2013

Coping with Disasters in Bangladesh: People's Vulnerability and Survival Strategy

Minhaz, Afif-UI-

University of Rajshahi

COPING WITH DISASTERS IN BANGLADESH: PEOPLE'S VULNERABILITY AND SURVIVAL STRATEGY

Ph.D. DISSERTATION

A thesis submitted to the Institute of Bangladesh Studies, University of Rajshahi, Bangladesh, in Partial fulfillment of the requirements for the degree of Doctor of Philosophy in Social Work

Researcher

Afif-Ul-Minhaz
PhD Fellow
Session: 2007-2008
Institute of Bangladesh Studies
University of Rajshahi, Bangladesh

Supervisor

Dr. Md. Elias Hossain
Professor
Department of Economics
University of Rajshahi, Bangladesh

Institute of Bangladesh Studies
University of Rajshahi
Bangladesh

June, 2013

COPING WITH DISASTERS IN BANGLADESH: PEOPLE'S VULNERABILITY AND SURVIVAL STRATEGY

Ph.D. DISSERTATION

A thesis submitted to the Institute of Bangladesh Studies, University of Rajshahi, Bangladesh, in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Social Work

Supervisor

Dr. Md. Elias Hossain
Professor
Department of Economics
University of Rajshahi, Bangladesh

Submitted by

Afif-Ul-Minhaz
PhD Fellow
Session: 2007-2008
Institute of Bangladesh Studies
University of Rajshahi, Bangladesh.

Institute of Bangladesh Studies
University of Rajshahi, Bangladesh

June 2013

SUPERVISOR'S CERTIFICATE

I have the pleasure to certify that the dissertation titled "Coping with Disasters in Bangladesh: People's Vulnerability and Survival Strategy", submitted by Afif-Ul-Minhaz for the award of the degree of Doctor of Philosophy in Social Work, is his original work. So far I know, this is the candidate's own achievement and is not a conjoint work. He has completed this thesis under my direct guidance and supervision.

I also certify that I have gone through the draft and final version of the dissertation and found it satisfactory for submission to the Institute of Bangladesh Studies (IBS) in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Social Work.

(Dr. Md. Elias Hossain)
Professor
Department of Economics
University of Rajshahi
and
Supervisor

Date: June, 2013

DECLARATION

I, the undersigned, do hereby declare that this dissertation titled "Coping with Disasters in Bangladesh: People's Vulnerability and Survival Strategy" submitted to the Institute of Bangladesh Studies of the University of Rajshahi, is entirely my original work except the quotations which have been duly acknowledged. This work has not been submitted previously, in part or full, for any academic degree to any University, except at the Institute of Bangladesh Studies, University of Rajshahi, Bangladesh.

Date: 29 June, 2013

(AFIF-UL-MINHAZ)

Dedicated to My Beloved Parents

ACKNOWLEDGEMENT

All praise to Almighty Allah, the Merciful, who gave me the strength and patience to complete this Ph.D thesis.

First of all, it is my profound pleasure to extend my gratitude and indebtness to my supervisor Dr. Md. Elias Hossain, Professor, Department of Economics, University of Rajshahi, for his scholarly guidance, constant supervision, constructive criticism and inspiration with valuable suggestions throughout all stages in completing this research work. Without his patience and help it would have been extremely difficult for me to prepare this dissertation paper. I am truly ever grateful to him not only for his intellectual contribution but also for his exceptional quality as a man of kind disposition.

I would like to thank Dr. Md. Mostafa Kamal, Associate Professor, IBS, University of Rajshahi, for his valuable suggestions and comments. He helped me from the very beginning of my research. I am grateful to Dr. ANK Noman, Professor, Department of Economics, and Md. Rabiul Islam, Associate Professor, Department of Social Work, University of Rajshahi, who assisted me a lot to enrich this thesis. Thanks to Md. Shakhawat Hossain, Lecturer, Department of English, who has helped me in many ways during the writing stage of this thesis. Special appreciation is paid to Ahmed Hasan, Managing Director, Ryans Archives Limited, who have kindly favored me in carrying out my research works and granted me leave whenever I needed.

Special thanks go to my friend Md. Abdullah for assisting me in the field survey and helping me in many ways from the beginning. I am also grateful to Md. Shahidul Islam, Johurul Islam and Anwar Hossain- three enumerators who assisted me in data collection. I also would like to convey my thanks to Md. Najmul Huq, Lecturer, Department of Sociology, University of Rajshahi; Md. Mahmud Ul Ala, Associate Professor, Joypurhat Mohila College; and Uday Sankar Biswas, Lecturer, Department of Folklore, University of Rajshahi, for their suggestive comments and encouragements to make this research done. I am also grateful to my friends- Pijush, Habib, Akkas, Shipu, Robi, Sonet, Humayun, and Md. Monirul Haque, Assistant Secretary, IBS, University of Rajshahi who stand beside me all the times.

My deepest gratitude goes to my dearest mother and father who have provided immense emotional support and motivation throughout the Ph.D process. Their love and support that constantly nurtured me, made the whole Ph.D. process much easier. My thanks to my lovely sisters and other dear ones who always encouraged me for doing something that brightens our family pride. Thank you all.

ABSTRACT

A large number of people live in the riverside areas of Bangladesh, which are prone to severe flooding and erosion. A huge amount of colossal damages have been recorded every year due to such natural disasters in those areas. Although there are several studies done on disasters and theirs effects in the context of Bangladesh, these studies are mostly focused on the cyclones and tidal surges in the coastal areas. Scant attention has been given on flood disaster and vulnerabilities and impacts caused by it in the context of plain land and riverside areas of Bangladesh. Moreover, during and after the flood, people of the affected areas usually try to adopt some measures as coping strategies. This aspect is also remained almost unexplored in case of Bangladesh. Therefore, this study has set its objective to explore the vulnerabilities and impacts of flood disaster and analyze the coping strategies people adopt at different phases of flood disaster in the study area. To obtain the objective an extensive field survey on 250 households has been carried out in two villages of Kazipur upazila of Sirajganj district in Bangladesh. It is found that among the different natural hazards, flood with river erosion is the foremost problem to the study people. The study finds that the people of the study area are vulnerable to flood disaster in terms of insecurity feeling about their economic, social, health related and other aspects of their livelihood. Reduction of income, crop damage, asset damage, children's education discontinuation, chances of occurring diseases, chances of being displaced etc. are the main areas of vulnerability created by flood disaster. During and after the flood, various types of impacts fall on the people. It is found that in the villages more that 80% households reported to face moderate to severe impacts of immediate past flood. It has been seen that flood has devastating impact on people's income, food consumption, health etc. In looking at the impacts of flood disaster, it is found that a large number of respondents became homeless and displaced. The economic losses were also high. The study finds that being vulnerable groups, women and children faced flood impacts more than men. To minimize the flood impacts the respondents were found to adopt many coping strategies at different phases of flood disaster. The study explored 34 major coping strategies of the respondents. They used such strategies mainly to pass the flood days somehow. The strategies they employed are mainly for maintaining the daily food requirements and income insecurities. Food and income security becomes the main concern of coping strategy to the landless and small farmers. While asset damage and crop damage are the main concerns of the medium and large farmers for which they adopt best possible coping strategies. Coping Strategy is influenced by various intra-household and external factors apart from the severity and duration of hazard. Among the intra-household and external factors, pattern of house structure, insufficient food or food insecurity, income and savings, having no effective local flood resistant infrastructures have been seen as dominant factors in deciding and adopting coping strategy in the study area. Relatives, neighbors, GOs and NGOs have been the great helpers to the affected people during flood. There is a need of strengthening the coping capacities of the households towards building a disaster resilient community but there is also a need of minimizing the threat of excessive flood with river erosion. Coping strategies have been their survival strategies as they practice the coping strategies to save themselves for years.

TABLE OF CONTENTS

TITLE	i
SUPERVISOR'S CERTIFICATE	ii
DECLARATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
CONTENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xv

CHAPTERS AND SECTIONS	Page no.
CHAPTER ONE: INTRODUCING THE RESEARCH	1-13
1.1 Introduction	1
1.2 Statement of the Problem	4
1.3 Research Objective	10
1.4 Significance of the Study	10
1.5 Scope of the Study	12
1.6 Organization of the Thesis	13
CHAPTER TWO: LITERATURE REVIEW	14-38
2.1 Introduction	14
2.2 Economic and Social Perspectives in Natural Disaster Research	14
2.3 Literature on Vulnerability and Coping Strategy	18
2.4 Literature on the Impact or Consequence of Natural Disaster	21
2.5 Natural Disaster Research in Bangladesh: Vulnerability and Coping Strategy	25
2.6 Government Efforts and Initiatives in Addressing Natural Disaster	31
2.7 Literature Gap	37
2.8 Conclusion	37
CHAPTER THREE: CONCEPTUAL AND ANALYTICAL FRAMEWORK	32-53
3.1 Introduction	39
3.2 Conceptualization of Different Terms	39
3.2.1 Natural Hazard and Disaster	40
3.2.2 Vulnerability	41
3.2.3 Risk	47
3.2.4 Impact	47
3.2.5 Coping Strategies	48
3.3 Conceptual Framework for the Present Research	50
3.3.1 The BBC Framework	50
3.3.2 A Generalized Analytical Framework for the Present Research	51
3.4 Conclusion	53

CHAPTER FOUR : METHODOLOGY 54-67
4.1 Introduction 54
4.2 Methodology Used in Natural Disaster Research 54
4.3 Methodology Used in the Present Study 55
4.3.1 Selection of the Study Area and Respondents 56
4.3.2 Data Type and Source 58
4.3.3 Technique of Data Collection 58
4.3.4 Technique of Analysis 59
4.3.5 Vulnerability Analysis 59
4.3.6 Impact Analysis 60
4.3.7 Coping Strategy Analysis 60
4.4 Description of the Study Area 61
4.5 Conclusion 67
CHAPTER FIVE: NATURAL HAZARD, DISASTER AND THE SOCIO- ECONOMIC FEATURES OF THE STUDY AREA 68-86
5.1 Introduction 68
5.2 Nature of Natural Hazard and Disaster in the Study Area 68
5.2.1 Characteristics of Flooding 69
5.2.2 Damages Recorded due to Natural Disaster 70
5.2.3 Other Natural Hazard and Disaster 71
5.2.4 Forms and Severity of Social Consequences of Flood Disaster 72
5.3 Extent of Flood Faced by the Respondents 73
5.3.1 Level of Flood Water 73
5.3.2 Frequency of facing Flood Disaster 74
5.3.3 Frequency of Displacement by River Erosion 75
5.4 Socio-Economic and Demographic Features of the Respondents 75
5.4.1 Demographic Features of the Respondents 75
5.4.2 Economic Features of the Respondents 77
5.4.3 Household Assets, Homestead and Land Ownership 82
5.5 Conclusion 85
CHAPTER SIX: PEOPLE'S VULNERABILITY TO FLOOD DISASTER 87-98
6.1 Introduction 87
6.2 Areas of Respondents' Vulnerabilities in Flood Disaster 87
6.2.1 Economic Vulnerability 88
6.2.2 Social Vulnerability 91
6.2.3 Health and Other Vulnerabilities 92
6.3 Major Factors of Vulnerability of the Respondents 95
6.4 Comparative Discussion on Vulnerability 97
6.5 Conclusion 98
CHAPTER SEVEN: IMPACT OF FLOOD DISASTER IN THE STUDY AREA 99-116
7.1 Introduction 99
7.2 Economic Impact 99

7.2.1 Impact on Income 99
7.2.2 Depletion of Savings 101
7.2.3 Dependency on Borrowing 101
7.2.4 Impact on Agriculture 103
7.2.5 Financial Losses due to Crops Damage 103
7.2.6 Loss due to Low Price Selling of Crops 105
7.2.7Land Erosion and Its Financial Losses 105
7.3 Impact on Homestead Structure & Assets 107
7.3.1 Homestead Structure Damage 107
7.3.2 Household Assets Damage 108
7.3.3 Impact on Livestock 109
7.4 Social Impact 110
7.4.1Impact on Vulnerable Group 111
7.5 Impact on Health and Nutrition 112
7.5.1 Food Consumption 112
7.5.2 Threat to Life & Health 114
7.5.3 Drinking Water Crisis 116
7.6 Conclusion 116
CHAPTER EIGHT: COPING STRATEGIES IN FLOOD DISASTER AND FACTORS INFLUENCING PEOPLE TO ADOPT COPING STRATEGIES 117-158
8.1 Introduction 117
8.2 Coping with Economic Insecurity 118
8.2.1 Occupation and Income during Flood 118
8.2.2 Using of Savings 119
8.2.3 Engaging Family Members for Earnings 120
8.2.4 Borrowing Goods and Its Source 120
8.2.5 Borrowing Money and Its Source 122
8.2.6 Strategies to Resume Earnings after Flood 123
8.3 Coping with Food Crisis or Food Insecurity 124
8.3.1 Coping Strategies to Overcome Food Crisis 124
8.3.2 Dependency on Less Expensive or Less Preferred Food 127
8.3.3 Reducing the Amount of Meal Intake and Number of Food Items 128
8.3.4 Reducing Frequency of Cooking 130
8.3.5 Borrowing Foods and Source of Borrowing 130
8.3.6 Storing Foods before Flood and Its Duration 131
8.3.7 Crops Selling for Fear of Damages 132
8.3.8 Borrowing Money to Buy Foods 133
8.3.9 Coping with Water Crisis 134
8.4 Coping Strategies for Household Assets Safety 134
8.4.1 Protecting House 134
8.4.2 Protecting Household Goods and Assets 135
8.4.3 Strategies to Make Temporary Shelter during Flood 136
8.5 Coping Strategy for Life and Health Insecurity 137
8.5.1 Protecting Life 137
8.5.2 Diseases and Treatment 138
8.6 Agriculture Related Coping Strategy 141
8.7 Coping Strategy for Livestock Safety 142

8.8 Coping with the Disrupted Communication and Transportation System 143
8.9 Summary of Coping Strategies 144
8.10 Role of Stakeholders in Coping Strategy 146
8.11 Factors Influence People to Adopt Coping Strategies 148
8.11.1 Factors Influencing Strategies Related to Income 149
8.11.2 Factors Influencing Strategies Related to Food 149
8.11.3 Causes of Suffering Most in Flood 151
8.12 Vulnerability and Coping Strategy 151
8.13 Impact of Coping Strategy Adopted 152
8.14 Comparative Discussion on Coping Strategy 156
8.15 Conclusion 158
CHAPTER NINE: CONCLUSION AND POLICY SUGGESTIONS 159-170
9.1 Introduction 159
9.2 Summary of the Research Findings 159
9.3 Policy Suggestions 166
9.4 Concluding Remarks 169
REFERENCE 171-180
ANNEX-I 181-197
ANNEX-II 198-202

LIST OF TABLES

Table No	Table Title	Page No
1.1	Natural Disasters in Bangladesh (1901-2009)	7
4.1	Sample Distribution and Techniques	58
4.2	Dependency Ratio in the Study Villages	63
4.3	Households by Size of the Study Villages	64
4.4	Housing Characteristics of the Study Villages	65
4.5	Economic Condition of the Study Villages	65
4.6	Sources of Household Income	66
5.1	Severity of Natural Hazard in the Study Area	69
5.2	Characteristics of Flooding in the Study Area	70
5.3	Flood and Colossal Damages in the Study Areas (Kazipur Upazila)	70
5.4	Riverbank Erosion in the Study Areas (Kazipur Upazila)	71
5.5	Major Cyclone/Storm in the Study Areas (Kazipur Upazila)	72
5.6	Social Consequences of Flood Disaster in the Study Area	73
5.7	Flood Level in the Homestead	74
5.8	Times of Falling in Flood Disaster in Life	74
5.9	Frequency of Displacement by River Erosion in Life	75
5.10	Educational Status of the respondents	77
5.11	Main Occupation of the Respondents	77
5.12	Monthly Family Expenditure of Respondents	78
5.13	Economically Active Persons in the Households	80
5.14	Unemployed Persons in the Household	80
5.15	Assets of the Respondents	82
5.16	Homestead Ownership among the Respondents	83
5.17	Amount of Homestead Land of the Respondents	83
5.18	Respondents by Land Ownership	84
5.19	Homestead Structure of the Respondents	85
5.20	Height of Homestead Plinth	85

Table No	Table Title	Page No
6.1	Areas of Respondent's Economic Vulnerabilities in Flood Disaster (by Village)	89
6.2	Areas of Peoples' Economic Vulnerabilities because Flood Disaster (by Respondent)	90
6.3	Areas of People's Social Vulnerabilities during Flood Disaster, by Village	91
6.4	Areas of People's Social Vulnerabilities in Flood Disaster, by Respondents	92
6.5	Areas of Respondents' Health and Other Vulnerabilities in Flood Disaster (by Village)	93
6.6	Areas of People's Health and Other Vulnerabilities in Flood Disaster (by Respondents)	94
6.7	Factors of Vulnerability of the Respondents (by Village)	95
6.8	Factors of Vulnerability of the Respondents (by Respondent)	96
7.1	Depletion of Savings during Flood, by Farmer	101
7.2	Amount of Borrowing Money during Flood, by Village	102
7.3	Amount of Borrowing Money during Flood, by Respondents	102
7.4	Losses Incurred for Crops Damage (by Village)	104
7.5	Losses Incurred for Crops Damage (by Respondents)	104
7.6	Price Level of Food Grain /Goods Sold during Flood	105
7.7	Amount of Land Eroded during Last Year's Flood	106
7.8	Financial Losses due to Land Erosion, by Village	107
7.9	Financial Losses due to Land Erosion (by Respondent)	107
7.10	Expense to Repair Homestead (Structure) After Flood	108
7.11	Assets Damage during Flood	109
7.12	Cost of Repairing Goods or Assets	109
7.13	Death of Domestic Animals	110
7.14	Respondents' Social Impact in Flood Disaster (by Villages)	110

Table No	Table Title	Page No
7.15	Respondents' Social Impact in Flood Disaster (by Respondents)	111
7.16	Impacts on Women during Flood	112
7.17	Impacts on Children during Flood	112
7.18	Persons' Illness due to Flood Induced Diseases	114
7.19	Expense for Treatment during Flood (Flood induced diseases)	115
7.20	Problem Faced by the Respondents in Getting Medicine during Flood	115
7.21	Crisis of Drinking Water during Flood	116
8.1	Major Strategies to Cope with Income Insecurity during Flood	118
8.2	Source of Income during Flood	119
8.3	Using Savings during Flood or Savings Spent for Flood	119
8.4	New Members Employed for Job during Flood/Extra Income	120
8.5	Goods/things Borrowing during Flood	120
8.6	Types of Goods/things Borrowing during Flood (among the borrowers)	121
8.7	Source of Borrowing Goods during Flood	121
8.8	Taking Loan During Flood	122
8.9	Strategies to Resume Earnings after Flood (by Village)	123
8.10	Strategies to Resume Income Generating Activities (by Respondents)	124
8.11	Coping Strategies Employed to Overcome the Food Crisis	125
8.12	Coping Strategies to Overcome the Food Crisis (By Respondent Category)	127
8.13	Dependency on Less Expensive/Unusual Food During Flood Disaster	127
8.14	Duration of Dependency on Unusual /Less Preferred Food during Flood	128
8.15	Change in Reducing the Amount of Meal Intake	129
8.16	Change in Number of Meal Items (Curry) during Flood	129

Table No	Table Title	Page No
8.17	Reducing Frequency of Cooking	130
8.18	Tendency in Borrowing Food/Meal during Flood	130
8.19	Store Foods before Flood as Pre-Strategy	132
8.20	Crops Selling during Flood	133
8.21	Borrowing Money to buy Foods during Flood	133
8.22	Measures Taken to Purify Water	134
8.23	Measures Taken to Protect House before Flood (Plinth and Structure)	135
8.24	Measures Taken to Save Household Goods and Assets at the Advent of Flood	135
8.25	Time of Moving Household Assets	136
8.26	Type of Temporary Shelter Made during Flood	137
8.27	Measures Taken after Entering Flood Water in the House (At the last stage)	138
8.28	Types of Diseases during Flood	138
8.29	Measures Taken for Treatment	139
8.30	Persons who Suffered from Illness during Flood	140
8.31	Measure Taken to Clean the House and Assets after Receding the Flood Water	141
8.32	Cultivation during Flood Period	142
8.33	Measures Taken to Protect Animals during Flood	143
8.34	Measures Taken for Transportation who had no Own Means of Transport	143
8.35	Summary of Coping Strategies Adopted by the Respondents in Different Phases of Flood Disaster	145
8.36	Need of External Help during Flood	146
8.37	Types of Assistance Received by the Respondents from Out Side during Flood	147
8.38	Time of Getting/Receiving External Assistance	147
8.39	Respondents' Perception about who Helped Most during Flood	148
8.40	Respondent's Expectation about Getting Assistance during Flood	148
8.41	Factors Influencing Strategies Relating to Income	149

Table No	Table Title	Page No
8.42	Factors Influencing Strategies Relating to Food	150
8.43	Factors Influence in Taking Preventive Strategy	150
8.44	Respondents' Opinion about Causes of Sufferings most in Flood	151
8.45	Time Taken to Return to Normal Life after Flood	153
8.46	Time Taken to Return to Normal Life after Flood (by Farmers)	154
8.47	Respondents' Opinion about Causes of Taking Long Time to Come Back in Normal Life after Flood	155
8.48	Opinions of the Respondents about Measures that Can Save Their Family from the Impact of Flood	155

