangladesh are mainly caused by generally low topography of the area along with its location. Rainfall in the upstream countries, i.e. the catchments areas, river siltation, human interventions like construction of barrages and protective works along the banks of the river and deforestation in the upper reaches of the rivers are not only leading accelerated water flow towards downstream but also causing deposition of loads in the river beds, resulting in reduced channel flow and consequent overland runoff water. Besides, there are other types of floods for instance, flash floods, caused by overflowing of hilly rivers of Northern Bangladesh.

History of floods in this area is perhaps inseparable from the history of this land. Floods are annual phenomena with the most severe occurrence during the months of *Jyaishta* to *Ashwin* (mid May to mid October). Regular river floods affect this area two or three times in a year. First time, it is occurred in the month of *Jyaishta* (mid May to mid June), second time, it is occurred in the month of *Ashar-Bhadra* (mid June - mid September). This second time flood is common in this area. It occurs every year which destroys every sectors especially agriculture and livelihood of the local people. Sometimes flood is occurred in the month of *Ashwin* (mid September to mid October).

Flash flood occurs only in the area near the border. . It is occurred here three or four times in every year from mid *Jyaishta* to *mid Kartik* (June to October). It comes suddenly from Indian hilly area and stays 1/ 2 days. The water of the flash flood sweeps through the local *jhiri* (river). However, when there is a downpour in the locality and the water level of the local river increases overflowing the banks, and its current gets arrested.making the whole community waterlogged for a long time. It visits every year destroying every sectors especially agriculture and livelihood of the local people.

Table : 18 Seasonal Hazard Calendar

TABLE 4.1: SEASONAL HAZARD CALENDAR

	BAISHAKH	JYAISTA	ASHAR	SHRABAN	BHADRO	ASHWIN	KARTIK	AGRAHAON	POUSH	MAGH	FALGUN	CHAITRA	
FLOOD		[Orange shaded area from Jyaishta to Ashwin]											
FLASH FLOOD		[Orange shaded area from Jyaishta to Shraban]											
RIVER BANK EROSION		[Orange shaded area in Jyaishta]	[Orange shaded area from Shraban to Ashwin]										
COLD WAVE									[Orange shaded area from Poush to Magh]				
KALBOISHAKHI/ NOR'WESTERS	[Orange shaded area in Baishakh]											[Orange shaded area in Chaitra]	
DROUGHT	[Orange shaded area in Baishakh]											[Orange shaded area in Falgun]	

Source: Traditional Coping Strategies of Rural People Living in Flood Prone Areas in Northwest Bangladesh, study conducted by Hasan Shafie and Dr Siddiqur Rahman, Funded by RDRS. 2009

7.2 River Bank Erosion

Rivers in Northwest Bangladesh are morphologically highly dynamic. The main rivers are braided, and form islands or chars between the braiding channels. These chars, the habitat of many people, "move with the flow" and are extremely sensitive to changes in the river conditions. Erosion processes, being highly unpredictable, have dramatic consequences for the lives and livelihood of people those areas. The major type of river erosion in Northwest Bangladesh is a form of hydraulic action where the force of the water wears away the river bank from underneath. Erosion may also be accelerated by different factors. Inundation of bank soils followed by rapid drops in flow after flood, redirection and acceleration of flow, removal or disturbance of protective vegetation from stream banks as a result of trees falling from banks or through poorly managed stock grazing, clearing or fire intense rainfall events etc.

River bank erosion is seen here in the month of *Jyaishtha* (mid May to mid June) to the month of mid *Kartik* (last week of October). In fact, the river bank erosion changes geo-morphology of the area. The fertile lands are dissolved in the river water and after a few years these lands surface in the char lands which contain mainly unfertile sandy soil. The river bank erosion forced the local people to shift their homestead as well as occupation. Due to this hazard, a land owner becomes landless.

7.3 Monsoon Storm

The frequency of devastating nor'westers (*kalbaishakhi*) usually reaches the maximum between the last week of *Falgun* (first week of March) and the second week of *Jyaishtha* (last week of May), while a few occur from the last half of *Baishakh* to the first half of *Jyaishtha* (May), and the minimum between the first half of the last half of *Falgun* and first half of *Chaitra* (March). Nor'westers is more frequent in the afternoon. Wind-speeds in nor'westers usually do not exceed 113-130 km/hr (70-80 miles/hr), but in some cases speed may exceed 162 km/hr (100 miles/hr). Nor'westers brings the much needed pre monsoon rain. Nor'westers may occur in late February due to early withdrawal of winter from Bangladesh, Bihar, West Bengal, Assam, and adjoining areas. The

occasional occurrence of nor'westers in early June is due to delay in the onset of the Southwest monsoon over the region (Karmakar, 1989).

7.4 Drought

Drought is an abnormal condition where there is a lack of sufficient water to meet the normal needs of agriculture, livestock, industry, or for human use. While generally associated with semi-arid or desert climates, droughts can also occur in areas that normally enjoy adequate rainfall, and moisture levels (ADB, 1991). Drought is the result of insufficient or no rainfall for an extended period, and causes a considerable hydrological (water) imbalance. The ensuing water shortage leads to stream flow reduction, depletion of ground water and soil moisture, and hence, crop fails. In drought conditions, evaporation and transpiration exceed normal levels. If it continues for a prolonged period, a serious threat is posed to agricultural production. Based on drought severity, crop loss ranges between 20->60% for T. Aman and other rice varieties (Iqbal, 2000). It is one of the most insidious causes of human misery. Seasonal drought occurs due to unusual rainfall shortage in places where there are well-defined annual rainy and dry seasons. Unpredictable drought involves a strange rainfall failure, mostly in localized areas of humid and sub-humid climates.

Drought conditions due to deficiency in rainfall affect Northwestern parts of Bangladesh mostly during the pre-monsoon and post-monsoon periods. The drought of 1979 was one of the most severe in recent times for this area. Droughts occurred in Northwest Bangladesh from last week of *Magh* to *Baishakh* (from second week of February to mid May).

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