LIST OF FIGURE

Table No	Figure Title	Page No
3.1	Interaction between the components of vulnerability by Klein (2004)	45
3.2	Interaction between the Components of Vulnerability by Klein (2004)	46
3.3	The BBC-Framework	50
3.4	A Generalized Frame for Identifying and Analyzing Coping Strategies in Natural Disaster	52
4.1	Map of the Study Villages	57
5.1	Age of the Respondents	76
5.2	Monthly Income of the Respondents	78
5.3	Number of Income Source of the Respondents	79
5.4	Monthly Savings of the Respondents	81
5.5	Sources of Taking Loan among the Loan Taker Respondents	82
7.1	Respondents Remained Jobless or Job Lost during Flood	100
7.2	Number of Days Respondents Remain Jobless during Flood	100
7.3	Crops Damaged during Flood	103
7.4	Land Eroded during Flood (among the land owners	106
7.5	Number of Meals Eaten a Day	113
7.6	Illness during Flood	114
8.1	Source of Borrowing Money during Flood	122
8.2	Source of Borrowing Foods during Flood	131
8.3	Duration of Food Stock among the respondents who stocked Food for Flood	132
8.4	Source of Expense for Treatment	139
8.5	Ways of Family Expenses when the Main Earner was ill	140
8.6	Transport Ownership during Flood	144

LIST OF ABBREVIATIONS

BBC	Birkmann, Bogardi and Cardona
BWFMS	Bangladesh Flood and Water Management Strategy
CDMP	Comprehensive Disaster Management Programme
CSDDWS	Committee for Speedy Dissemination of Disaster Related Warning Signals
DMB	Disaster Management Bureau
DMTATF	Disaster Management Training and Public Awareness Building Task Force
DMB	Disaster Management Bureau
DFID	Department for International Development
DRR	Directorate of Relief and Rehabilitation
DRR	Disaster Risk Reduction
EIA	Environment Impact Assessment
EOC	Emergency Operation Center
FAP	Flood Action Plan
FPOCG	Focal Point Operational Co-ordination Group on Disaster Management
GIS	Geographical Information System
GO	Government Organization
GoB	Government of Bangladesh
HFA	Hyogo Framework for Action
LDAP	Local Disaster Action Plans
IFPRI	International Food Policy Research Institute
IMDMCC	Inter-Ministerial Disaster Management Co-ordination Committee
IWRM	Integrated Water Resources Management
ISDR	International Strategy for Disaster Reduction
km	Kilometer
MDMR	Ministry of Disaster Management & Relief
MGDs	Millennium Development Goals
MoFDM	Ministry of Food and Disaster Management

MP	Member of Parliament
NGO	Non-Governmental Organization
NGOCC	NGO Co-ordination Committee on Disaster Management
NDMC	National Disaster Management Council
NWMP	National Water Management Policy
SAARC	South Asian Association for Regional Cooperation
SoD	Standing Order on Disasters
UNDP	United Nations Development Programme
UNISDR	United Nations International Strategy for Disaster Reduction

GLOSSARY

Bigha	A measurement of land, (1 Bigha = 0.30Acre)
Char	Area surrounded by river or a mid-channel island that periodically emerges from the riverbed as a result of accretion
Jagon	A float made out of water hyacinth and thatch
Jhupri	House made with polythene or straw
Kot	Leased or rented (land)
Kutcha	House made with mud
Mahalla	A series of houses in the city area
Mauza	Land map for a specific area
Macha	A bamboo made high place or an indigenous structure made out of bamboo or wood that is used as a platform
Mahajan	Local money lender
Muchan	A bamboo made high place or an indigenous structure made out of bamboo or wood that is used as a platform
Pataton	Houses build with either bamboo or wooden ceiling in the upper part of the shelter where people live
Paurashava	Municipality
Pucka	House structure made with brick or building
Samity	Association
Taka (Tk)	Bangladeshi currency
Union	A small unit of government administration
Union Parishad	Administrative office of Union
Upazila	A unit of government administration
Matbar	Local elite person

CHAPTER ONE

INTRODUCING THE RESEARCH

1.1 Introduction

Natural disaster has been seen as an integral and inevitable part of human life and society. Society that has never experienced any disaster is rare in the human history. The history of natural disaster is basically a history of human loss and devastation, because it resulted in numerous deaths, economic losses and destroyed year-round development gains. This is why, natural disaster has always been a great concern to human society. Human concerns about the negative consequences of natural disaster were increased more on the backdrop of climate change realities and talks in the recent decades. It has been realized that natural hazards cannot be stopped rather the impact can be lessened by increasing human capacity to cope with disaster. It has also been recognized that both disaster risk reduction and response are more likely to be effective when they include coping mechanisms in the assessment and programme design.[1] This is why, coping strategy has been a prime issue for addressing the problem of natural disaster.

Every year various natural hazards occur in the world and almost all hazards turn into disasters due to damage and loss of properties and human casualties. Each year more than 600 disasters occur globally.[2] Since 1900, more than 9000 natural disasters have occurred around the world, of which about 80% have occurred over the last 30 years.[3] During 2000-2006, each year about 116 countries were hit by disasters, and in 2007 it was 133. On the other hand, in recent decades, the number of reported hydrological disasters has increased yearly 7.4% on the average. It is true that the number of

---

[1] ProVention Consortium, Flood Disaster, Learning from Previous Relief and Recovery Operations, 2008, p.3.

[2] Maxx Dilley, et al. *Natural Disaster Hotspot: A Global Risk Analysis-Synthesis Report*, (Washington DC: World Bank, 2005), p.2.

[3] D. Guha-Sapir, D. Hargitt, and P. Hoyois, *Thirty Years of Natural Disasters 1974-2003: The Numbers,* (Brussels: CRED, 2004), p. 20.

natural hazards worldwide is increasing, but the number of victims or affected people is increasing significantly. It has been found that during 1990-2003 almost 60% disasters have increased in numbers reported while 180% victims have increased which is a definite trend likely to climb in near future.[4]

Two third of South Asia's disasters are climate-related, and global warming will increase the frequency, severity and unpredictability of disasters caused by the weather.[5] In Bangladesh, most of the natural disasters are also climate related. However, geo-physical characteristics have also made this country vulnerable to different natural hazards. It is reported that, in 2007, 414 natural disasters occurred worldwide in which 16,847 persons were killed, more than 211 million were affected and caused economic losses worth over US$ 74.9 billion.[6] Hydro-metrological disasters like floods and storms have been the devastating disasters around the world. For example, the number of hydro-metrological disasters reported worldwide was 195 in the period 1987-1998 but during the years 2000-2006 this has increased by 187% to a number of 365 in that period.[7] The earth is unsafe largely in terms of the natural hazards it experiences. Unsafe living places and human settlements add extra degree to its uncertainty. About 1.3 billion of the world's population live on fragile lands.[8] Most of the people in such fragile habitats are concentrated in South Asia.[9] In these regions, over population and poverty force people to live in dangerous locations and unsafe shelters.[10] On the other hand, natural disasters also compel a great number of people to live below the poverty line losing their economic well-off each year.

Among the different regions of the world, Asia has received the hardest hit and is the most affected region by natural disasters. Statistic shows that the impacts on humans were essentially concentrated in Asia where 37% of the year's reported disasters occurred which accounted for 90% of all reported victims and 46% of the economic

---

[4] P. Hoyois, et.al. *Annual Disaster Statistical Review: Numbers and Trends 2007*, (Brussels: CRED, 2008), p. 53.

[5] Oxfam International, *Rethinking Disasters* (New Delhi : Oxfam International, 2008) p.13.

[6] P. Hoyois, et.al. *Annual Disaster Statistical Review: Numbers and Trends 2007*, (Brussels: CRED, 2008), p. x.

[7] Ibid, p.21.

[8] World Bank, *World Development Report 2003* (Washington: World Bank, 2003) p.XVI.

[9] World Bank, *World Development Indicators 2006* (Washington: World Bank, 2008), in Rethinking Disasters, (New Delhi: Oxfam International, 2008) p.17.

[10] Oxfam International, *Rethinking Disasters*, New Delhi: Oxfam International, 2008 p. 2.

damage of the world. Among the Asian countries India, China and Bangladesh are the most affected.[11] On the contrary, Europe is the safest region of the world where natural disasters are relatively rare and their negative impacts are stronger on economy than on human lives. For example, 65 disasters were reported in Europe in 2007, accounted for 27% of the world's economic damages from natural disasters, but the disasters affected people in that area are only 1% of the world's victims.[12] A recent UNDP report notes that while only 11% of people exposed to natural hazards live in countries classified as 'low-human-development' countries, these same countries account for more than 53% of disaster-related deaths.[13] The figures above indicate people's vulnerability of this region and show the sign of incapacity to cope with disaster. This scenario is common in the disaster-prone areas in the world and also in Bangladesh.

Among the different natural disasters, flood has always been a matter of great concern to the riverside people of Bangladesh. Yet the people cope with the disaster relentlessly. They devise different strategies and struggle to survive. They cope with the situations by their own ways, in some cases, with external supports without which their very existence would be threatened.

In spite of having importance of the coping strategies that people adopt, they have not received extensive attention from researchers. Identifying coping strategies help to understand the coping mechanisms of the people which may have safe and unsafe practices. It also helps to understand overall capacities of the people to cope with disaster and also helps to differentiate between safe and unsafe coping strategies. A safe and useful coping strategy can be replicated or practiced to other areas where people do not use.

Knowing indigenous knowledge, practices and adaptation mechanisms to overcome a particular disaster is a prerequisite to building a resilient community. The adaptation

---

[11] Oxfam International, *Rethinking Disasters*, New Delhi: Oxfam International, 2008 p. 2. p.x.

[12] P. Hoyois, et.al. *Annual Disaster Statistical Review: Numbers and Trends 2007*, (Brussels: CRED, 2008), p. xiii.

[13] UNDP, 2004, p.1, Cited in Jeff Dayton-Johnson, *Natural Disasters And Adaptive Capacity,* Working Paper 203, 2004, P.10.

capacities of the people can be strengthened if their coping strategies can be explored. The present research contributes to that direction. This research is an attempt to unearth the coping strategies of the people of a particular area and to suggest the ways to strengthening the coping capacities. This research also tries to shed light on natural disaster caused by floods in Bangladesh and the coping mechanisms adopted by the people of the flood areas taking two villages of Siranjganj district as the study area. The study also tries to explore and depict the causes behind selecting a particular coping strategy.

1.2 Statement of the Problem

Bangladesh is a land of natural disaster where different types of natural disasters occur each year. It creates a lot of problems and forces many people to live in poverty and disaster-prone areas. The people living in disaster-prone areas, especially in the riversides, are highly vulnerable to natural disaster. Every year a large number of people die, become homeless and destitute in this region. On the other hand, decline in agriculture production, losses of valuable livestock, disruption in communication and livelihood system also occur in these areas to a great extent due to different natural disasters.

Natural disaster is a problem to the people of Bangladesh because they often fail to cope with the natural hazards. Statistical figures show the devastation and depth of the problem of natural disasters in Bangladesh. Since 1901 to 2000, 231 disasters have occurred in Bangladesh (within the geographical territory) in which 1,069,693 people died, 956,867 were injured, 36,556,677 become homeless, and a total number of 3,46,530,651 were affected during the same period. Economic damages to those disasters were US$ 10,431,980.[14] The country's GDP growth rate has also faced ups and downs in several years for various natural disasters viz. from 11.6% in 1973-1974 to 3.5% in 1974-75 for flood, from 9.6% in 1975-76 to 1.6% in 1976-77 for El-Niño, from 4.3% in 1978-79 to 1.2% in 1979-80 for drought, from 6.2% in 1980-81 to 1.4% in 1981-82 for El-Niño again and from 6.6% in 1989-90 to 3.4% in 1990-91 for

[14] Asian Disaster Reduction Center, *Data Book-2006,* vol. 2, (Kobe: ADRC, 2007) p.n.p.

cyclone.[15] The death associated with different types of disasters shows the magnitude of disaster in terms of persons killed. During 1901 to 2000, 125 windstorms hit the country and killed 615,192 persons, affected 53,292,511, injured 854,337 and made 4,923,943 persons homeless. The major cyclones in terms of death are the cyclone of 1970, 1991 and 2007.[16] In 2007, 4,234 people were killed and 6 million people were displaced or made homeless by cyclone, Sidr. Again 1,110 people were killed in flood in the same year. Moreover, the extent of cyclone was significantly high in terms of death, destruction and economic damages. In 1970, more than 3,00,000 people were killed by cyclone and in 1991, over 1,38,000 people were killed by another cyclone named Gorky.[17] The figure of deaths and damages associated with different disasters in this country is stunning and it definitely makes everybody worried.

On the other hand, the number of catastrophic flood is relatively low than windstorm during the same period. Again during that time 58 flood disasters hit the country, that killed 50,309 persons and affected 265,493,273 persons. Of the affected 102,020 were injured and 33,613,724 were homeless. The total economic damage by those disastrous floods was US$ 7,360,100.[18] Among the floods, the floods of 1974, 1977, 1980, 1994, 1987, 1988 and 1998 were the most devastative in the country's history in terms of its extent, infrastructure damage, economic loss and threat to life of people. In 1988, Bangladesh experienced an unprecedented flood causing loss of 1621 lives and in the flood of 1998, almost two-third of the area of the country was inundated (Brammer and Khan, 1991).

Each year in Bangladesh about 26,000 sq. km. (18% of the country) area is flooded and during severe floods, the affected area may even expand upto 55% of the total area of the country. In an average flood, 844,000 million cubic metre of water flows into the country during the humid period (May to October) through the three key rivers the Ganges, the Brahmaputra-Jamuna and the Meghna (Ahmad, 2005). About

---

[15] A. M. Choudhury, "Managing Natural Disasters in Bangladesh," in *the Dhaka Meet on the Sustainable Development in Bangladesh : Achievements, Opportunities and Challenges at Rio+10*, by the Bangladesh Unnayan Parishad (Dhaka : Bangladesh Unnayan Parishad, March 16-18, 2002), p. 4.

[16] A. M. Choudhury, *"Cyclones in Bangladesh,"* K. Nizamuddin, ed., Disaster in Bangladesh Selected Readings (Dhaka: DRTMC, 2001) p.66.

[17] Ibid, p.8-10.

[18] A. M. Choudhury, *"Cyclones in Bangladesh,"* K. Nizamuddin, ed., Disaster in Bangladesh Selected Readings (Dhaka: DRTMC, 2001) p.66.

one-fifth to one-third of the country gets flooded to varying degrees of floods each year where about two-thirds of the food grains are produced.[19] About 30% of the country is prone to river flooding resulting from about 80% of the annual rainfall.[20] Flash floods also cause immense damages to pre-harvesting crops of dry-season and infrastructures. On the other hand, tidal flood and flood caused by storm and high water surge have more devastating impact in the coastal areas of the country in varying forms and degrees.

Riverbank erosion is one of the main characteristics of riverside flooding in Bangladesh. Because of the monsoon wind, current, wave and the pattern of soil composition the river bank erosion has also been seen as a devastating natural hazard and disaster in Bangladesh. The gradual shifting in major rivers in Bangladesh ranges from 60 meters to 1600 meters and about 2,400 kms. of the riverbank line experiences major erosion in a year.[21] It displaces more than 1,00,000 people annually in Bangladesh.[22] During 1982 to 1992, a net area of 87,000 hectares of land was lost because of riverbank erosion.[23] More than 100,000 people annually displaces in Bangladesh.[24] During 1982 to 1992, a net area of 87,000 hectares of land was lost because of riverbank erosion.[25] Most of the families of erosion-prone areas have witnessed a displacement in their lifetime. On an average, a household experienced riverbank erosion 2.33 times in the life of its members. Some of them experienced displacement 4-5 times or more.[26]

Bangladesh is also prone to earthquake and drought as well. Among the earthquakes the earthquake of the year 1897, 1950, 1962, 1965, 1988, were devastating in the

---

[19] Emaduddin Ahmed et al. "Floods in Bangladesh and Their Process," in *Disaster in Bangladesh Selected Readings*, ed. K. Nizamuddin, (Dhaka: DRTMC, 2001) p.17-18.

[20] K. Nizamuddin, ed. *Disaster in Bangladesh Selected Readings*, (Dhaka: DRTMC, 2001), p.2.

[21] http://banglapedia.search.com.bd/HT/R_0211.htm, Last accessed on 30/10/2008.

[22] http://www.adb.org/Documents/News/2002/nr2002225.asp, Last accessed on 24/10/2008.

[23] Khondoker Nizamuddin et al. *"Women-headed Households Displaced by River Bank Erosion: Problems and Strategies of Survival,"* in K. Nizamuddin, ed., Disaster in Bangladesh Selected Readings (Dhaka: DRTMC, 2001) p.49.

[24] http://www.adb.org/Documents/News/2002/nr2002225.asp, last accessed on 24/10/2008.

[25] Khondoker Nizamuddin et.al. "Women-headed Households Displaced by River Bank Erosion: Problems and Strategies of Survival," *Disaster in Bangladesh Selected Readings*, ed. K. Nizamuddin, (Dhaka: DRTMC, 2001) p.49.

[26] Ibid.

country's history.[27] Bangladesh has several devastating histories of drought. The drought of 1951, 1961, 1973, 1975, 1978-1979, 1981, 1989, 1992 and 1994-1995 were severe.[28] The drought of 1979 was one of the severest in recent times. The other mentionable droughts affected the area of the country were 31.63% in 1951, 46.54% in 1957, 37.47% in 1958, 42.48% in 1972, and 42.04% in 1979.[29] Arsenic contamination in ground water is another disaster that is clandestine in nature. It has affected almost 61 districts. Slow onslaught of arsenic is also a catastrophic disaster causing sufferings to millions of people of this country. So, Bangladesh is a place where multiple hazards occur with various degrees and most of the hazards turn into disasters. As a result, natural disasters have been seen as a serious problem to the people of Bangladesh.

Bangladesh has devastating history of natural disasters. It is very difficult to present a concrete data about different natural disasters and their consequences. Yet these can be summarized in the table below.

Table 1.1: Natural Disasters in Bangladesh (1901-2009)

Disasters	Frequency	Killed
Flood	63	52,156
Cyclone/Storm with surge	128	6,18,746
Drought	5	18
Earthquake	5	29
Extreme Temperature	11	970
Land Slide	2	327
Total	206	6,66,719

Source: Asian Disaster Reduction Centre, Kobe, 2010 and Bureau of Disaster Management, Bangladesh.

According to the IPCC Special Report (2007) on the Regional Impacts of Climate Change, there would be drastic changes in rainfall patterns in the warmer climate and

[27] Md. Hossain Ali, and Jamilur R. Choudhury. *"Assessment of Seismic Hazard in Bangladesh,"* in K. Nizamuddin, ed., Disaster in Bangladesh Selected Readings (Dhaka: DRTMC, 2001) pp.122-124.

[28] K. Maudood Elahi, "Drought in Bangladesh : A Study of Northwest Bangladesh," in K. Nizamuddin ed., Disaster in Bangladesh Selected Readings (Dhaka : DRTMC, 2001) p. 150.

[29] M.H.K. Chowdhury and A. Hussain, "Aridity and Drought Conditions of Bangladesh," *Journal of Tropical Meteorology*, pp.73-80, in Bangladesh State of Environment 2001, Department of Environment (Dhaka: DoE, 2001), p.100.

Bangladesh may experience 5-6% increase of rainfall by 2030, which may create frequent high and prolonged floods. As a large number of people live in *Char*-land and river-side areas, flood is still a big threat to the people. On the other hand, according to Barkat et al (2007) poverty and vulnerability are highly geographically concentrated in the chars than the plain land areas. Nevertheless, no conscious effort was taken in the past aiming at true development of life and livelihood of the char people, who have always remained excluded from the main stream (Islam et al 2011).

The Hyogo Framework for Action- 2005-2015, also gave emphasis on how to assess local disaster risks and to build a culture of safety, and resilient, and strengthen disaster preparedness for effective response at all levels (UNISDR, 2005). As the people of Bangladesh face multiple disasters each year they have to pass the disaster days by depending on their own capacities and strategies at first. However, they have to overcome the disasters by their own abilities. External supports or interventions are hardly seen to cover all victims. Sometimes external intervention seems as curative and rehabilitative rather than preventive by strengthening their coping capacities (Islam et al 2011).

The char-dwellers try to cope with this adverse flood situation though they have low adaptive capacity due to extreme poverty, recurrent natural hazards and overwhelming dependence on nature. Recurrent flood and erosion disasters are not new for the char-dwellers who have been living in multi-hazard prone areas for long time. The char-communities are engaged in a constant fight for survival with flood and riverbank erosion hazards. These have given them a great deal of knowledge to fight against recurrent floods. In the process the char people are facing various asset damages, economic losses and social insecurity. How to reduce such damages, losses and insecurity is a big challenge for these vulnerable communities. This leads to a gap in the conduct of in depth research on household level responses and coping strategies by the char-dwellers to reduce damages from recurrent flood hazards in this highly populated disaster prone country (Islam et al 2011).

Similar to the global and national context, natural disaster is also a major problem in Sirajganj district of Bangladesh, the study area for this research. The study villages

are prone to severe river flooding and erosion. Many people of this area have been affected and displaced by flood and river erosion. Loss of life, property and crop damage has also been noticed in the area in a great number. The floods of 1988, 1998, 2000, 2002, 2004, 2005 and 2007 were the devastating floods in this area. In Kazipur Upazila of Sirajganj district a total of 46 villages (out of 154) were partly or entirely eroded and 26,620 households were affected by river erosion during the period 1998-2008.[30] In 2007 a total of 15,500 households were affected by flood with a loss of BDT 50,18,780. The social impact like displacement, migration, disruption of education is common in this area due to flood and erosion. The people of the study area cannot cope with the flood properly. Though the people of the study area are vulnerable to flood disaster the issues of their vulnerabilities and coping strategies have been remained uncovered. Moreover, the areas of people's vulnerabilities and coping pattern have not been identified and explored yet from academic point of view. To look into the problem of natural disaster and finding the way out, there is a need to explore the vulnerability and coping strategy of the people of the study area. So, addressing flood disaster in the study area constitutes the research problem for this study.

From the discussion above, several questions arise in the context of natural disaster, especially, floods in Bangladesh. These are- i) what are the vulnerabilities of the flood affected people? ii) what are the impacts of flood disaster on the people of the affected area? iii) what are the coping strategies people adopt in different phases of flood disaster for minimizing the impacts? and iv) what are the factors that influence peoples' coping strategies? This study is set to address these questions mainly. For addressing the questions or problems of natural disaster the study focuses on the vulnerabilities and coping strategies of flood disaster. It aims at exploring how people cope with flood disaster and try to minimize the flood impacts with their limited capacities and resources.

---

[30] M.H.K. Chowdhury and A. Hussain, "Aridity and Drought Conditions of Bangladesh," *Journal of Tropical Meteorology*, pp.73-80, in Bangladesh State of Environment 2001, Department of Environment (Dhaka: DoE, 2001), p.100.

1.3 Research Objective

The main objective of this study is to gain insights into people's vulnerabilities and the coping strategies of the flood prone areas. To achieve the main objective there are some specific objectives which are as follows:

1. To analyze the nature and frequency of natural disasters in the study area;
2. To identify people's vulnerabilities in association with flood disaster in the study area;
3. To assess the impacts of flood disaster on the people of the study area;
4. To analyze the coping strategies people adopt in different phases of flood disaster and to explore the factors influencing people's adoption of different coping strategies.
5. To suggest policy guideline from the findings.

1.4 Significance of the Study

A large number of people live in the riverside areas of Bangladesh which are prone to severe flooding and erosion. They are vulnerable to natural disaster and poverty as well. They struggle with both situations to survive but they fail to cope with. They often become unable to take safe coping strategies because of their inabilities or incapacities. The vulnerabilities and coping strategies of the flood affected people have been remained unexplored. So, there is a need of empirical research for identifying their vulnerabilities and coping strategies in flood disaster.

In a disaster or crisis situation, people make their own efforts first to prevent their properties from further damage. People's failure to cope with hazards turns into disaster. If people's coping capacities are enhanced, disaster impacts can be minimized. Moreover, it is also difficult to intervene and formulate any policy regarding disaster reduction and mitigation without knowing or considering what people do in different phases of disaster and what factors affect their coping strategies. On the other hand, taking any structural measure like building embankment can have negative consequences if the people's own initiatives and measures are not

taken into consideration. So, it is necessary to understand how people cope with disaster.

Disaster impacts can be minimized and even prevented through reducing people's vulnerabilities. For minimizing the peoples' vulnerabilities, there is a need of identifying the vulnerabilities first. On the other hand, it has been widely recognized that community resilience through capacity building is a solution to reduction of disaster impact, but question has also been raised on how people's capacity can be built effectively and how they can play their vital roles effectively in minimizing disaster impacts. Under these circumstances, it is necessary to have a profound insight into the people's strategies which they deploy in different phases of disaster. However, people's vulnerabilities and coping strategies in relation to flood disaster can vary from place to place and from people to people. So, from this point of view there is a need of area specific understanding of the problem as well.

There is no doubt that disaster creates huge losses to the lives, assets and the country's economy. It hampers poverty alleviation progress and washes out all development efforts. It is also thought to be a threat for achieving the targets of MDGs. So, the development efforts will not be sustained until and unless the disaster impacts are minimized. For minimizing the disaster impact there is need of improving the coping mechanism of the people. In recent time, the issue of global warming has added an extra concern for all. As a result, disaster risk reduction, adaptation capacities have become an issue of institutional intervention for the government and NGOs. It has got the first priority along with poverty reduction. So, the problem of coping with flood is a policy issue for the government and NGOs. The NGOs and government also get involved in improving people's coping mechanism during disaster period. For developing and strengthening the policy, there is a need of research, especially from the academic point of view. Moreover, the findings of the study may be of help to the study people through the interventions of GOs and NGOs who work with natural disaster issues. The present study can help policy makers, planner and decision-makers to think more effectively and efficiently so that they can build more effective programs for strengthening people's capacity to cope with disaster to make a disaster-resilient community.

The poorer section of people suffers most in flood disaster. The ultra poor or the poorest of the poor living in the flood prone areas always fight with the climatic disasters like flood, cyclone, river erosion etc. Every year during the rainy season, ultra poor households face the devastating impacts of flood in terms of loss of assets and shelter, loss of livelihood opportunity, health hazard and increasing food insecurity. It is assumed that due to lack of resource and power, the ultra poor are the worst victims of flood and had little coping ability to sustain the shocks of seasonal calamities. As food is the main concern of ultra poor during and after flood, their flood coping strategies towards food security should be properly documented for the policy implication concerning national food security (Islam, 2010). Although many studies are available on people's flood coping strategies in general but specific study on coping strategies towards food security were found very scarce or almost unavailable (Islam, 2010).

The people of Bangladesh have their own coping mechanisms and yet very little had been discovered (Yasmin et al, 2013). From this perspective, this research has a contribution in extensive exploration into the peoples' vulnerabilities and coping strategies. No research has been conducted extensively on these issues before as long as the study area is concerned. This present research has tried to provide a more comprehensive and significant study in this arena and helped to fill the literature gap and showed the analysis from the academic perspective.

1.5 Scope of the Study

There are different types of natural disaster in the study area. The present research covers only flood disaster with some aspects of river erosion. It attempts to explore the vulnerabilities and coping strategies of the riverside people of two villages of a district of Bangladesh. The impact of flood and affecting factors of coping strategies have also been tried to cover. The research is a new field of study in terms of vulnerability and coping strategy in case of flood disaster. There is a chance of conducting empirical research on the problem from the academic point of view. There are 64 districts in Bangladesh among which many are prone to disasters such as flood,

cyclone, drought etc. This research has taken Sirajganj district in its scope of empirical study.

1.6 Organization of the Thesis

The thesis is divided into nine chapters. The first chapter, the present chapter, provides the research problem, objectives and significance of this research. The chapter two deals with literature review. The chapter shows the research gap and justifies the present research. Chapter three deals and explains some terms and concepts commonly used in the light of natural disaster research. This chapter also presents some theoretical aspects related to vulnerability and coping strategies in natural disaster. The forth chapter describes the methodology used for the present research. Chapter five shows the nature of disasters in the study area and the socio-economic and demographic profile of the respondents. Chapter six provides an analysis of people's weaknesses and to gain insight into people's vulnerabilities during flood disaster. Chapter seven shows the impacts of flood disaster on the people and study area. Chapter eight describes the coping strategies people adopted during different phases of flood disaster. Factors affecting decision to adopt coping strategies are also discussed in this chapter. The last chapter, Chapter nine, deals with the research findings and policy implication of the study. It concludes with some recommendations and guidance for improving policy related to flood disaster.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Reviewing literature is a source of knowledge that provides a deep understanding about the topic or the issue closely related to the research to be undertaken. It also finds knowledge gap and justify the research. It finds a research gap, relates and oppositely takes apart the research from others and makes a new contribution in the exiting knowledge. It helps to relate the understanding about the research. In view of doing so, an attempt has been made to explore the existing relevant knowledge through various relevant books, journals, theses, dissertations and research reports. There is no doubt that many scholars have been carried out research on disaster from different perspectives. This chapter has reviewed all those literature.

This chapter is divided into eight sections. The section 2.2 describes the economic and social perspectives of natural disaster research. Section 2.3 illustrates the literature on vulnerability and coping strategy. Section 2.4 depicts the literature on the impacts and consequences of natural disaster. In section 2.5 natural disaster research in the case of Bangladesh is described. The section has two sub-sections. Section 2.6 briefly describes the government efforts and initiatives in addressing natural disaster in Bangladesh. Section 2.7 deals with the research gap and justify the research. Finally, Section 2.8 concludes the chapter.

2.2 Economic and Social Perspectives in Natural Disaster Research

Economic aspects in relation to natural disaster have been tried to explore in different literature. It ranges from microeconomic to macroeconomic issues of a country. Researchers like Sorkin (1982) and Albala-Bertrand (1993) aimed a generalized framework of disaster analysis. To them, disasters are quite different from other economic events, in terms of its frequency, extent, and predictability. Development

ideologies believe that nature can be conquered by doing more economic development (Harwell, 2000). Such an economic analysis shows that widespread deforestation of mangrove trees in Thailand exacerbated the effects of the 2004 tsunami (Barbier 2007). Based on this analysis, a policy response of replanting mangrove trees was suggested. According to Okuyama (2003) disasters pose quite a different set of impacts to an economy from other economic phenomena, such as changes in public policy and/or regulation, and often require a careful treatment of economic behavior changes under the chaotic situation after a disaster. Disasters help or force individuals, groups or states to make opposite but positive policy decision for their betterment. The study showed that a rubber industry was severely damaged by the Kobe earthquake in 1995. The authority decided to relocate the factory instead of repairing and reconstructing it. Without the Kobe earthquake, they may have still used the old one. So, a disaster forced them to adopt quite a different environment for decision making. Contrary to this situation, it should also be noted that the company had to spend a huge amount of money for relocating it but if the disaster would have not been happened the company would not spent money in this purpose rather it could invest in many other areas (Okuyama, 2003).

Efforts have been made for modeling spatial economic impacts of disasters in a regional context. (Okuyama and Chang eds., 2004) which was based on empirical analysis and toward modeling strategies. However, the theory on economics of disasters (Okuyama, 2003; Dacy and Kunreuther, 1969) has also tried to explore for providing theoretical perspectives toward disaster related research on the basis of a research work which was one of the first attempts to quantify the economic impact of the Alaska Earthquake of 1964. They found that many Alaskans were actually better off afterward than before because a huge amount of money rushed into the Alaskan economy after the event.

Disaster has not always been seen as destructive and not slows down country's economy. Some research have also focused this issue. According to Skidmore (2002), Emmott (2011), Pilling (2011) and Horwich (2000), disasters are also more likely to promote growth rather than retard it. It has been showed in another study that after the earthquake in China in 2008, the rebuilding money injection would cause the

subsequent economic growth that would outweigh the economic loss and result in a total gain in GDP by 0.3% (Bennett, 2008). Similarly the Kobe earthquake of 1995 in Japan resulted in more growth than in the previous year with a total GDP growth of 1.4% from a 0.6% growth in 1994 (Horwich, 2000). The trend shows that unless there is a fundamental underlying weakness in the system or if there is a radical revolution following the disaster a natural disaster is likely to promote a short-term growth spurt (McRae, 2007). A study by the World Bank showed that increase of soil fertility after flood lead more agricultural output (2011). Arnason (2011) has summarized this relation as firstly decrease in growth rate after disaster but increase in growth more later, because of a gradual surge in recovery activity that translates in more GDP growth that prior to the disaster.

Clarke and Wallsten (2003) showed that remittances increase when the household is hit by an exogenous shock. In the case of the Philippines, Yang and Choi (2005) observed that remittances replaced 60 per cent of income lost due to weather related shocks. On the contrary, Yang (2006) suggests that US$1 worth of hurricane damage led to roughly US$0.13 in additional remittances in the year of the hurricane and US$0.28 over five years after the damage. The literature suggests that remittances are significant form of post-disaster financing which help to smooth consumption for affected households. The impact of remittances in this regard is seen as having both an immediate as well as a lagged effect. Many studies including Fajnzylber and López (2007) show that remittances rise in the year following an economic shock. But it should not be viewed as positive always for all places or countries where there is much poverty and do not have persons aboard to send remittance. The nexus between disaster and poverty has also been tried to explore. The linkages between poverty and disaster vulnerability in the context of remittance flows has been examined and tried to seek whether flows of remittances alleviate the post-disaster living conditions of Caribbean households. (Marlene Attzs, 2008).

Research has been carried out on some social aspects caused by natural disasters. For example, disaster is another ongoing actor of violence against women in both countries the developing and industrialized countries. Disaster magnifies violence against women. Violence against women increases following disasters (Dasgupta, et

al., 2010; Elaine Enarson, 2000; Molin Valdés, 2009; Palinkas, Downs, Petterson and Russell, 1993; Wilson, Phillips and Neal, 1998; Phillips and Morrow, 2008). On the other hand, in both developed and developing countries domestic violence like increase in divorce and child abuse occurs after a disaster (Dasgupta, et al., 2010; Fothergill, 1998) which figured at 50% increase in domestic violence and court cases for injunctions increased by 98% (Wilson, et al., 1998). An alarming figure has also been found in another study. In the first four months following the earthquake in Dale County, reports of domestic violence increased by 600% (Wilson, et al., 1998). The UN Inter-Agency Standing Committee (September, 2005) also acknowledged it. The committee noted that the most immediate and dangerous type of gender-based violence occurs in acute emergencies.

In fact, there is evidence that violence against women increases in the wake of colossal disasters and that the increased risk is associated with gender inequality and the limited representation of women in disaster responses (Rees, Pittaway, and Bartolomei, 2005). Many researchers have noted the link between disaster and increased violence against women (E Enarson, 1998; Elaine Enarson and Phillips, 2008; Fothergill, 1998; Jenkins and Phillips, Fall, 2008; Morrow, 1999; Palinkas, et al., 1993) They hypothesize that this increase is due to a number of factors including heightened stress, alcohol abuse, and lapses in constraints to behaviour offered by legal and societal expectations (Bradshaw, 2004, cited in Elaine Enarson and Phillips, 2008; Neumayera and Plümperb, January, 2007). Homelessness and changed living circumstances would be another factor (B. D. Phillips and Morrow, 2008). The women and children subjected to this abuse suffer doubly when large-scale catastrophes strike in spite of having surrounding peoples in rescue operation (Jenkins and Phillips, Fall, 2008). Phillips et al. (2009) theorized that reasons for the apparent increase of domestic and sexual violence after disasters include threats to the male provider and protector role; loss of control; increased and possibly forced contact between the couple; and loss of options as support services for women are reduced. So it is apparent that disasters and their aftermath increase the vulnerability of people.

In Indian Ocean tsunami, 80% of the 300,000 deaths were women and children from 13 nations (Phillips and Morrow, 2008). In the Ashkabad earthquake, of the 33,000

people who died, only 18% were men: 47% were women and 35% were children and in Tashkent, 20% more women died than men (Beinin, 1981 cited in Rivers, 1982, p. 257). Neumayera and Plümperb (2007) picked up the gender differences in natural disaster mortality and addressed it one important, yet relatively neglected aspect of disaster research till now. In an earthquake in Guatemala, more women were injured than men (Glass et al. 1977), and in an earthquake in Cairo, Egypt, more females were killed or injured than males (Malilay et al. 1995). (Fothergill, 1998). Although known death rates after Hurricane Katrina were almost the same for males (50.6%) and females (49.3%) (Jonkman, Maaskant, Boyd and Levitan, 2009).

Disasters can be a force for social change for the better (Dasgupta, et al., 2010; Quarantelli, 1994). Disasters can provide, both financially and psychologically, an opportunity to leave an abusive relationship. (Fothergill, 2008). Likewise, Anastario, et al. (2009) showed an increase in rates of gender based violence in a population of women displaced by Hurricane Katrina. Gender and disaster researchers feel lack of both the scarcity of research on gendered patterns of decision-making, and the absence of women's voices from the discourse (Elaine Enarson and Phillips, 2008). Disaster researchers point to the learning that can be gained by hearing from women and their significance to disaster response. However, Jenkins and Phillips, Fall, 2008)emphasized on listening the voice of women victims in post-disaster contexts by which new insights can be gleaned as to how to make all women safer during disasters.

2.3 Literature on Vulnerability and Coping Strategy

Gaillard (2010) analyzed vulnerability, capacity and resilience from policy perspectives.[1] On the other hand, Ribot (2009) viewed it from societal creation point and relates it to policy issues.[2] Jeff Dayton-Johnson analyzed disasters and development with 'adaptive capacity' as a combination of a society's *ex ante*

[1] Gaillard, C.J, 2010. Policy Arena: Vulnerability, Capacity and Resilience: Perspectives for Climate and Development Policy. Journal of International Development 22, 218–232.

[2] Ribot, Jesse C. 2009. *"Vulnerability does not just Fall from the Sky: Toward Multi-Scale Pro-Poor Climate Policy,"* In Robin Mearns and Andrew Norton (Eds.), *Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World.* Washington, DC: The World Bank.

vulnerability to damages from natural hazards and its ex post resilience or ability to cope with the damages that result. Chambers (1989) focused on the connotation of 'vulnerability' and separated it from poverty. However, issue of coping and policy also discussed and analyzed.[3] Skoufias (2003) analyzed coping strategies and policy implications.[4] Samson (2008) tried to present strength and weaknesses of coping strategies people use in relation to health issues.[5]

Many research tried to look at women's vulnerability (DeLaine, et al., 2003; Williams, Summer 1993, 1994). Several Australian researchers have called for more research into disaster that considers social and gender aspects and empathized specifically on the need for qualitative research and wrote about the potentially significant role that women could play in disaster preparedness and response (Williams, Summer 1993, 1994). Proudley (2008) pointed to the lack of research into the role of women in bushfires, the impact of disaster on families, and how decisions are made in emergency situations. Study on women about social and health aspects of their disaster experiences has been also conducted by Finlay (1998); Proudley (2008); Wallace, (1983).

Wisner *et. al* (2003) argue that extreme natural events are not disasters until a vulnerable group of people is exposed. They identify disaster a failure of mainstream development and provided two analytical models for understanding vulnerabilities. One links remote and distant root cause to unsafe conditions in a progression of vulnerability. The other uses the concepts of access and livelihood to understand why some households are more vulnerable than others.

There are some studies on vulnerability and gender issues in Bangladesh which addressed river erosion and cyclone mainly. Ikeda (1995) investigates the gender aspects in human loss and vulnerability during quick-onset natural disaster by

---

[3] Chambers, R. 'Editorial Introduction: Vulnerability, coping and Policy' Institute of Development Studies Bulletin. Vol. 20. No. 2. 1989. pp. 1-7.

[4] Skoufias, E. 2003. Economic Crises and Natural Disasters: Coping Strategies and Policy Implications. *World Development* Vol. 31, No. 7, pp. 1087–1102.

[5] Samson, W. A. 2008. *Floods and Health in Gambella region, Ethiopia: An Assessment of the strength and weakness of the coping mechanism.* LUMES – Lund University International Master Programm in Environmental Studies and Sustainability Science.

examining the case of the April 1991 cyclone in Bangladesh.[6] Haque, and Zaman (1989), Rahman (1991) analyzed vulnerability syndrome of peasant people particularly on river erosion displaced people.[7,8] Murshid (1992) analyses the survival strategies in relation to food crisis during flood. Huq, and Alam (2003) portray the issues of flood management and vulnerabilities of the people of Dhaka city.

Gender inequalities in personal freedom exacerbated in a disaster, and access to information and resources become limited for many women, which Enarson and Morrow (1998) term as 'gendered disaster vulnerability'. On the other hand, economic insecurity and patriarchal social structure both contribute to increased vulnerability for women in a time of disaster as women's financial situation is hindered further by caring responsibilities and inequitable access to financial aid (Enarson and Phillips, 2008). Gender influences both reaction to the disaster and ongoing stresses and it influences coping styles (Dasgupta, et al., 2010). Grosh, and Gaag (1993) concur with the view that there is a weak link between poverty and female headship. Women are poorer than men in the world. As a result, women live in fragile lands with poorly structured and constructed houses which is more susceptible to disaster. (Dasgupta, et al., 2010; Neumayera and Plümperb, January, 2007; Scanlon, 1998). On the other hand, having less resource is another factor that affects women in disaster. Vulnerability to disaster occurs also as a result of women's poverty. Henrici, Helmuth, and Braun argued that women are less likely to have the resources to escape if a disaster threatens (2010).

---

[6] Ikeda, Keiko, Gender Differences in Human Loss and Vulnerability in Natural Disasters: A Case Study from Bangladesh. *Indian Journal of Gender Studies.* Vol. 2 (2), 1995. pp.172-193.

[7] Rahman, M. Vulnerability Syndrome and the Question of Peasents' Adjustment to Riverbank Erosion and Flood in Bangladesh. in *Riverbank Erosion, Flood and Population Displacement in Bangladesh.* K.M. Elahi, K.S. Ahmed, and M. Mafizuddin eds. Dhaka: REIS, 1991.

[8] Haque, C.E. and M.Q. Zaman 'Coping With Riverbank Erosion Hazard and Displacement in Bangladesh: Survival Strategies and Adjustment. *Disasters.* Vol. 13. No. 4 September-December, 1989.

2.4 Literature on the Impact or Consequence of Natural Disaster

It is arguably the case that most developing-country disaster policy takes the form of *ex post* coping. Indeed, *ex ante* policies, to the extent that they exist, are not specifically targeted to disasters - although this is a feature of some *ex post* measures as well. In many cases, some authors argue that a greater emphasis on *ex ante* measures is called for. The study by Owens et al. (2003) is especially useful in this regard, as it compares the post-drought impact of relief aid in Zimbabwe (1994/95) with counterfactual projections of the impact of ex ante policies.

Ahern *et al* (2005) in their review on the global health impacts of flooding, report a number of epidemiological studies which examined the effects of flooding on common mental disorders, including anxiety and depression, post-traumatic stress disorder and suicide. They found that most studies explored the effects of flooding on common mental disorders came from high or middle-income countries, and results revealed significant increases in depression, anxiety and psychological distress among flooded adults and relatively few studies examined the effects of flooding on children

Rashid (2000) in his qualitative survey on 1998 flood in Bangladesh finds that 918 officially reported flood deaths recorded but qualitative study observed 1200 deaths of which 2% were drowning. On the other hand, Biswas (2010) studied on the flood of 2007 in Bangladesh through household survey of child injury in flood-affected areas and found that 8% children injured were during flood, injuries included 38% lacerations, 22% falls, 21% drowning, 8% road traffic, 6% burns, 5% animal bites. Pradhan (2007) on the flood of 1993 in Nepal using household survey in flood affected areas finds 302 deaths and females and young children had greatest risk of death.

Bich (2011) on the flood of 2008 in Vietnam through cross-sectional household survey found 2 deaths, 27 injuries, including 18 lacerations, 3 fractures, 1 trauma and 5 others. Causes of injuries included falling (16), near-drowning (1) and other (10). Similarly, Beyhun et al. (2005) reviewed the impact of flooding in Turkey from 1970 to 1996 found that 624 floods recorded during study period, including 83 fatal events

with 539 deaths. They found that there was an association between deaths and material losses, close to half of flood events occurred in summer months, and 37% of deaths in the Black Sea region.

Morris and Wodon (2003) analyzed the impact of disaster aid following Hurricane Mitch in Honduras. They find that aid was reasonably well targeted to victims of the hurricane, but tiny (on the order of $10 per household) compared to asset losses. Poorer households and those who suffered larger losses were more likely to receive aid. Looking more closely at the targeting, they find that relief amounts appeared to be linked more closely to losses incurred than to pre-disaster asset levels. They find that households with more assets fared better.[9] Datt and Hoogeveen's (2003) study of the impact of the Philippine drought of 1997 suggests that diverse sources of labour income helped to protect living standards.[10]

Attzs and Samuel (2007) analyzed the impact of remittance after disaster. They showed the relationship between disasters and remittances in Central America and the Caribbean. They showed that migration increases in the aftermath of natural disasters like hurricane. Many people sought temporary refuge after these events but never returned to their home country. They also showed that migration from a given area reduces economic opportunities in the area, and needed infrastructure to mitigate the effects of natural disasters, like better drainage and flood controls, is postponed which exacerbates the effects of the next event. The occurrence of the next natural disaster prompts even more migration. Wisner (2003) suggests that in the area of disaster risk reduction the transfer of funds from individuals abroad to assist recovery has been a notable feature of recent events such as the earthquakes in Gujarat and El Salvador. It is well documented that remittances also have had a special role in smoothing household consumption in the aftermath of disasters.

According to Scheueret (2011) floods risks are multidimensional and complex issues. High-magnitude floods inundate large areas causing widespread damage to crops,

---

[9] Cited in Jeff Dayton-Johnson, 2004. Natural Disasters and Adaptive Capacity, Working Paper No. 237, P.17, 28.

[10] Cited in Jeff Dayton-Johnson, 2004. Natural Disasters and Adaptive Capacity, Working Paper No. 237, P.27.

human beings, livestock and property, as well as devastation to life and livelihoods (Paul 1997; Few 2003). In the absence of adequate assets and insurance to smooth income or consumption, risks emerged from disasters may lead to irreversible losses, such as damage of productive assets, the fall in a vicious cycle of debt, reduced nutrient intake, or disruption of education that eternally reduces human capital (Jacoby and Skoufias 1997).

Skoufias (2003) notes that where poverty-alleviation or social safety net policies exist before a disaster, they can be called upon to provide post-disaster relief without first incurring prohibitive fixed costs. In the context of a different kind of shock, Maluccio (2003) argues that the Nicaraguan social safety net provided surprisingly effective relief for coffee farmers and others hit by the precipitous decline in world coffee prices, even though the policy was not intended to mitigate terms of trade shocks. In the case of natural disasters, mitigation policies might include the formation of medical networks that could be rapidly mobilized, or the establishment of food storage facilities.[11]

The degree of impact or effect has variation between man and woman which has been echoed in many studies. To some authors, women are affected differently by natural disaster than men (Alston, 2009; Domeisen, 1998; Fothergill, 1998; Neumayera and Plümperb, January, 2007; Phillips, Jenkins, and Enarson, 2009). On the contrary, the reverse situation is seen in other studies. To some writers, the situation is reversed and seen that more men than women are killed in disasters caused by severe weather events (Fothergill, 1998). In other study, Fothergill (1998) mentioned that men take greater risks and be engaged in outdoor activities more than women. So, men can be less victimized by hazards (Neumayera and Plümperb, 2007).

There are different impacts on individuals depending on gender as well as class, ethnicity, disability. And this is why it has been seen that the impact of a disaster is influenced by the way a society is structured. Fothergill (1998) argues that social processes are more visible in times of a disaster. In the disaster risk-management

[11] Cited in Jeff Dayton-Johnson, 2004. Natural Disasters and Adaptive Capacity, Working Paper No. 237, P.29.

literature, it is widely accepted that there are six stages in the disaster risk management lifecycle covering the pre and post disaster phases. Fothergill (1998) suggests a gendered approach to disaster risk-management with the justification that men and women are likely to have different perceptions of the different disaster phases and an understanding of their different responses to these phases could enhance the efficiency of disaster risk-management.

Some writers argued that across the globe, women are at greater risk in disasters than men (Alston, 2009; Domeisen, 1998; Neumayera and Plümperb, January, 2007; B. Phillips, Jenkins, and Enarson, 2009a). Such mortality is seen not only in developed countries but also the developing and under developed countries. It has been showed in the literature that women are victims of natural disaster with a higher disaster mortality rate than men in developing countries (Domeisen 1998; Neumayera and Plümperb 2007).

However, the disaster researchers are urged to look on both the negative and the positive aspects disaster so as to the way society evolves can be better understood (Quarantelli, 1994). Picking up on this, Dasgupta (2010) wrote, "It is important to understand that women are not only victims of chance, but also agents of change" (Dasgupta, *et al.*2010). Holzmann and Jørgensen (2000, 2001) have developed an eminently useful framework for policy analysis that they call social risk management. They categorise risks as idiosyncratic (affecting a single household) or covariant (affecting several households at once, and thus limiting the extent to which neighbouring households can pool such risks). They consider the strengths and weaknesses of the various actors that can address these risks: households, communities, non-governmental organizations, governments, and international organizations.[12]

[12] Cited in Jeff Dayton-Johnson, 2004. Natural Disasters And Adaptive Capacity, Working Paper No. 237, P.17.

2.5 Natural Disaster Research in Bangladesh: Vulnerability and Coping Strategy

In Bangladesh the history of natural disaster research is mainly from the middle of the 19th century but numerous studies have been carried out on the backdrop of climate change speculations just in the last two decade. Research has been carried out from many dimensions which have contributed a lot in policy making, taking programmes, projects and gradually given a solid foundation in the field of scholarly literatures. In terms of approaches, the geographers or the discipline Geography has dominated the literature related to natural hazards and disaster in Bangladesh most. However, anthropological and sociological studies have been carried out mainly after the flood of 1987-88. There are a lot of researches on the field of natural disaster in Bangladesh. Among the researches some are briefly mentioned below.

Hutton (2000) in his research wants to see psychological aspects of riverbank erosion-induced displacement in the flood prone Sirajganj. The study has made an attempt to compare the differences between displacees and non-displacees. The study finds that the constant threat of riverbank erosion has contributed to a substantial disaster subculture in the riverine zones of Bangladesh. The study finds that in most cases, displacees cope with erosion and land loss by relocating nearby lands and when the impacts of displacement become acute, land scarcity forces displacees into urban areas. Among both displacees and non-displacees, chronic survival concerns, daily hunger, and marginal living conditions were predictive factors of psychological distress. However, vulnerability to economic strain and psychological distress was particularly high among women and the elderly. Research has shown that displacees in Bangladesh usually survive poverty and marginalization because of mutual kinfolk obligations of assistance and rehabilitation programmes in this context may have the most benefit.[13] In other work by Hutton and Haque (2004) analyzed the role of socio-economic variables in determining the coping ability and recovery of the river erosion induced displacees. The study shows that the socio-economic variables play a significant role in coping ability and response capacity.

---

[13] David Hutton, e-Journal of Prehospital and Disaster Medicine, Vol. 15 (3): 99 (Winnipeg: Manitoba, 2000). http://pdm.medicine.wisc.edu/Hutton.htm. Last accessed on the 5/11/2008.

Addressing the policy response to massive flooding in Bangladesh in 1998, Del Ninno et al. (2003) consider two major diversification strategies that helped Bangladesh stave off a starvation crisis in the wake of flooding in 1998. The first was long-term agricultural and investment policies that had fostered expansion of winter rice, reducing dependence on flood-susceptible monsoon rice. Thus, though the monsoon harvest was devastated, the impact on consumption was less drastic than would have been the case in the absence of the winter-rice policy. Secondly, more startling in its impact, substantial liberalization of trade in the years preceding the flooding allowed massive rice imports, which prevented a surge in the rice price.[14]

In sociological approach by Nasreen (1995) illustrates the gender aspect during flood disaster. The study focused on the pre-disaster, during-disaster and post-disaster activities performed by women during flood. The researcher has focused on gender aspects during flood and argued that disaster affects both men and women but the burden of household responsibilities falls on women. During flood disaster women become bearers of children and responsible for their socialization and play roles of collectors and providers of food, fuel, water etc. The researcher argues that women virtually enable the rural folk to cope with disaster. Again the researcher emphasizes that women, especially the poor, should be included in policy making. [15]

The issue of social vulnerability has been raised by Shoeb (2002). The researcher endeavors to explore flood disaster in relation to social vulnerability, its factors and disaster management. The researcher showed the adjustment and adaptation strategies of people in flood disaster. The study also focused on institutional and organizational framework for disaster management and national measures and policies. However, the researcher also tries to show the situation of women in flood disaster and the responses and adaptations of the people towards hazards and disaster. The researcher

---

[14] Cited in Jeff Dayton-Johnson, 2004. Natural Disasters And Adaptive Capacity, Working Paper No. 237, P.28.

[15] Mahbuba Nasreen, Coping with Floods : The Experience of Rural Women in Bangladesh. Unpublished PhD. Dissertation. Massey University, New Zealand, 1995. in Disaster Research : Exploring Sociological Approach to Disaster in Bangladesh. Mahbuba Nasreen, Bangladesh e-Journal of Sociology, Vol. 1. No. 2, July, 2004. pp.-1-8.

shows that the perception of people is also motivated by social structure and cultural set up.[16]

Dell Ninno *et al.* (2001) focused on the government policy and private food grain markets in relation to 1998 floods disaster. The study shows the efficiency in targeting of public-sector transfers, coping strategies, and determinants of nutritional outcomes in relation to flood. Moreover, the extent of coping strategies in 1998 floods by different studies also mentioned here. The study provides an analysis of how appropriate government policy can both provide incentives for private markets to maintain food availability and directly reduce the food insecurity of poor-disaster-exposed households.[17] Nizamuddin *et al.* (2001) depicted a picture of women-headed households living on the embankments. According to them women are the most deprived and vulnerable group. They show women's vulnerability to crisis events, socio-economic deprivation, adopt measures to cope with crisis and stress the NGOs should address their problems through different programs. However, the study samples here include only women-headed households.[18]

Empirical research has been carried out by Islam (1995). The study mainly focused on the riverbank erosion displacees. The study attempts to locate how the displacees adopt to the changing environment both physically and socially depicting the survival strategies the displacees adopt indigenously for reducing their losses. The study shows that the displacees migrate to neighboring villages or towns for free from erosion and lack of local and national levels supports. The study finds different coping strategies such as sell out of properties, to procure loan from relatives and neighbours, low paying jobs etc. On the other hand, female displacees sell their labour for low payment, change the frequencies of daily meal taking, and employ themselves in

---

[16] A.Z.M. Shoeb, Flood in Bangladesh : Disaster Management and Reduction of Vulnerability-A Geographical Approach, Unpublished PhD. Dissertation, (Rajshahi: IBS, 2002).

[17] Carlo del Ninno, Paul A. Dorosh, Lisa C. Smith, and Dilip K. Roy, The 1998 Floods in Bangladesh-Disaster Impacts, Household Coping Strategies, and Response, (Washington D.C.: IFPRI, 2001).

[18] Khondoker Nizamuddin, Zinatunnessa R.M. Khuda, and Nasreen Ahmed, *"Women-Headed Households Displaced by River Bank Erosion: Problems and Strategies of Survival,"* in Disaster in Bangladesh –Selected Readings, ed. K. Nizamuddin, (Dhaka: DRTMC, 2001), p. 49-60.

homestead agricultural and other complementary activities to reduce the adverse impact of disaster situation.[19]

The study by Latif (1989) emphasizes on the structural measures such as building embankment, dredging of rivers to control flood disaster. Here the researcher has mentioned the negative consequences of such structural measures that should be considered before implementation. The study lacks showing peoples' own initiatives in flood control.[20] Baqee (1997) in his study argues that the poor char dwellers respond to hazards like flood and riverbank erosion with the help of their *matbars.* The researcher has tried to show the role of the elites of those areas in mitigating the disaster crisis. The study also shows the structural measures devised by the people such as homestead repair, agriculture coping, human safety etc.[21]

Anthropological study of Schmuck (2000) reveals that how people's fatalistic views can disguise their actual risk perception and risk-avoidance behaviour. The author explored people's response in relation to religious perspective and showed that people response by their religious thoughts first and act accordingly and take some other risk-avoiding strategies. However, it has also been showed that fatalistic attitudes limited their strategies for managing risk during flood.[22]

Sultana et al (2007) examined the participation in floodplain management in Bangladesh and England and concluded that there are significant merits to building up from local participation to catchments planning and linking floodplain-specific participatory institutions with existing local government, particularly as evidenced in the Bangladesh experience (Sultana et al., 2007, cited in ProVention consortium, Flood Disaster, Learning from previous relief and recovery operations, 2008). A study

---

[19] Md. Zulfiquare Ali Islam, Environmental Adaption and Survival Strategies of the Riverbank Erosion Displacees in Bangladesh : A Study of two Villages in Nawabganj Districts, Unpublished PhD. Dissertation, Institute of Bangladesh Studies, University of Rajshahi,1995.

[20] A. Latif, "Control of Flood in Bangladesh : Need for International Co-operation fo Solution of Problem" in Mohiuddin Ahmed ed. Flood in Bangladesh. (Dhaka: Community Development Library, 1989).

[21] Abdul Baqee, "Coping with Floods and Erosion in Bangladesh Charlands," in *Asia Pacific Journal on Environemnt and Development*, Vol. 4 No. 2, December, 1997, p. 38-52.

[22] H. Schmuck, "An Act of Allah" Religious Explanations for Floods in Bangladesh as Survival Strategy', *International Journal of Mass Emergencies and Disasters*, vol. 18, no. 1, 2000, pp. 85-95.

by the International Food Policy Research Institute (2001) after the 1998 Bangladesh flood found that 55 per cent of households lost assets, equivalent to 16 per cent of their pre-flood total value of assets.[23]

Paul and Routray (2009) conducted a study in two villages of Bangladesh regarding flood proneness and coping strategies of the people in flood disaster. This paper explores peoples' indigenous survival strategies and assesses variations in people's ability to cope with floods in two flood-prone villages in Bangladesh. It reveals that people continuously battle against flood vulnerability in accordance with their level of exposure and abilities, with varied strategies employed at different geophysical locations. The paper reports that people in an area with low flooding and with better socioeconomic circumstances are more likely to cope with impacts compared to people in areas with high and sudden flooding. Similarly, households' ability to cope varies depending on people's socioeconomic conditions, such as education, income and occupation. Although floods in Bangladesh generate socioeconomic misery and cause damage to the environment, health and infrastructure, people's indigenous coping strategies have helped them to reduce significantly their vulnerability. According to them such flood-mitigating strategies should be well recognized and emphasized further via proper dissemination of information through an early-warning system and subsequently external assistance.[24]

A review of a preparedness programme in Bangladesh shows that vulnerable people have little or no surplus income to invest in the measures that can protect them from flooding although they know what to do.[25] Social capital, e.g., reciprocal support among neighbours, support from immediate family members and wider kinship networks, is a vital safety net for people in coping with recurrent flooding. The destruction of assets, which function as a buffer, can make people more vulnerable to the next flood.[26]

---

[23] ProVention consortium, Flood Disaster, Learning from previous relief and recovery operations, 2008, p.3.

[24] http://onlinelibrary.wiley.com/doi/10.1111/j.1467-7717.2009.01139.x/abstract

[25] Alam et al., 2007b, cited in ALNAP-ProVention consortium, Flood Disaster, Learning from previous relief and recovery operations, 2008, p.3.

[26] ALNAP-ProVention Consortium, Flood Disaster, Learning from previous relief and recovery operations, 2008, p.8.

Moreover, there are other studies in which coping mechanisms have been tried to explore in many ways such as Murshid in his 'An Analysis of Survival: Floods and Food Crisis, in From Crisis to Development: Coping with Disasters in Bangladesh (1992) examines coping strategy in relation to food crisis. Ahmad (2003) sees adaptation and response strategies in relation to flood management. Sarkar, Haque and Alam (2003) and Schmuck-Widmann (1996) tried to present the survival and adaptation strategies of char-dwellers. Zama (1999) explored the social and political context of adjustment to riverbank erosion and resettlement strategies. Clarke, Guarnizo. 'Living with Hazards: Communities' Adjustment Mechanisms in Developing Countries' (1992), Haque and Zaman (1989) studied on the survival strategies and adaptation pattern in riverbank erosion. Hossain, Dodge and Abed (1992) tried to present coping strategies in natural disaster as a development issue. Hossain, *et al.* (1987) highlights the recurrent disasters and people's survival strategies and Murshid (1992) analyzed the survival pattern in flood disaster and sees the disaster from food crisis.

There are some studies based on the river Jamuna like Hazards in Fickle environment: Bangladesh by Haque (1997) which was a project based research and was mainly riverbank erosion impact study, Saifullah (2010) sees the char dweller's adaptation to Climate Change, Uddin and Rahman (2011) viewed Socio-economic impact of Erosion. The Climate Change Cell of Department of Environment (2009) studied on the impact assessment of climate change and sea level rise. Bangladesh Institute of International and Strategic Studies (2009) studied on the monsoon flooding, climate change and security issues of Bangladesh and Halli (1991) viewed the economic impact of riverbank erosion in Kazipur upazila. There are also major studies on the bank of river Jamuna like Hossain (1984) conducted study on the riverbank erosion and population displacement in Kazipur upazila, Unnayan Onneshan (2011) studied the issue of climate change and displacement through exploratory GIS based approach. Islam (2008) studied the survival strategies of the female displacees by river erosion in rural Bangladesh. However, researches on indigenous knowledge have been carried out by many researchers. Schmuck-Widmann (2001) 'Facing the Jamuna River: Indigenous and engineering knowledge in Bangladesh' is one of them.

2.6 Government Efforts and Initiatives in Addressing Natural Disaster

The flood management efforts have been seen through different acts and rules like Embankment Act, Drainage Act and Cannel Act etc.[27] The government of Bangladesh has different environment policies, laws, strategies and planning which is related to natural hazard and disaster management. Some strategies, planning are seen on the basis of short, medium and long term action instead of a sound policy for addressing natural disaster issues.

In Bangladesh, flood has got one of the important priorities among other natural disasters since the early sixties after experiencing the successive disastrous floods of 1954 and 1955. The flood management strategy has been changed gradually by dint of other disastrous flood of the later decades. In the 1956 a study was carried out with the intervention of United Nations to find out the cause and solution led by Mr. Krugg. The plan basically focused on protecting the agriculture land. As a result water development master plan was prepared in 1966 where structural options having large projects were given priority. Such projects were time consuming in terms of full completion. But during implementation of these projects some medium scale flood like 1968 hit the country again. The government realized that only through structural measures flood problems could not be solved or mitigate. As a result in 1972 the government decided to go for non-structural measures by developing flood forecasting and warning system to mitigate flood problems.[28]

In 1987 and 1988, disastrous floods hit the country again. As a result, national water and flood management strategy got the prime attention of government. The international development partners proposed a study project entitled Flood Action Plan (FAP) in 1990 to formulate a national flood and water management strategy. However, the Flood Action Plan (FAP) has been adopted in view of structural measure as a way of minimizing disaster impact. On the basis of FAP the government formulated Bangladesh Flood and Water Management Strategy (BWFMS) in 1996. In BWFMS some policy guidelines for water resources development and management were envisaged i.e. people's participation, Environment Impact Assessment (EIA),

---

[27] The Associated Programme on Flood Management, Integrated Flood Management Case Study Bangladesh: Flood Management Sep. 2003 A.N.H. Akhtar Hossain, p.10.

[28] Ibid, p.7.

Multi-Criteria Analysis during planning process were made mandatory in all future water sector projects. Now the government has introduced National Water Policy in 2001. The government has involved and integrated about 53 central government organizations and 13 ministries into flood and water management.[29]

On the other hand, at the end of the FAP implementation the government realized that all the issues have not been addressed in the light of Integrated Water Resources Management (IWRM) in these studies and later on in 1999 government formulated National Water Policy to guide the National Water Management Policy. The NWMP was prepare in 2001 with 25 years projection dividing short term 5 yrs, medium term 10 yrs and long term with 25 yrs period programme approach.[30]

After facing flood and cyclone Sidr in 2007, the government has prepared National Plan for Disaster Management, 2010-2015, aiming at reducing vulnerability of the poor to natural, environmental and human-induced disaster to a manageable and acceptable level taking into consideration of the Hyogo Framework for Action 2005-2015 and basic principles of the SAARC Framework of Disaster Management which will address disaster in a comprehensive way. The prime focus of government is now involving the community people in disaster management. Environmental issues have also been integrated in many government policy and activities and also considering a way of sustained poverty reduction through these efforts.

Bangladesh has gained or learned lessons from its experience over 40 years in flood management and managing other natural disasters, and learned that flood management activities should not be a standalone approach rather an integrated approach. Flood management should be a combination of both structural and non-structural measures. It should be participatory based in which community should be pro-actively involved and in a sustainable manner. Government realized that flood management should directly contribute to poverty reduction.[31]

---

[29] The Associated Programme on Flood Management, Integrated Flood Management Case Study Bangladesh: Flood Management Sep. 2003 A.N.H. Akhtar Hossain, pp.8, 11.

[30] Ibid, p.8.

[31] A.N.H. Akhtar Hossain, The Associated Programme on Flood Management, Integrated Flood Management Case Study Bangladesh: Flood Management, Sep. 2003, p.13.

Comprehensive Disaster Management Programme (CDMP)

Realization of the reality of natural disasters in Bangladesh the issue of managing natural disasters came forward gradually. With the issue of managing natural disaster, the government of Bangladesh has taken different plans and programs for reducing disaster risks through a well and comprehensive disaster management. Realizing the fact the government of Bangladesh initiated a project "Support to Comprehensive Disaster Management" in 1993 with overall goal to reduce the human, economic and environmental costs of disaster in Bangladesh. One of the main elements for the development objective of the project was to increase the capacities of the households and local communities in the highly disaster prone areas through establishment of Local Disaster Action Plans (LDAPs) to cope with cyclones, floods and other potentially disaster situations. The project has been completed on 30 June, 2001, making scope for the formulation of Comprehensive Disaster Management Programme (CDMP) for more holistic approach to risk management with support from development partners and international agencies.[32]

In mid 1999 the GoB together with UNDP and other development partners agreed to address the issue of risk reduction in a more comprehensive programmatic approach. Hence Comprehensive Disaster Management Programme (CDMP) is about to start functioning.[33]

CDMP has been designed to adopt an umbrella programme approach that encompasses all aspects of risk management. CDMP is a strategic institutional and programming framework that is meant to optimise the reduction of long-term risk and the operational capacities for responding to emergencies and disaster situations. CDMP is, therefore, a realistic strategy consistent with the GoB's vision for a more comprehensive approach to addressing the issues of risk and vulnerability. CDMP has

[32] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

[33] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

the main focus on Capacity Building, Partnership Development, Community Empowerment, Research & Information Management and Response Management.[34]

In line with the paradigm shift from relief and response to comprehensive disaster management, the Ministry of Relief and Rehabilitation before has been changed to the Ministry of Disaster Management and Relief and in 2003, it was again renamed as the Ministry of Food and Disaster Management (MoFDM). A series of inter-related institutions were developed to ensure that planning and coordination of disaster episodes were performed in accordance with the Standing Order on Disasters (SoD).[35]

As part of the paradigm shift earlier, the Disaster Management Bureau (DMB) was created as a professional unit at national level back in 1992 under the then Ministry of Disaster Management and Relief. DMB was assigned to perform specialist support functions working in close collaboration with District and Thana/Upazila level authorities and the concerned line ministries under the overall authority of high level Inter-Ministerial Committee (IMDMCC).[36]

DMB is a small dynamic professional unit at national level to perform specialist support functions working in close collaboration with District and Thana–level authorities, and the concerned line ministries under the overall authority of high–level inter-ministerial committee (IMDMCC). It is a technical arm to the Ministry of Food and Disaster Management (MoFD) to overview and co-ordinate all activities related to disaster management from national down to the grass-root level. As a continuation of the paradigm shift process, the Comprehensive Disaster Management Programme (CDMP) has been designed as a long-term programme of the Ministry of Food and Disaster management with multi-agency involvement. Funded jointly by the United

---

[34] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

[35] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

[36] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

Nations Development Programme (UNDP) and the Department for International Development (DFID), the programme was launched in November, 2003.[37]

CDMP The project aims to further reduce Bangladesh's vulnerability to adverse natural and anthropogenic hazards and extreme events, including the devastating potential impacts of climate change. It will do so through risk management and mainstreaming. CDMP II is a natural expansion and a logical scaling up of its first phase. That pioneering phase laid the foundations for institutionalising the risk reduction approaches and frameworks developed through pilot testing. CDMP II aims to institutionalise the adoption of risk reduction approaches, not just in its host Ministry of Food and Disaster Management, but more broadly across thirteen key ministries and agencies. CDMP II (2010-2014) is a vertical and horizontal expansion of its Phase I activities designed based on the achievements, lessons learned and the strong foundation laid during CDMP I by continuing the processes initiated, deriving actions from the lessons learned, utilizing knowledge resources generated and knowledge products published. The approach of CDMP II is to channel support through government and development partners, civil society and NGOs into a people-oriented disaster management and risk reduction partnership. That partnership will promote cooperation, provide coordination, rank priority programmes and projects, and allocate resources to disaster management activities, risk reduction activities and climate change adaptation activities in Bangladesh.[38]

CDMP II offers an outstanding opportunity to improve linkages with, and synergies between, disaster risk reduction and adaptation to climate change. This applies both at the community and at the general stakeholder level. The linkages are clearly expressed in many of the activities outlined in the operational outcomes of the project design, as well as through strengthened institutional capacities. CDMP II is designed with six interrelated outcome areas.[39]

---

[37] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

[38] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

[39] http://www.bangladesh.gov.bd/index.php?Itemid=27&id=145&option=com_content&task=category and http://www.cdmp.org.bd/index.php Last accessed on 12.2.2013

Institutional Arrangement

The GoB has taken a number of significant steps during the last few years for building up institutional arrangements from national to the union levels for effective and systematic disaster management facilitating mitigation to the sufferings of disaster victims in Bangladesh. To maintain proper coordination amongst the concerned ministries, departments, line agencies, Local Government Body (LGD) and community people, the GoB has formulated a set of mechanisms for Council and Committees from national down to the grass-root levels. For the mechanisms to be best operative, the Standing orders on Disaster (SOD) acts as a guidebook.[40]

The high powered National Disaster Management Council (NDMC) and Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC), developed as effective bodies to promote and coordinate risk-reduction, preparedness activities and mitigation measures, meet twice and four times a year respectively. While NDMC formulates and reviews disaster management policies and issues directives to all concerned, the IMDMCC plays key role in implementing the directives maintaining inter-Ministerial coordination, supervising the services of the Armed Forces as well as NGOs working in the field of disaster management in the country. Under the mechanism there exists a well-established organization named Directorate of Relief and Rehabilitation (DRR) within the administrative control of the MDMR wherein Emergency Operation Center (EOC) is located. The DRR acts during post-disaster emergency situation and operates relief activities for distribution to remote field levels under the supervision and guidance of the Ministry of Disaster Management & Relief (MDMR) / IMDMCC. The MDMR has a small dynamic professional unit known as Disaster Management Bureau (DMB) to perform specialist functions and ensure coordination with line departments/agencies and NGOs by convening meetings of Disaster Management Training and Public Awareness Building Task Force (DMTATF), Focal Point Operational Co-ordination Group on Disaster Management (FPOCG), NGO Co-ordination Committee on Disaster Management (NGOCC) and

[40] http://www.adrc.asia/countryreport/BGD/2003/page2.html Last accessed on 12.2.2013

Committee for Speedy Dissemination of Disaster Related Warning Signals (CSDDWS) every three months regularly.[41]

2.7 Literature Gap

It is vivid from the discussion above that there exits substantial gap in addressing the problem of natural disaster in the literature. Most of the research are based on economic impacts of natural disasters mainly. Some research have addressed the issues of gender and displaced people of river erosion. The survival pattern of river erosion has been studied most than the flood disaster. In spite of its importance, the issues of vulnerability and coping strategy have received almost no or a little attention from the disaster researchers exclusively. In addition, most of literatures have discussed vulnerability from theoretical perspective with special importance on women. On the other hand, the discussions on coping strategies and vulnerabilities in those literatures are insufficient. So, the previous research lack in focusing an entire picture of vulnerability and coping strategies in relation to flood disaster. As previous works have emphasized less on the vulnerability and coping strategies of the people in disaster, there is a chance to explore this area for making a profound insight into the coping strategies of the people in flood disaster. Moreover, there is a lack of addressing the problem of flood disaster in the study area also. Because, most of the studies are based on river induced peoples' adaptation strategies. On the other hand, there is a lack of empirical data based academic research on the problem of the study area as well. The present research sees the problem of natural disaster through identifying vulnerabilities and coping strategies.

2.8 Conclusion

The objective of this chapter was to review the existing literature on natural disaster. Natural disaster research has been carried out from many disciplines and perspectives like economics, geography, anthropology, sociology etc. The research methods have

[41] http://www.adrc.asia/countryreport/BGD/2003/page2.html Last accessed on 12.2.2013

also been used in varied forms like case study, survey based empirical research and historical data analysis by using both qualitative and quantitative research approaches. Many donor agencies, NGOs have also carried out many researches on the problem. The review shows that the major studies were on economic and social impact of natural disaster mainly. It also reveals the methodologies used by other researchers in brief. The review reveals that there is a lack of addressing the natural disaster especially flood from the vulnerability and coping point of view. Addressing vulnerability and coping strategy, the present study is different in terms of showing coping strategies in flood disaster from the academic point of view.

CHAPTER THREE

CONCEPTUAL AND THEORETICAL FRAMEWORK

3.1 Introduction

The objective of this chapter is to discuss the terms, concepts and theoretical aspects of natural disaster research. The chapter presents some definitions and theoretical frameworks relating to vulnerability and coping strategy in natural disaster especially. Different components of vulnerabilities and different linkages are also discussed in this chapter. A general analytical framework for the present research is also provided in this chapter.

This chapter has three sections. Section 3.2 discusses the different terms related to natural disaster research. The section has five sub-sections which deal with the different terms viz. hazard, disaster, coping strategy, vulnerability and impact. Section 3.3 describes the conceptual framework regarding natural disaster research. Conceptual and analytical frameworks have been discussed in sub-section 3.3.1 and 3.3.2 of this chapter.

3.2 Conceptualization of Different Terms

Natural disaster related terms, concepts and their various connotations have made the disaster research complex as well as diversified. Among these terms hazard, risk, vulnerability, coping strategy, adaptability and impact have dominated in many scholarly writings. For example, the term 'risk' is used in economics, market or business operation and as 'security threat' to the computer security analysts or engineers. The term 'hazard' is used in many disciplines. For example, medical or health scientists use it as 'health hazard', hydrologists and physicists use it as 'source and cause and manifestation'. On the other hand, the term 'vulnerability' is used by

the sociologists, environmentalists, ecologists, and other scientists in various ways. Though there are interventions of many disciplines, it is quite difficult to use a single one or use a combination form of all. So a conceptual and analytical framework has been formulated for this study as an essence of all connotations and discussions and to guide the present research to its destination.

3.2.1 Natural Hazard and Disaster

Hazard is generally defined as recurring natural phenomenon such as flood, cyclone and drought that poses a threat to lives, structures, or economic assets and which may cause a disaster (Quarantelli,1994) described droughts, famines and some epidemics as 'diffused' and concluded that disaster is best understood as 'an occasion involving an immediate crisis or emergency' (Quarantelli,1994). Hazards could be either man-made or simply natural geophysical phenomena occurring in our environment in regular or irregular intervals. Natural hazards are often termed as 'natural events' and 'natural calamities'. Natural hazards cannot be stopped for forever, or reduced its frequency, magnitude etc, rather man can save them from hazards to a great extent if timely and wisely decisions and subsequently actions are taken. So there is a relation between hazard-human interaction and the disaster impact. Hazards do not produce disaster initially, but when the environment and human cannot absorb such pressure then it becomes a disaster. Natural hazard and natural disaster has relation of probability.

Disaster is a sudden, devastating event that brings great damage, loss and devastation to life and property. It may also be termed as a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected society to cope using its own resources. If the community is able to cope then the event is regarded as hazard. Disasters usually are of two types – Natural and Man-made. The following criteria are given by which a disaster can be

identified by fulfilling at least one of the following criteria for calling a natural hazard to a disaster.

- 10 or more people reported killed;
- 100 or more people reported affected. [1]

Natural disaster is a situation where daily activities are disrupted with colossal damage for a period of time. According to Quarantelli (2005), disasters can be defined as a social phenomenon, such that disaster is socially constructed and rooted in the social structure of the community affected by a natural hazard. Disasters are not simply extreme events created entirely by natural forces rather they are sometimes manifestations of unresolved problems of development. According to Appel (2001), natural disaster is the consequence of the occurrence of a natural phenomenon affecting a vulnerable social system. On the other hand, natural phenomena themselves do not necessarily lead to disasters. It is only their interaction with people and their environment that generates impacts, which may reach disastrous proportions.[2] Alcántara Ayala (2002) differentiates 'natural hazard' from 'natural disaster' as geophysical events such as volcanic eruptions, floods, earthquakes or tsunamis, and 'natural disasters' are those state that involve the interaction of natural hazards and social systems. In this conception, two societies might face a similar exposure to natural hazards, but they may have different vulnerabilities to the damages that ensue from the hazard.[3]

3.2.2 Vulnerability

Vulnerability is a complex and multidimensional concept. Its meaning varies from discipline to discipline. So, it is necessary to review the definitions of vulnerability. In general, vulnerability is a situation resulted from the interaction among the social systems. According to Warmington (1995), vulnerability is a condition or set of

---

[1] Center for Research on the Epidemiology of Disaster (CRED), *Annual Disaster Statistical Review: The Numbers and Trends 2007,* (Brussels: CRED, 2008), p.2.

[2] Jeff Dayton-Johnson, 2004, *Natural Disasters And Adaptive Capacity*, Working Paper No. 237, P.9.

[3] Ibid, P.25.

conditions, which adversely affects people's ability to prepare for, withstand and/or respond to a hazard.

Mitchell (1999), Schneider and Chen (1980), Barth and Titus (1984) have seen vulnerability as physical exposure, Susman, O'Keefe, and Wisner (1983); Timmerman (1981), Cannon (1994) seen as measures of socioeconomic status and access to resources, Drabek (1986), Bolin (1982), Quarentelli (1992) seen vulnerability as sociological investigations of the differential ability of groups to resist harm and to recover afterwards. On the other hand, Chamber (1983, 1989) disaggregated vulnerability into two. According to him, "Vulnerability thus has two sides: an external side of risks, shocks, and stress to which an individual is subject to; and an internal side which is defenseless, meaning a lack of means to cope with damaging loss".[4]

Pelling (2003) denotes vulnerability as exposure to risk and the inability to avoid or absorb potential harm. Gheorghe (2005) explains vulnerability as a function of susceptibility, resilience, and state of knowledge. Watts and Bohle (1993) look to the social context of hazards and relate (social) vulnerability to coping responses of communities, including societal resistance and resilience to hazards. They were trying to find an easier way to understand and reduce the concept through a better understanding of the social background.

Anderson (2000) argues that the poor are more vulnerable to natural hazards. In this sense, poor countries are not only more exposed, but they are more vulnerable than rich countries and the poorest people within them are the most vulnerable.[5] Wisner (2003) notes four features of mega cities that accentuate their vulnerability to natural disasters, their scales and complexities; their considerable ecological impacts, among them, large energy and water use, as well as large amounts of waste; their proximity to natural hazards, especially given their coastal or riverine locations; and the

---

[4] Chamber 1989, p.1, sited in Towards a Clearer understanding of vulnerability in relation to Chronic Poverty, CPRC Working Paper No 24, Chronic Poverty Research Centre, April 2003, p.22.

[5] Jeff Dayton-Johnson, 2004. Natural Disasters and Adaptive Capacity, Working Paper No. 237, P.18.

widespread 'irregularity' of many settlements.[6] Veen and Logtmeijer (2005) broaden the concept of vulnerability to explain flood vulnerability from an economic point of view. Here the vulnerability is characterized as a function of dependence, redundancy and susceptibility.

According to Chambers (2006) vulnerability is not the same as poverty. It means not lack or want, but defenselessness, insecurity, and exposure to risk, shocks and stress.[7] On the other hand, Gabor (1979) referred to vulnerability as a threat to which a community is exposed to but Timmerman (1981) defined vulnerability as the degree to which a system acts adversely to the occurrence of a hazardous event. Bohle et al. (1993) defined vulnerability as an aggregate measure of human welfare that integrates environmental, social, economic and political exposure to a range of harmful perturbations. On the other hand, Moser (1996) defined vulnerability as the insecurity of the well-being of individuals, households, or communities in the face of a changing environment. Sinha and Lipton (1999) distinguish three characteristics of a society related to shocks. These are exposure, vulnerability and resilience. *Exposure* is the *ex ante* probability that the shock will occur within a given time frame. *Vulnerability* is the expected value of the damage that would occur conditional on the realisation of the shock. *Resilience* is the capacity of the economy to respond to the shock.

Organizations have defined vulnerability in other ways. The World Food Programme (WFP) and Food and Agricultural Organization (FAO) have explained vulnerability on the basis of food security or food crisis. FAO refers vulnerability to the full range of factors that place people at risk of becoming food insecure. The degree of vulnerability for an individual, household or group of persons is determined by their exposure to the risk factors and their ability to cope with or withstand stressful situations. The Vulnerability Analysis and Mapping (VAM) project of WFP (1999), also defines vulnerability in terms of food security. They defined vulnerability as the probability of an acute decline in food access or consumption levels below minimum

---

[6] Jeff Dayton-Johnson, 2004. Natural Disasters and Adaptive Capacity, Working Paper No. 237, p.21.

[7] Chambers, R. *'Editorial Introduction: Vulnerability, coping and Policy' Institute of Development Studies Bulletin.* Vol. 20. No. 2. 1989. pp. 1-7.

survival needs. It is a result of both exposures to risk factors - such as drought, conflict or extreme price fluctuations and also of underlying socio-economic processes which reduce the capacity of people's ability to cope. The Intergovernmental Panel on Climate Change-IPCC (1997) defined vulnerability as the extent to which a natural or social system is susceptible to sustaining damage from climate change. Vulnerability is a function of the sensitivity of a system to changes in climate and the ability to adapt the system to changes in climate.

United Nations (1982) defines vulnerability as the degree of loss to a given element, or a set of such elements, at risk resulting from a flood of given magnitude and expressed on a scale from 0 (no damage) to 1 (total damage). UNDRO (1982) defined vulnerability as a degree of loss to the given elements of risk resulting from the occurrence of a natural phenomenon of a given magnitude. Vulnerability has been described by the International Strategy for Disaster Reduction (ISDR) (2004) as the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. The definition of vulnerability was given more specifically later on. According to United Nations Vulnerability is the condition determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards (UN 2009).

There is a relation of human vulnerability and coping capacity to withstand it. Commonwealth Secretariat (1997) argued that vulnerability is the consequence of two sets of factors: (1) the incidence and intensity of risk and threat and (2) the ability to withstand risks and threats (resistance) and to bounce back from their consequences (resilience). Such threats were perceived to emanate from three main sources: economic exposure; remoteness and insularity; and proneness to natural disasters. . As vulnerability to disasters is a result of human action, it is possible to reduce vulnerability through appropriate interventions (Appel 2001).

Vulnerability is 'insecurity, and reverse of security'; it reflects "the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard." It involves a combination of factors that

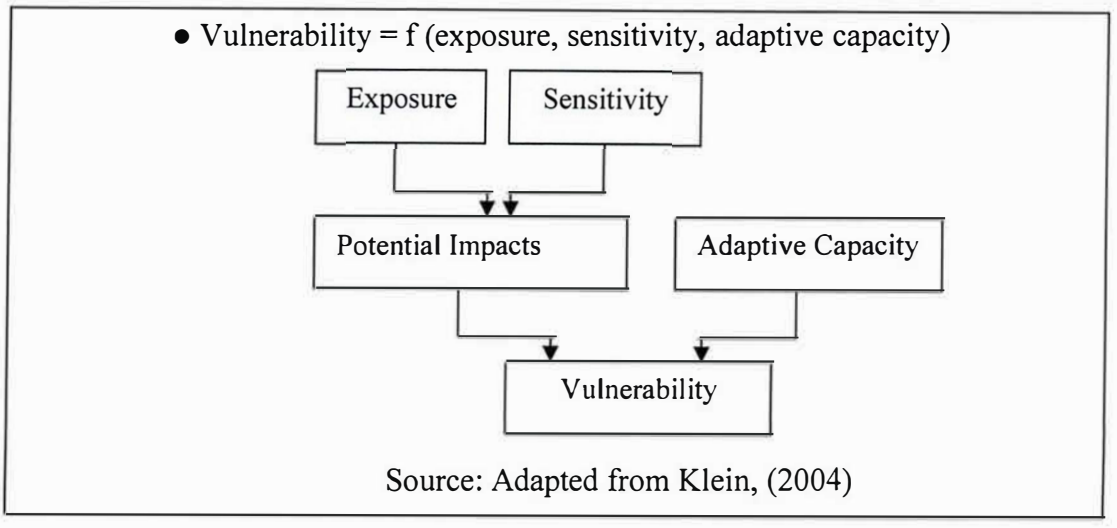
determine the degree to which someone's life and livelihood is put at risk by a discrete and identifiable event in nature or in society (Blaikie et al 1996:8). Vulnerability refers to exposure to contingencies and stress and difficulty in coping with them. It has two components: i) an 'external' side of risks, shocks and stress to which a structure, individual, household, community or nation is subject; and ii) an 'internal' side of lack of resources to cope without damaging loss (Hossain et al 1994).

According to Hossain (2002), vulnerability is too complicated to be captured by models and frameworks. There are so many dimensions to it, economic, social, demographic, political and psychological. Not only that, there are so many factors making people vulnerable: not just a range of immediate causes but a host of root causes too. There are no common measures or indicators of vulnerability. Generally speaking, therefore, vulnerability is the manifestation of social, economic and political structures, and environmental setting. Vulnerability can be seen to be mainly dealing with two elements that is exposure to hazard and coping capability of the people. People having more capability to cope with events of extreme nature are naturally also less vulnerable to risk. There are some formulas which were used by many researches. These are:

Disaster Risk = hazard × vulnerability.
Vulnerability = exposure to risk + inability to cope

Klein (2004) developed a scheme to explain the interaction between the components of vulnerability by the figures below.

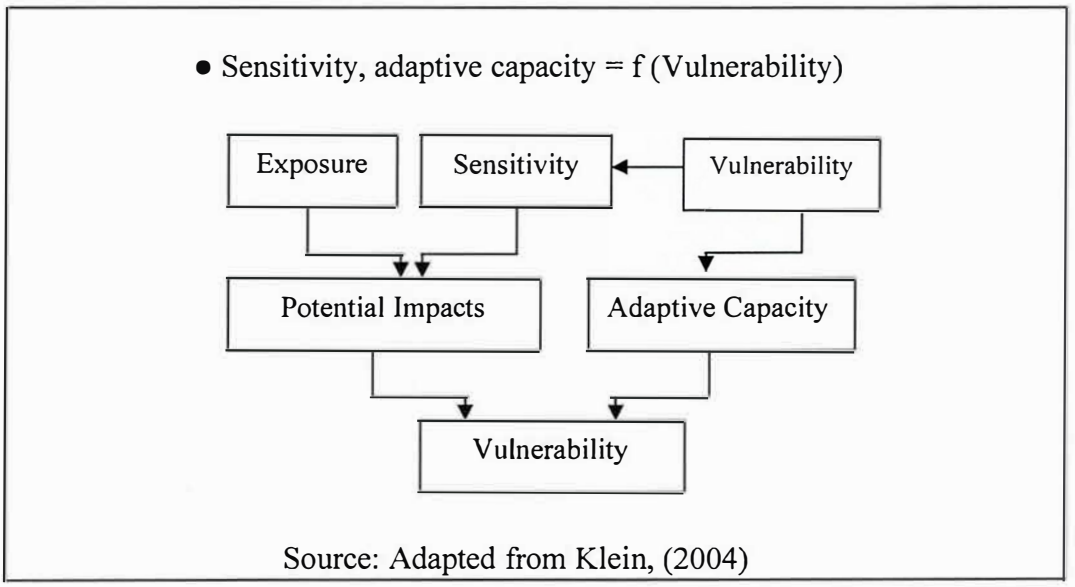
Figure 3.1: Interaction between the Components of Vulnerability by Klein (2004)



Source: Adapted from Klein, (2004)

Vulnerability is composed of three major states or elements. These are weaknesses, defenseless state and uncertainties or risks for the future. For example, each household or community has some weaknesses which are created from social system or due to many factors. These weaknesses create defenses states and incapacities to cope with future crisis. This defenseless state poses some uncertainties and risks for them. The vulnerable areas don't turn into impact until and unless it is hit by any external shock or natural hazard. A society is vulnerable means the society has less or no resilience to cope or resist the potential impact of disaster. So it is seen that vulnerability is a state resulting from the interaction among human, environmental and social settings.

Figure 3.2: Interaction between the Components of Vulnerability by Klein (2004)



Source: Adapted from Klein, (2004)

In all societies vulnerability pre-exists in various forms. It can vary according to sex, age, assets, settlement pattern or areas of housing, place and nature of work, types of natural hazard and its frequency, severity and duration. More vulnerability can create more risk and includes not only people or group of people but also infrastructure,

communication, system that can cause human miseries. In this sense, all societies are vulnerable to certain natural hazard.

3.2.3 Risk

The concept of risk has been used in the disaster related literatures in various ways. Risk is sometimes used as uncertainty that may arise in near future by dint of any incident or crisis. Wisner (2003) suggests that there is a general agreement that risk is a part of the daily life of the poor and that comprehensive development should provide the conditions for increasing personal and social protection (UNRISD 2000). Hossain (2002) used the term 'uncertainty' for describing the situation created by a disaster and used the term 'risk' for defining the probabilistic occurrence of a specific event (Hossain 2002).

In the other disaster literature (Oppenheim, 1980; Nordenson, 1997; Johnson and Eguchi, 1998) with engineering emphasis, the term 'risk' is used for probability of a disaster occurrence or of the damages from a disaster. In the disaster studies emphasizing more on economic theory, on the other hand, many used also the probabilistic occurrence of a disaster as 'risk' in order to derive the expected utility for decision-makings against disasters (for example, Howe and Cochrane, (1976), Brookshire, et al.(1985), Boisvert (1992), and Kunreuther and Roth, (1998). So risk is the consequence of the interactions between hazard and vulnerability. Risk is called the probability of harmful consequences or expected losses that may occur in near future due to the lack of capacity to cope with natural hazards.

3.2.4 Impact

Impact means result or manifestation of an interaction or the outcome of interaction. It can have both meanings, positive and negative. In the field of natural disaster, impact is always seen as negative consequence of natural hazard or external shock. On the other hand, there is also a positive connotation of it in many ways. There many

proven evidences that disaster has also some positive impact on the society. In the developing and under developed countries the impact of natural disaster is always seen as negative. Natural disaster impact is determined by many indicators or factors. These are the coping strategy people adopt to pass the disaster days, degree, frequency and magnitude of natural hazards, the capacity to absorb such pressure or hazards and the resilience capacity or the capacity to come back in normal life in a short time.

3.2.5 Coping Strategies

There are several synonyms of the term 'coping strategies' in relation to different disaster situations. These are 'copying mechanism,' 'survival strategies,' 'adjustment mechanism,' 'adjustment strategies,' 'adaptation' etc. The relation between the coping strategy and vulnerability is that vulnerability influences the coping strategy. The more vulnerabilities people have the more unsafe coping strategies the people employ. So the word 'coping strategy' means the ways or means the people adopt by their knowledge and experiences in different phases of a disaster situation. Coping strategies also include strategies induced by external interventions or supports like NGOs and GOs. According to UN/ISDR (2002), the ways in which capacities are mobilized in times of crisis reflect coping strategies. Coping strategies refer to the manner in which people and organizations use existing resources to achieve various beneficial ends during unusual, abnormal and adverse conditions of a disaster phenomenon or process (UN/ISDR, 2002 cited by Gillard, 2010). On the other hand, according to International Strategy for Disaster Reduction (ISDR), coping is defined as the ways people using their available resources and their abilities to face and manage adverse circumstance.

Blaike, *et al.*(1994) defined coping as the manner in which people and organization act, using existing resources within a range of expectations of situation to achieve various ends. According to Douglas (1985 cited from Blaike, et al. 1994) when people know an event may occur in the future because it has happened in the past, they often set up ways of coping with it. Such coping strategies depend on the assumption that

the event itself will follow a familiar pattern, and that people's earlier actions will be a reasonable guide for similar events. The assumptions on which people make their decisions therefore rest in the knowledge that, sooner or later, a particular risk will occur of which people have some experience of how to cope (Blaikie, et al, 1994).

Frankenberger (1992) defines coping strategy as the fallback mechanisms when habitual means of meeting needs are disrupted. Twigg (2004) referred coping as the application of indigenous knowledge in the face of hazards and other threats. Coping is a mechanism that households or a community employs to handle the stress situation by mobilizing the assets or capital resources (Thapa, 2005). Coping is no more than the manner in which people act within the limits of existing resources and a range of expectations to achieve various ends. But usually it means how it is done in unusual, abnormal, and adverse situation. Thus, coping can include defense mechanisms, active ways of solving problems and methods for handling stress (Thapa, 2005; Wisner et al., 2003).

Coping strategy is a set of ways people devise during facing any natural hazards or external shocks to avoid or stay away from damages or impacts. In other words, what people do at the time of facing any natural hazards or shocks is coping strategy. Coping strategy is devised for a short period of time. It is influenced by many factors. In broad sense, these are natural factors and human factors behind adopting a coping strategy. However, risk factors and vulnerability factors affect coping capacity in a great extent. If coping strategy is used in overcoming any adverse situation for years then it becomes their survival strategy. Coping strategy is sometime referred as adaptive capacity. Adaptive capacity is a combination of vulnerability and resilience.[8]

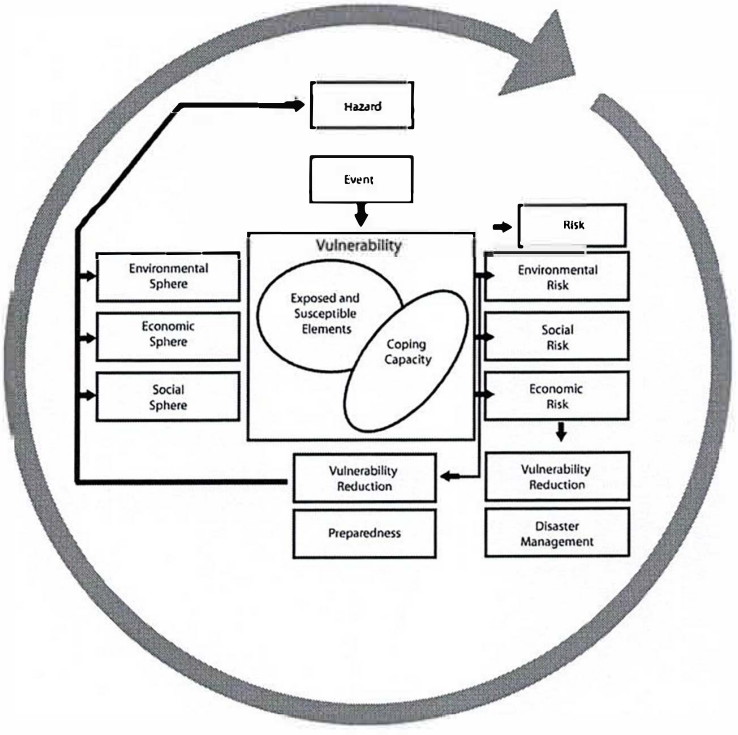
[8] Cited in Jeff Dayton-Johnson, 2004. Natural Disasters and Adaptive Capacity, Working Paper No. 237, P.26.

3.3 Conceptual Framework for the Present Research

3.3.1 The BBC Framework

The BBC framework has been used to frame the present study. In the framework Birkmann (2006) shows that the BBC conceptual framework addresses various vulnerabilities in the social, economic and environmental sphere. It underlines the necessity to view vulnerability within a process (dynamic), which means focusing simultaneously on vulnerabilities, coping capacities, and potential intervention tools to reduce vulnerabilities. In contrast to some other approaches which define vulnerability separate from coping capacity and exposure, the BBC-framework views vulnerability as the susceptibility and the degree of exposure of an element at risk as well as the coping capacity. The present study deals with the economic and social shares of vulnerability mainly.

Figure 3.3: The BBC-Framework



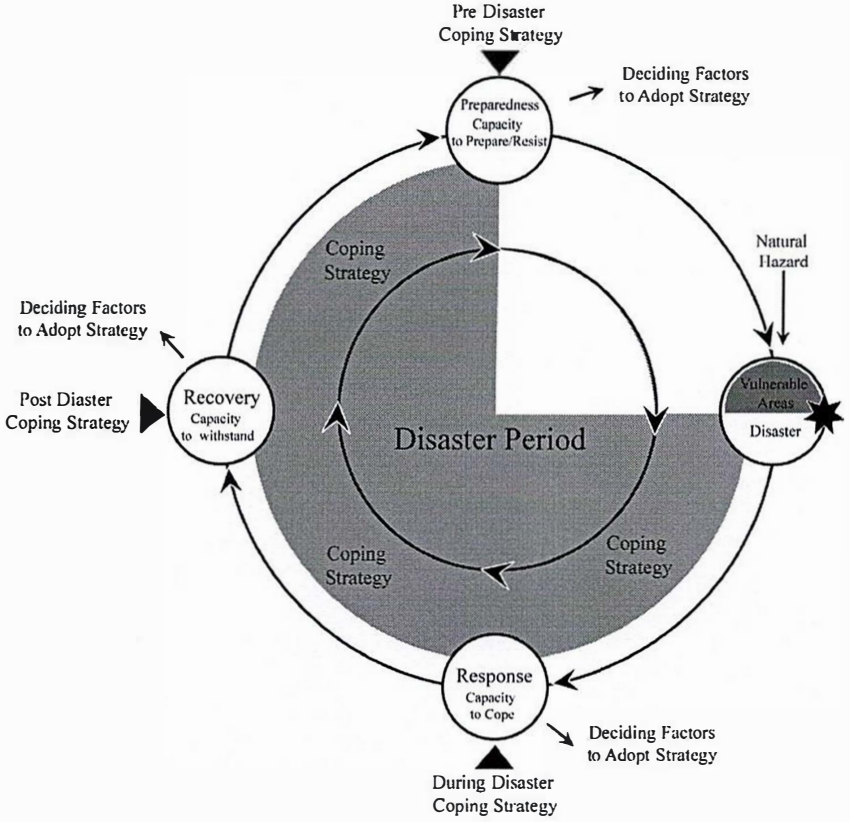
Source: Adapted from Bogardi et al. (2004) and Cardona (2001).

3.3.2 A Generalized Analytical Framework for the Present Research

The framework below has been developed for the present research to achieve the research objectives. The framework depicts the major phases of natural disaster, i.e preparedness or pre-disaster phase, response or during-disaster phase and recovery or post disaster phase. In each phase people adopt different coping strategies. The coping strategies have been identified and explored on the basis of those disaster phases. Coping strategy has been seen as a continuous process until the crisis ends up. It moves clock-wise. During a disaster people face and pass those phases by their own ways and strategies. In some cases with external supports are seen. The study tried to explore those factors. However, there are some deciding factors that affect the coping strategy people adopt during the phases.

People are the first responders to any natural hazard they face. They try to cope with hazard so that their vulnerable areas remain intact and unharmed. For facing natural hazard, the people mainly adopt two types of strategies. The first one is the strategy to face hazard and the second one is the strategy to withstand and came back to normal life. In this framework it has been shown that the people firstly deal with 'preparedness' and 'response' phases and secondly deal with the 'recovery' phase. There is preparedness stage where people also prepare themselves to face disaster before the disaster strikes. In all stages, the disaster impact and coping strategies varies by the capacity they have to face, cope and withstand. The figure below has been used for the present research.

Figure 3.4: A Generalized Frame for Identifying and Analyzing Coping Strategies in Natural Disaster



Source: Adapted from Natural Disaster Management Stages of Habitat.

Figure 4 above depicts the different phases of natural disaster. It has been tried to frame the research objectives through this framework. Firstly, it has been tried to identify the types of natural hazards people face. Secondly, people's vulnerabilities have been identified. Thirdly, what types of measures or strategies people take to cope with the hazards and what factors affect or influence coping strategies have been tried to explore and lastly it has been tried to assess the impact people face during the periods in spite of taking strategies.

3.4 Conclusion

The purpose of this chapter was to describe the terms, concepts the relevant theoretical framework. The chapter finds that natural disaster related terms have different connotations. It varies according to disciplines. Natural hazard is a natural process where natural disaster is the result of human weakness and incapability to cope with it. People always try to minimize the risk or potential threats by adopting coping strategy. Coping strategy is a set of ways to adjust and overcome impact or the situation induced by natural hazard. On the other hand, vulnerability is the result of the weaknesses of social system. It is the result of socio-economic factors which pre-exists in the society. It is such a situation that puts people at risk. If an actor such as natural hazard hits the vulnerable areas, there is a chance to damage or loss of life and property. Vulnerability is a present condition and risk is a potentiality or threat for the future. Risk can happen if capacity to cope with those risk fail. Many factors such as social, economic, and environment can create a state of vulnerability and susceptibility to an impending risk. Areas of people's vulnerability may vary according to place, people and hazard. The study focuses people's areas of vulnerability and coping strategies.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

The purpose of this chapter is to present the research methodology used in conducting the present research and to give the description of the study area. A brief discussion about the methodology used in other studies has also been presented here. The objective of such discussion is to gain a general understanding about the nature of other investigation into the field of natural disaster and to comprehend the present research as well.

This chapter contains five sections. Section 4.2 briefly depicts the methodology used by other researchers in conducting natural disaster research. Section 4.3 describes the methodology used in conducting the present research. The sampling processes, selection of study area, data source, data collection tools, and analytical techniques have been described in this section. The section 4.4 deals with the description of the study area. It highlights the socio-economic profile of the study area using secondary data. Section 4.5 concludes the chapter.

4.2 Methodology Used in Natural Disaster Research

There are several studies based on empirical investigation on the field of natural disaster impacts and coping mechanisms. In these research, various research methods have been used for analysis of disaster impacts and related coping strategy have also been seen from many directions. These studies are- Shah (1989), Adnan (1990), Hanchett (1992), Nasreen (1995, 1999), Paul (1998) Ahmad (2003), Sarkar, Haque and Alam, (2003), Shmuck-Widman (1996), Valdiya ed. (2004), Zaman, (1999)

Guarnizo (1992) Ninno, Dorosh, Smith and Roy. (2001), Chambers (1989), Elahi (1991) Haque and Zaman (1989), Hossain, Dodge and Abed (1992) Hossain, M. et al. (1987) and Murshid (1992). These research were based on empirical data where general survey techniques have been used mostly. Murshid (1992) in his study in Bangladesh examines coping strategy of disaster in relation to food crisis which is an empirical explorative research. Dahal (1998) in his study entitled 'Coping with Climatic Disasters in Isolated Hill Communities of Nepal: The Case of Rampur Village in Okhadhunga' relates coping strategy with climate change related disasters which is also based on empirical data. Impact of natural disaster on women, children, elderly, marginalized and indigenous communities has also been seen by many researchers. Such investigations were basically based on empirical data though some theoretical aspects have also been used to relate and generate theories.

Among the researchers, Alam (1990), Hussain (2001), Kates (1962), Britton (1986), Hewitt (1998), Kates (1971), Oliver-Smith (1996) used sociological, psychological, ecological and anthropological approach to explore the common perception about flood among people. In terms of research approach, qualitative and quantitative research approaches have also been used by many researchers. Post disaster behavior social adjustment and adaptation approaches are also seen. Research has been carried out to study pre-during-post disaster situation and impact analysis. Historical data analysis, model simulation and projection have also been used. GIS approach has also been used for assessing vulnerability and risk of particular areas and people. Among the policy issues and research work carried by Zaman (1991) is mentionable here.

4.3 Methodology used in the Present Study

The research methodology for the present study has been set based on reviewing the methods and techniques used in the above studies. The present research is an explorative type of research based on empirical data and observations. Both qualitative and quantitative research approaches have been employed in the study. The methodology in this research comprises of three components viz. selection of study area and sampling, techniques of data collection and techniques of analyzing

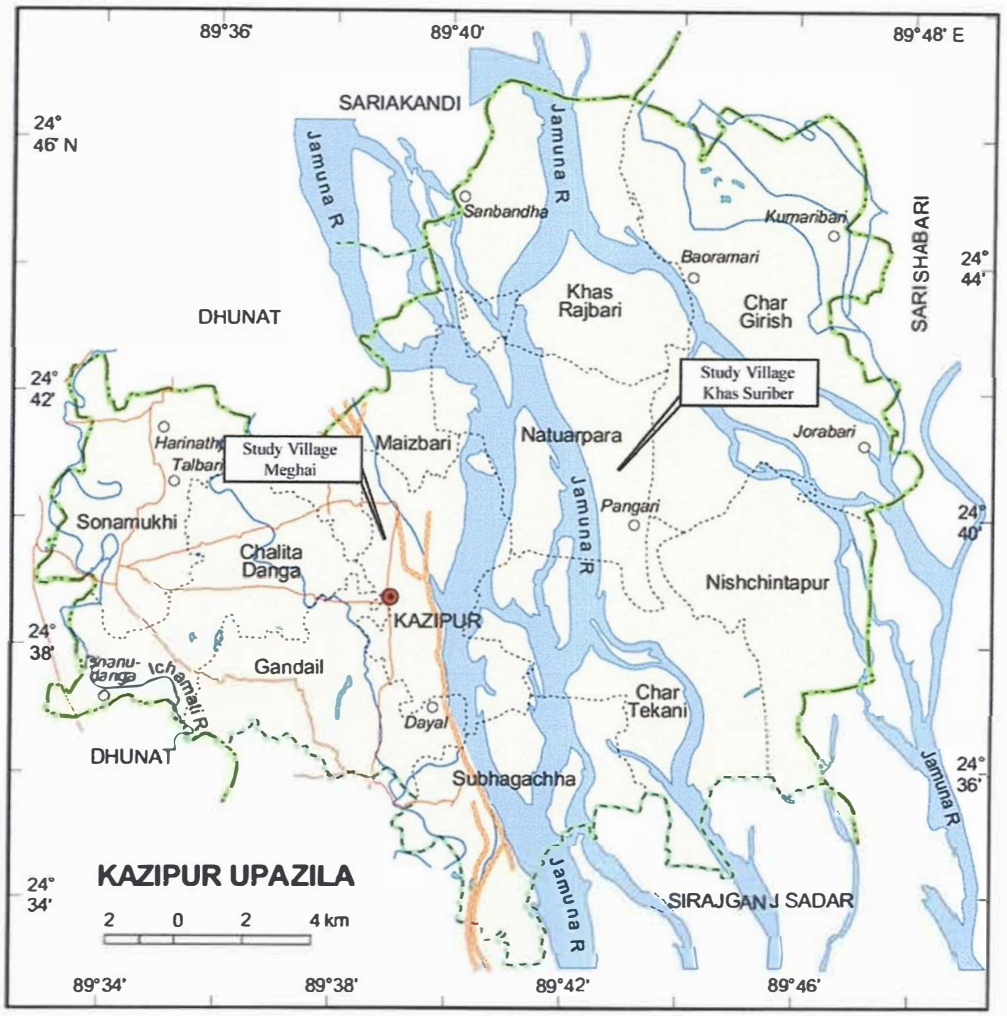
vulnerability, impacts and coping strategies. These are described in the following sections.

4.3.1 Selection of Study Area and Respondents

This research has been conducted purposively in Sirajganj district of Bangladesh. Sirajganj is one of the most flood affected districts in Bangladesh and disasters like flood and river erosion are very common in most of the areas of this district. There are 9 Upazilas in Sirajganj district among which Kazipur a typically flood and river erosion affected Upazila and therefore, this Upazila has been selected for the case study. A Multi-stage sampling method has been used for this study where both purposive and random sampling techniques were used for selecting study villages as well as the respondents. As a course of selecting the study area, the Unions of the Upazila has been listed first. From this list two Unions were selected randomly and from the villages of those Unions two villages are selected at random taking one from each Union. Thus, Megai and Khas Subiber are the two villages selected randomly for the study to be carried out.

The village Meghai is situated at the west bank of river Jamuna and the village Khas Suriber is situated at the east bank. Both villages are situated at the very adjacent of the giant river Jamuna and are prone to severe river flooding and erosion. The study area faces flood and river erosion disasters for many years. A large number of people of different social and economic background live in these villages. Both villages are situated in slightly remote place from the main City of Sirajganj.

Figure 4.1: Map of the Study Villages



After selecting the villages the researcher collects the households' list for both the villages and from those lists 250 households were selected randomly for the study. The sample includes large, medium and small farmers as well as landless and petty business holders.

Table 4.1: Sample Distribution and Techniques

Study Areas & the Respondents	Number of Sample	Sampling Techniques
District	1	Purposive
Upazila	1	Purposive
Union	2	Random
Village	2	Random
Households	250	Random

4.3.2 Data Type and Sources

The present research was based on primary data mainly. The source of primary data was the sample households or respondents. The respondents for the primary data were the heads of the sample households. Primary data on vulnerabilities, impact, coping strategies, factors affecting coping strategies etc. have been collected from the head of the households. Moreover, the other primary sources from where data have been elicited were observation, informal discussions and field notes. Secondary data has also been used for explaining and attaining research objectives in details. The secondary data has been used for identifying natural hazards and disaster in the study area. Theoretical base of the research has been generated from the secondary sources as well. The sources of secondary data were the local government administrations, research reports, earlier thesis works, books and government documents. Data collected from the primary and secondary sources were both qualitative and quantitative by nature.

4.3.3 Technique of Data Collection

Required qualitative and quantitative data on demography, occupation, income, literacy, vulnerability, coping strategies, impact and other household information from primary sources have been collected through semi-structured scheduled questionnaire with face to face interviewing technique. The technique of secondary data collection

was basically through document analysis. Field note and observation technique have also been used for the present research.

Scheduled questionnaire survey was the prime source of primary data for this study. Both close-ended and open-ended questions have been used in this regard. The number of the respondents for scheduled questionnaire was 250. The sample respondents were selected randomly. The main respondents were the heads of the households. A pre-test of the scheduled questionnaire was carried out before finalizing the main schedule. In addition to questionnaire survey observation method using field note technique has been used to analyze non-verbal behavior and attitude of the respondents such as homestead scenario, structural and non-structural measures adopted by them to cope with disasters and efforts to reduce disaster impacts. It has helped to compare the validity and reliability of data obtained from other sources and techniques. It has also been a source of a clear understanding about the environmental and hazard scenarios of the study area.

4.3.4 Techniques of Analysis

Quantitative data from primary and secondary sources were processed and revised to minimize the error before final analysis. Descriptive statistical tools such as mean and percentage were used for analyzing the different household information such as age, occupation, literacy, household members, land ownership, assets etc. Result of data analysis has been presented in tabular or graphical forms. However, qualitative data and data collected through observation were analyzed through logical reasoning of the respondents' view. However, vulnerability variables have been set mainly from the literature.

4.3.5 Vulnerability Analysis

Vulnerability is one of the prime issues in the present research. Vulnerability has been viewed, defined and linked mainly with two aspects. The first one is the weaknesses household, people or communities have and the second one is the people's opinion

about their vulnerability and risk if flood disaster occurs. As tools of vulnerability analysis some indicators have been taken from the literature and some were also developed and set for identifying people's vulnerabilities. These vulnerability indicators include economic, social, health related and people's vulnerabilities have been tried to identify using those variables. However, socio-economic conditions of the respondents have also been drawn for analyzing the vulnerability in relation to flood disaster. The vulnerability has been analyzed and presented by villages and farmer's types. It has been tried to explore that whether the vulnerability varies by respondents or farmer type.

4.3.6 Impact Analysis

A general attempt has been made to see the impact of flood disaster on the sampled households in the study area. Economic indicators have been taken from literature and were developed for identifying economic impacts. Some indicators have been set for identifying the extent of impact. The measurement of impact and its analysis have been done from general point of view using descriptive statistics, tables and graphs. The economic impacts have been tried to measure with these tools mainly. The main objective of impact analysis is to see the result or consequence in spite of taking coping strategy during flood disaster. However, economic and infrastructural damages of households have been tried to explore in the impact analysis as well. The socio-economic status of the respondents has been drawn to compare and examine the flood impact whether flood impact varies by coping strategies and economic status or not.

4.3.7 Coping Strategy Analysis

The coping strategies respondents adopted in different phases of flood disaster have been tried to explore in this study. The main disaster management phases like response, recovery and preparedness have also been considered for identifying the coping strategies. The coping strategy has identified and analyzed by villages and

farmers' types to see the variations of coping strategies used by the respondents. Coping strategy has been identified and analyzed by food and income insecurity, strategy for saving assets and livestock, life safety etc. In analyzing coping strategy, it has been tried to explore the variations of adopting strategies and impacts among the respondents or farmers. However, a list of coping strategies adopted by the respondents in different phases of disaster has been presented for getting an entire picture of it. In analyzing coping strategy, it has been tried to see if there is any role of GOs, NGOs and other stakeholders in coping strategies. In addition, it has been tried to explain the coping strategy with economic vulnerability and economic impact of the respondents. The research has emphasized and analyzed more on household level disaster management practice or system than community or local.

4.4 Description of the Study Area

The study has been designed in two villages, Meghai and Khas Suriber. Meghai is a village of Kazipur Union and Khas Suriber is a village of Natuarpara Union. Both unions are under Kazipur Upazila of Sirajganj district of Bangladesh.

Kazipur Upazila

Kazipur is the second largest upazila of Sirajganj district in respect of area. It is an upazila among 9 upazilas of Sirajganj district. Kazipur upazila occupies an area of 368.63 sq. km. It lies between 24°33 and 24°47 north latitudes and between 89°33 and 89°33 east longitudes. The upazila is bounded on the north by Sarikandi and Dhunat upazilas of Bogra district, on the east by Sarishabari upazila of Jamalpur district, on the south by Sirajganj Sadar upazila and on the west by Dhunat upazila of Bogra district. The upazila consists of 1 paurashava, 9 wards, 9 mahallas, 11 unions, 114 mauzas and 154 villages.[1] The population of Kazipur Upazila is 2,66,950 of which 50.97% male and 49.03% female. The annual population growth rate is 1.29%. The population density is 724 per sq.km.[2] The housing characteristic of Kazipur upazila is

[1] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001* (Dhaka : BBS, 2001) p.24.

[2] Ibid., pp. 24, 66.

mainly *kutcha*. In the upazila 96.2% of the dwelling households live in *kutcha* houses, 1.99% in *jhupri* houses, 1.73% in *semi-pucka* houses, 0.27% in *pucka* houses.[3]

Total cultivable land of Kazipur Upazila is 23384.06 hectares and fallow land is 207.2 hectares. In Kazipur upazila, 68.53% of the households have own agricultural land.[4] Among the peasants 6.63% are landless, 17.6% marginal, 20.5% small, 35.27% intermediate and 20% rich.[5] The distance of Kazipur from Sirajganj district by road is about 28 k.m. The total length of road in Kazipur Upazila is 221 km of which 19 km is *pucca* and 202 km mud road.[6] There is a government hospital which is called Upazila Health Complex with a capacity of 31 beds. There are 9 health care centres and 2 private clinics in Kazipur Upazila.[7] All kinds of medicine are not available in normal days as well as the flood days. Emergency patients are referred to the district hospital. The average temperature of Kazipur Upazila is 34.6°C (max.) and 11.9°C (min.). The total annual rainfall is 1,610 mm.[8] There are two rivers in Kazipur Upazila. These are the Jamuna and Ichamati.

The Study Villages

Kazipur and Natuarpara are two unions among 11 of Kazipur Upazila. The area of Kazipur union is 6,786 acres which is consisted of 13 villages with 4,093 households. On the other hand, the area of Natuarpara union is 7,640 acres which is consisted of 5 villages with 2,807 households.[9] Meghai and Khas Suriber are the two villages of Kazipur and Natuarpara union respectively. The village Meghai occupies an area of 1,376 acres. It is situated in the north of Kazipur Upazila and on the very west bank of the river Jamuna. It is basically a plain land. The total number of the households of Meghai is 465.[10] The village Khas Suriber is situated in the east of Kazipur Upazila

---

[3] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001* (Dhaka : BBS, 2001) p.25.
[4] Ibid.
[5] Upazila Parishad, Kazipur, Sirajganj.
[6] http://www.dcsiraj.com/d_upzilla4.html, Last accessed on 10/06/2009
[7] Ibid.
[8] http://www.dcsiraj.com/d_upzilla4.html, Last accessed on 10/06/2009
[9] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001*, (Dhaka : BBS: 2001) p.66.
[10] Ibid.

and on the east bank of the river Jamuna. It is a *Char* area. The area of this village is 843 acres. The total number of the households is 360.[11]

Population and Dependency Ratio

The population of the village Meghai is 1,992 of which 50.75% are male and 49.25% are female. The total population of the village Khas Suriber is 1,715 of which 50.15% are male and 49.85% are female.[12] The dependency ratio of the two villages is comparatively very high. In the village Meghai the dependency ratio is 40.01% and in the village Khas Suriber the dependency ratio is 48.45%. The total dependency ratio of the two villages is 43.91%.

Table 4.2: Dependency Ratio in the Study Villages

Villages	Age Group			Dependent	Independent (Active)	Total	Dependency Ratio
	<14	15-59	60>				
Meghai	682	1,195	115	797	1,195	1,992	40.01
Khas Suriber	722	884	109	831	884	1,715	48.45
Total	1,404	2,079	224	1,628	2,079	3,707	43.91

Source: Bangladesh Bureau of Statistics (BBS), Community Zila Series Sirajganj 2001 (Dhaka: BBS: 200) p.103.

Members per Household

The average size of the household in terms of persons in Meghai is 4.28 and 4.76 in the village Khas Suriber. It means, most of the households consist of four persons in both villages. The table shows the details below.

[11] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001*, (Dhaka : BBS: 2001), p.66

[12] Ibid.

Table 4.3: Households by Size of the Study Villages

Villages	House holds	Number of Family Member(s) and Number of Households									Avg. Size of Households
	1	2	3	4	5	6	7	8	9+		
Meghai	465	1 1	77	85	108	89	45	22	11	17	4.28
Khas Suriber	360	2	33	67	93	69	42	18	15	21	4.76

Source: Bangladesh Bureau of Statistics (BBS), Community Zila Series Sirajganj 2001 (Dhaka: BBS, 2001) p.369.

Education and Religion

The total literacy rate (7+) of the people of Meghai is 44.40% of which 46.95% are male and 41.75% are female. On the other hand, the literacy rate of the people of Khas Suriber is 37.36% of which 41.62% are male and 33.14% are female.[13] In Mghai among the 465 households 94.19% households, having 94.28% population, are Muslims and 5.81% households, having 5.72% population, are Hindus. Among the 360 households in Khas Suriber 99.72% households are Muslims and 0.28% households are Hindus. In accordance with the total population, 94.28% are Muslims and 5.72% are Hindus.[14]

Housing Characteristics

Most of the houses in the study villages are built mainly with tin. The homestead plinth is made of mud. In the village Meghai 82.75% households have tin-shade houses, 4.98% households have straw, and building and mud are 0.17% and 12.10% respectively. In the village Khas Suriber 65.33% households have tin-shade houses and 34.67% households have houses made with straw.

[13] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001* (Dhaka : BBS, 2001) p.66.

[14] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001* (Dhaka : BBS, 2001), p. 331.

Table 4.4: Housing Characteristics of the Study Villages

Housing Type	Meghai (%)	Khas Seriber (%)	Total (%)
Mud and Tin	12.10	-	6.49
Building	0.17	-	0.08
Straw and Tin	4.98	34.67	18.75
Tin	82.75	65.33	74.67
Total	100	100	100

Source: Upazila Parishad, Kazipur, Sirajganj.

Economic Condition and Land Ownership

Most of the people belong to the lower class in both villages. About 63% of the households are in lower class in the village Meghai and about 82.76% in the village Khas Suriber. In the village Meghai 41.72% have their agricultural land. On the other hand, in Khas Suriber, 64.72% have their own agricultural land.[15] The economic condition of the people of the study villages is shown below.

Table 4.5: Economic Condition of the Study Villages

Households by Economic Condition	Meghai (%)	Khas Suriber (%)	Total (%)
Lower Class	63.78	82.76	73.27
Middle Class	26.59	11.88	19.24
Upper Class	9.63	5.36	7.49
Total	100	100	100

Source: Relief list 2008, Kazipur and Khas Suriber Union Parisad, Sirajganj.

Sources of Household Income

The main source of the household income of both villages is agriculture. In the village Meghai, the source of income of 31.83% households is agriculture and 21.08% is business. On the other hand, in Khas Suriber the source of income of 43.89% households is agriculture and the source of income of 25.55% households is

[15] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001* (Dhaka : BBS, 2001), pp.254-55.

agriculture, forestry and livestock-related jobs. A comparative table about the main source of income is given below.

Table 4.6: Sources of Household Income

Sources of Income	Meghai		Khas Suriber		Kazipur	
	No.	%	No.	%	No.	%
Agriculture Labour	148	31.8	158	43.9	14,363	23.8
Business	98	21.08	64	17.8	6,759	11.2
Service	53	11.40	9	2.5	4,072	6.75
Agro/Forestry Livestock	49	10.54	92	25.5	25,565	42.3
Transport	37	7.96	0	0	1,034	1.71
Construction	29	6.24	3	0.8	1,537	2.5
Non-Agriculture Labour	20	4.30	9	2.5	1,183	1.9
Other Incomes	20	4.30	15	4.17	3,742	6.2
Fishery	5	1.07	8	2.2	758	1.7
Industry	3	0.65	1	0.3	431	0.7
Remittance	3	0.65	0	0	56	0.1
Hand-loom	0	0	1	0.3	611	1.1
Hawker	0	0	0	0	67	0.1
Religious	0	0	0	0	116	0.9
Rent	0	0	0	0	38	0.06
Total	465	100	360	100	60,332	100

Source Bangladesh Bureau of Statistics (BBS), *Community Zila Series, Sirajganj*, BBS: 2001, p.292-293.

Water, Sanitation and Electricity Facilities

The main source of the drinking water of the village Meghai is tube-well water. 77.2% of the households use tube-well water whereas 1.5% use tap water, 0.2% households use pond water and 21.1% households use other source of drinking water.[16] On the other hand, in the village Khas Suriber, the main source of drinking water is tube-well water. Of the households, 92.9% use tube-well water. 0.8% households tap water, 1.1% well water and 5.3% use other source of drinking water.[17]

[16] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001* (Dhaka : BBS, 2001) p.254.

[17] Ibid., p. 255.

Most of the households (51.8%), in the village Meghai use sanitary toilet whereas 21.9% use non-sanitary latrine and 26.4% have no toilet. On the other hand in the village Khas Suriber, most of the households (55.6%) use non-sanitary latrine. Of the households 32.5% use sanitary latrine and 11.9% have no toilet.[18] In the village Meghai 19.8% have electric connection and in the village Khas Suriber 1.7% households have electric connection.[19]

4.5 Conclusion

The objective of this chapter was to describe the study area and methodology used in the present research. The methodology used by other researchers has also been presented. It aims at examining the overall research scenario and trend in using methods and techniques in natural disaster research. It finds that natural disasters have been viewed from multi-disciplinary subject like science, social science, psychology and economics. A brief description of the statistical methods used in analyzing process has also been illustrated through this chapter. A description of primary and secondary data collection and analysis tools and techniques has been presented.

---

[18] Bangladesh Bureau of Statistics (BBS), *Community Zila Series Sirajganj 2001* (Dhaka : BBS, 2001) pp. 254-55.

[19] Ibid.

CHAPTER FIVE

NATURAL HAZARD, DISASTER AND THE SOCIO-ECONOMIC FEATURES OF THE RESPONDENTS

5.1 Introduction

The purpose of this chapter is to identify natural hazard and disaster the study people face and to assess the socio-economic conditions of the respondents. A detail socio-economic and demographic profile of the respondents has also been presented and discussed through this chapter. Analyses provided in this chapter are based on both primary data from the respondents and secondary data from documents, literatures on flood and other natural disasters in the study area.

This chapter contains five sections. Section 5.2 describes the nature of natural hazard and disaster in the study area. It has four sub-sections which describe the characteristics of river flooding and economic damages recorded due to natural disasters. Section 5.3 depicts the extent of flood disaster the respondents face. Section 5.4 dealt with the socio-economic and demographic features of the respondents. It has three sub-sections which describe respondents' occupation, income, savings, credit, assets, land ownership etc. The chapter deals with primary and secondary data.

5.2 Nature of Natural Hazard and Disaster in the Study Area

It was found that several natural hazards take place in the study area. These are flood, cyclone mainly northwester, riverbank erosion, mild drought, abnormal rainfall with various degrees. Of the hazards 'flood' and 'riverbank erosion' make people think more than the other natural hazards. Flood and riverbank erosion have been seen as devastating natural disasters in the area in terms of colossal damages, destruction of the economic condition of the people and number of persons affected. However, the degree and effect of other natural hazards are insignificant because these do not occur

in every consecutive year and the colossal damages are very little. So the present study finds that among the different natural hazards, flood and riverbank erosion are the 'devastating natural disasters' in the study area. It has been seen that the study area belongs to moderate to extreme level of vulnerability in terms of hazards the people face (Table 5.1).

Table 5.1: Severity of Natural Hazard in the Study Area

Indicator	Natural Hazards	Meghai	Khas Suriber
Natural Hazards & Severity Level	Flood	Severe	Severe
	River Erosion	Severe	Severe
	Storm/Cyclone	Moderate	Moderate
	Drought	Mild	Mild
	Earth Quake	Rare	Rare
	Hail Storm	Rare	Rare
	Excessive Rain (Monson Rain)	Moderate	Moderate
Frequency of Flood	-	Once (Twice Sometimes)	Once (Twice Sometimes)
Frequency of Riverbank Erosion	-	Twice	Twice

Source: Upazila Parishad, Kazipur, 2009.

Table 5.1 above depicts the nature and severity of natural disaster in the study area. The severity of flood is seen in devastating form and it occurs once a year. River erosion is a major characteristic of river flooding of this area. It occurs twice a year, the first one occurs at the beginning of flood and the second one is at the end of flooding. The form of river erosion is severe. Storm or Northwester is seen in moderate form. The form of drought is mild. The study area belongs to 'earthquake zone 2' but any casualty has been recorded so far. The form of excessive rain is moderate with monsoon rain. The abnormal rainfall occurs sometimes. In both villages the same level of severity prevails.

5.2.1 Characteristics of Flooding

Table 5.2 below depicts the major characteristics of river flooding in the study area. It is seen that flood severity is very high with incessant monsoon raining. The flood is

seen once a year. Sometimes it is also seen twice a year. In major flooding years the area inundates very early. It stays about a month normally.

Table 5.2: Characteristics of Flooding in the Study Area

Indicators	In both villages
Flood Severity	Very high with incessant raining
Flood Frequency	Major flooding once a year, sometimes twice flooding is seen
Inundation Level	Very high
Flood Stay Time	1 month
Danger Level of Flood Water	13.35 metre

Source: Field Survey, Upazila Parishad, BWDB, Kazipur, 2009.

5.2.2 Damages Recorded due to Natural Disaster

The impacts or consequences of flood and river erosion have also been recorded in very high number. Table 5.3 depicts the damaged caused by flood in different years. It is seen that the study Upazila faced huge damages during the period from 1998 to 2007. The number of affected households, people and the economic cost of flood was high. The death caused by flood was also seen during the period (Table 5.3).

Table 5.3: Flood and Colossal Damages in the Study Areas
(Kazipur Upazila)

Year of Major Flooding	Economic Losses (BDT)	Affected Household	Affected People	Death
1998	82,50,120	20,025	62,510	4
2000	58,73,020	25,368	88,788	2
2002	63,42,015	18,200	36,700	2
2004	48,70,028	13,503	26,400	1
2005	42,80,020	14,310	24,270	1
2007	50,18,780	15,500	54,130	3

Source: Upazila Parishad, Kazipur, 2009.

The form of riverbank erosion is very dangerous in the study areas. The entire Kazipur Upazila is endangered by riverbank erosion. About 44 villages, partly or entirely, have gone into river just within a few decades. The displaced rate is very high. It is reported that about 35% of people have been displaced seven times or more by bank-line erosion of that union.[1]

Table 5.4 : Riverbank Erosion in the Study Areas
(Kazipur Upazila)

Year of Erosion	Affected Household	No. of Eroded Villages
1998	3075	6
1999	1805	3
2000	1502	4
2001	2236	4
2002	1273	5
2003	836	3
2004	1435	2
2005	1927	4
2006	5000	2
2007	3642	2
2008	3889	11
Total	26620	46

Source: Upazila Parishad, Kazipur. Adapted by the researcher.

5.2.3 Other Natural Hazards and Disasters

The study people did not experience too much dry seasons for many years except the drought of 1973, 1975 and of 1978-79. The study areas face normal to moderate drought but they can easily cope with this adverse situation with their own irrigation system. Tropical storm like Northwester is a threat or hazard to the entire locality but it has not been seen as devastating disaster though some damages have been recorded. According to the local people, it is not destructive. They hardly think of it as they have witnessed a little damage caused by storm.

[1] Oxfam International, Rethinking Disasters (New Delhi : Oxfam International, 2008) p.8.

Table 5.5: Major Cyclone/Storm in the Study Areas
(Kazipur Upazila)

Year of Erosion	Affected Household	Injured	Death
1999	12600	20	-
2004	17780	65	02
2006	1500	50	02
2007	700	35	01

Source: Upazila Parishad, Kazipur. Adapted by the researcher.

Based on the information found from the field survey, the natural hazards in the study areas can be classified into two categories. The first one is 'devastating natural hazards' and the second one is 'non-devastating natural hazards' or 'possible threat'. Flood and riverbank erosion belong to the first category and drought, earthquake, cyclone/storm belong to the second.

5.2.4 Forms and Severity of Social Consequences of Flood Disaster

In the study area, the respondents are socially vulnerable. They become displaced during flood. Many respondents migrate to other places by loosing their socio-economic status. Flood deteriorates their economic and resource strength gradually and river erosion root-out them from the locality and in many cases make them landless and destitute in the society. The table below illustrates the level of social consequences in the study area (Table 5.6). It is seen from the table that displacement of people within villages or nearest villages is common due to flood and erosion. Such displacement is seen in high level in both villages. On the other hand, forced migration to outside villages or cities due to flood and river erosion is seen in severe form in both villages. 'Self-migration' has been recorded as 'slight' in both villages. It has also been recorded change in economic or social status in severe form due to land loss during flood (Table 5.6)

Table 5.6: Social Consequences of Flood Disaster in the Study Area

Indicators	Village & Vulnerability Level	
	Meghai	Khas Suriber
Displaced (within village due to flood/riverbank erosion)	High	High
Displaced/forced migration (Outside village or city due to riverbank erosion/flood)	High	High
Migrated Trend (willingly before disaster)	Slight	Slight
Change of Economic/Social Class	High	High
Social Instability/crime during natural disaster	Less seen	Less seen

Source: Field Survey, Upazila Parishad & BWDB, Kazipur, 2009.

On the other hand, social instability like theft during disaster period has been found but the number, frequency and brutality of such incidence has been seen in very less form. Though a few cases of theft or looting have been found in both villages but fear of such incidences make them passive from not to leave homestead during flood. As a result they face flood disaster staying within their own homesteads as long as they can stay at their houses.

5.3 Extent of Flood Faced by the Respondents

5.3.1 Level of Flood Water

The study people faced extreme flood many times in their whole lives. In most of the times flood submerged almost all households and they have been displaced from their houses. The severity of flood impact depends on whether flood water enters in the house or not. If the flood water enters into the room the flood impact becomes much more devastating and surrounds a household with many crises within a crisis. An attempt has been made to explore the level of flood water in the house of the respondents. It has been seen that 95.6% respondents faced flood in their own houses. As a result they became displaced and took shelter on embankments, bridges etc. Such extent or level of hazard affects people badly. Level of flood water in the house is another indicator of flood impact. It is seen that the level of flood water in the house was not considerably very high during the flood. Because of low height of home

plinth they were affected by flood easily. If they had a high plinth they would have saved themselves from flood. The table 5.7 illustrates that the level of flood water of 88.4% respondents was less than 3ft in both villages. On the other hand, 4% respondents' entire houses were submerged. The table shows the level of flood water in the houses below.

Table 5.7: Flood Level in the Homestead

Flood Level in the House	Meghai (%)	Khas Suriber (%)	Total (%)
Not Entered	4.8	4	4.4
1ft	1.6	2.4	2
2ft	36.8	36.8	36.8
3ft	50.4	48.8	49.6
4ft	4.8	5.6	5.2
Entire House	1.6	2.4	2
Total (n=250)	100	100	100

Source: Field Survey, 2009.

5.3.2 Frequency of Facing Flood Disaster

The table 5.8 depicts the frequency of falling in flood disaster in the life of the respondents. Among the respondents, 68% respondents said they faced flood in their entire life where as 32% respondents said they faced flood in major flooding years, not consecutive years in both villages. The table shows the details below.

Table 5.8: Times of Falling in Flood Disaster in Life

Times/Year	Meghai (%)	Khas Suriber (%)	Total (%)
Each Year/ Entire Life	62	75	68
Major Flooding Years	38	25	32
Total (n=250)	100	100	100

Source: Field Survey, 2009.

5.3.3 Frequency of Displacement by River Erosion

An attempt has been made to explore the proportion of respondents who faced riverbank erosion in their entire lives. Table 5.9 depicts the frequency of displacement by river erosion the respondents faced in their entire lives. It has been seen that in both villages about 70% respondents faced riverbank erosion 4 times in average in their lives. It is seen that 57% respondents have been displaced by river erosion. Of them some were displaced within villages and some were migrated from another village. In both villages 6% respondents have been displaced more than five times by river erosion. The table shows the details below.

Table 5.9: Frequency of Displacement by River Erosion in Life

Times of Falling in Erosion	Meghai (%)	Khas Suriber (%)	Total (%)
1	18	22	20
2	12	25	19
3	7	8	8
4	5	3	4
5+	6	7	6
Did not face	52	35	43
Total (n=250)	100	100	100

Source: Field Survey, 2009.

5.4 Socio-Economic and Demographic Features of the Respondents

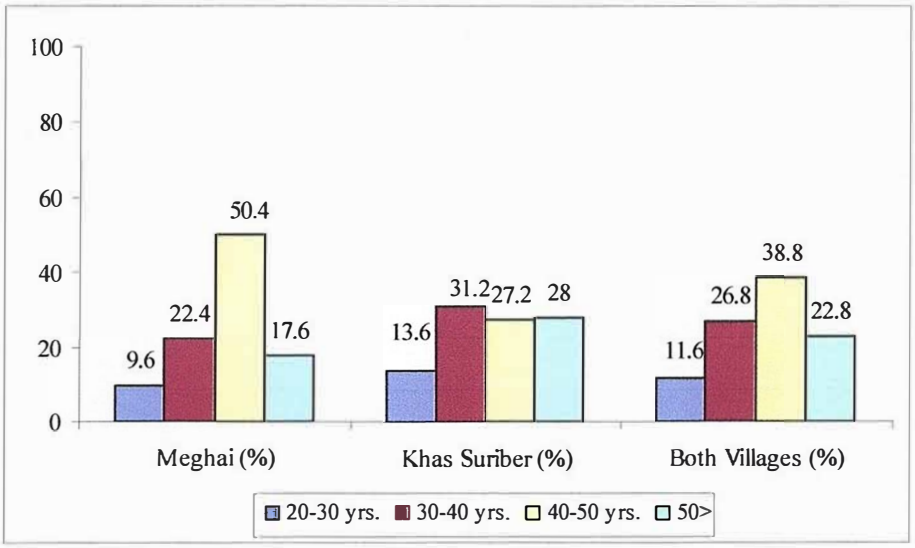
The socio-economic condition of the riverside people is vulnerable. Most of them are poor. A large number of respondents are landless. Agriculture is the prime source of their livelihood. The major features of the respondents are presented below through different tables and figures.

5.4.1 Demographic Features of the Respondents

Figure 5.1 depicts the age category of the respondents. Among the 250 respondents, most of the respondents belong to middle aged category. It is seen most (50.4%) of the respondents of the village Meghai belong to the age group 40-50 years where as in the village Khas Suriber majority (31.2%) of the respondents belong to the age category 30-40 years. In comparison with both villages the proportion of the age

category 40-50 years is dominant (38.8%). The proportion of the respondents over 50 years is 22.8%. Among the respondents, 94.8% were male and 5.2% respondents were female. 97% respondents were married and 3% respondents were widow. In both villages 9.2% respondents said that they had physically disabled children.

Figure 5.1: Age of the Respondents



Education of the Respondents

Table 5.10 depicts the educational status of the respondents. It is seen that 42% respondents in both villages are illiterate. On the other hand, of the different educational levels the proportion of primary education is the highest. Among the literate respondents, 31.6% respondents have primary level of education and 9.2% were of high school education. The rate of higher education is very low. 2.4% and 3.2% of the respondents in both villages are honours degree and master passed respectively.

Table 5.10: Educational Status of the respondents

Education Status	Meghai (%)	Khas Suriber (%)	Total (%)
Illiterate	41.6	42.4	42.0
Primary	26.4	36.8	31.6
High School	8.0	10.4	9.2
SSC	7.2	4.8	6.0
HSC	8.8	2.4	5.6
Hons. Degree	4.8	-	2.4
Masters	3.2	3.2	3.2
Total (n=250)	100	100	100

Source: Field Survey 2009.

5.4.2 Economic Features of the Respondents

Occupation, Income and Expenditure

Table 5.11 illustrates the occupations of the respondents of both villages. It is seen that 54.6% respondents' main occupation is agriculture and its related labour, of which 39.2% respondents' main occupation is agriculture in both villages. 16.4% respondents are labourers who work as agro-labour. 22.4% respondents' main occupation is business, 10.8% respondents are service holders and 11.2% respondents have petty business like umbrella, lock, utensil repairman. The table below shows the details about respondents' occupations.

Table 5.11 Main Occupation of the Respondents

Occupations of the Respondents	Meghai (%)	Khas Suriber (%)	Total (%)
Agriculture	24.0	54.4	39.2
Labour (agro mainly)	17.6	15.2	16.4
Small Business/ Petty Trader	27.2	17.6	22.4
Service	16.0	5.6	10.8
Others (repairman etc)	15.2	7.2	11.2
Total (n=250)	100	100	100

Source: Field Survey 2009.

The figure 5.2 depicts the monthly income of the respondents. It shows that 57.2% respondents earn less than Tk 4,000. The proportion of respondents who earn Tk 4,000-8,000 is 27.2% in both villages. The respondents with higher income were found very less. The figure below shows the details.

Figure 5.2: Monthly Income of the Respondents

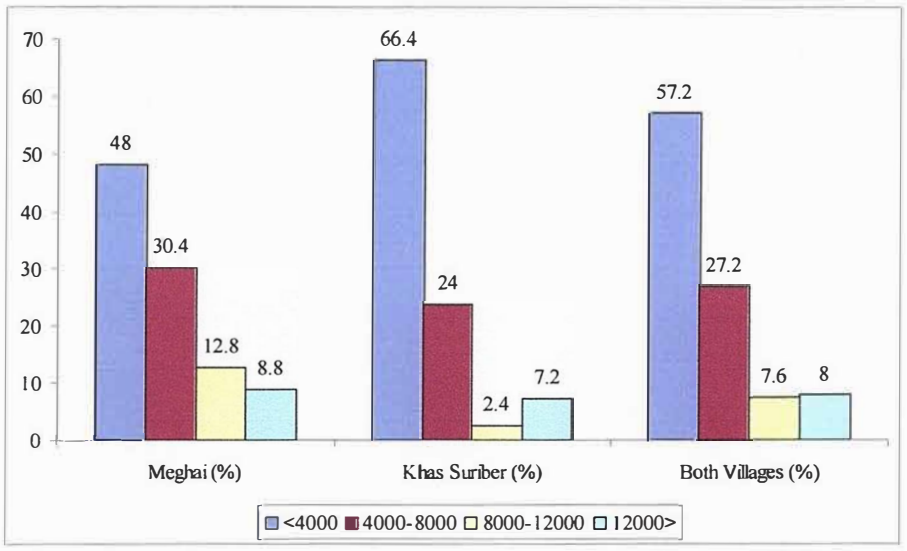


Table 5.12 depicts the monthly family expenditure of the respondents. It is seen that most (66%) of the respondents' monthly expenditure is less than Tk 5,000. There are some respondents (7.6%) whose monthly expenditure is Tk 10,000 and above. The table below shows the details.

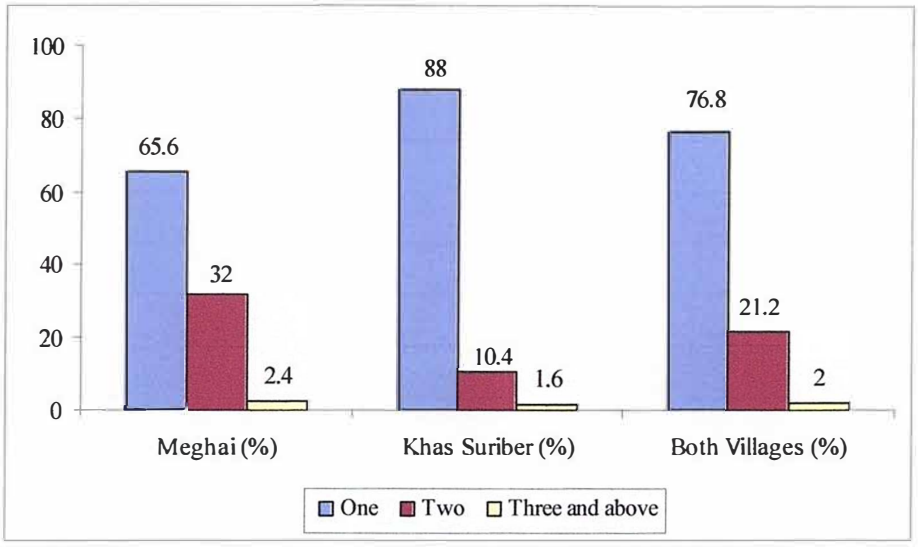
Table 5.12: Monthly Family Expenditure of Respondents

Monthly Family Expenditure	Meghai (%)	Khas Suriber (%)	Total (%)
<5,000	60.8	71.2	66.0
5,000-10,000	26.4	26.4	26.4
10,000-15,000	8.8	1.6	5.2
15,000-20,000	4.0	0.8	2.4
Total (n=250)	100	100	100

Source: Field Survey 2009.

Figure 5.3 depicts the number of income sources of the respondents. The figure depicts that most (76.8%) respondents have only one source of income where as 21.2 % respondents have two sources of income. In Meghai, the proportion of respondents who have two income sources is higher than the village Khas Suriber. The figure below shows the details.

Figure 5.3: Number of Income Source of the Respondents



Economically Active Persons and Unemployment in the Households

Table 5.13 below depicts the households having economically active persons. It is seen that majority (73.6) of the respondents have a single earner in both villages where as the 26.4% respondents have two and more economically active persons in the households. The proportions of dual wage earners in the households in both villages are 21.2%. On the contrary, the proportions of the households having three and more persons are 5.2% altogether.

Table 5.13: Economically Active Persons in the Households

No. of Economically Active Person(s)	Meghai (%)	Khas Suriber (%)	Total (%)
1	71.2	76.0	73.6
2	24.0	18.4	21.2
3	3.2	3.2	3.2
4	0.8	1.6	1.2
5	0.8	0.8	0.8
Total (n=250)	100	100	100

Source: Field Survey 2009.

The table 5.14 illustrates the unemployment situation of the households in both villages. It is seen that 30.8% households have economically active but unemployed members in their households. Among the respondents in both villages, 13.2% respondents have one unemployed member where as 15.9% households have two or more unemployed members who are economically active but unemployed due to lack of job opportunities.

Table 5.14: Unemployed Persons in the Household

Unemployed Persons	Meghai (%)	Khas Suriber (%)	Total (%)
1 Person	12.8	13.6	13.2
2 Persons	1.6	19.2	10.4
3 Persons	0.8	9.6	5.2
4 Persons	-	4	2
None	84.8	53.6	69.2
Total (n=250)	100	100	100

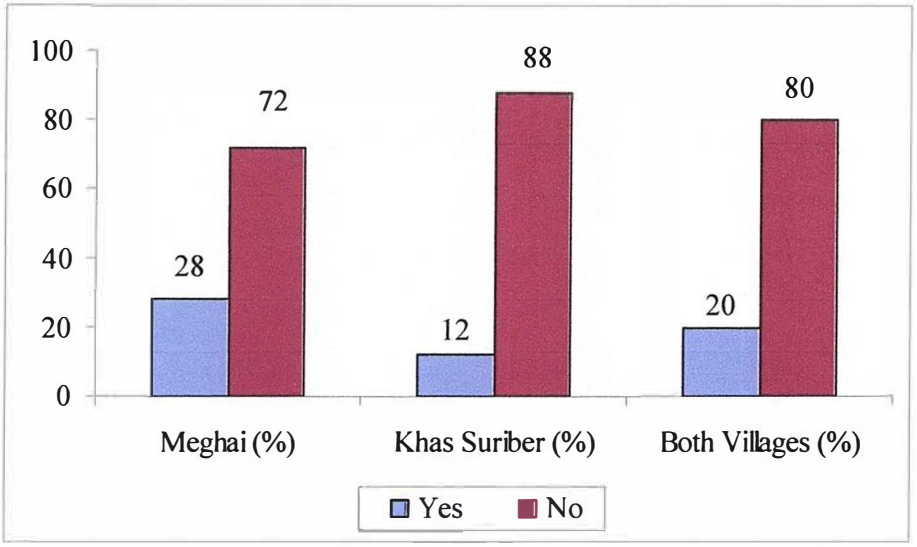
Source: Field Survey 2009.

Savings, Credit and Its Source

The figure 5.4 illustrates the monthly savings of the respondents. It is seen that 20% respondent have savings. Most (80%) of them do not have savings. In Meghai, the

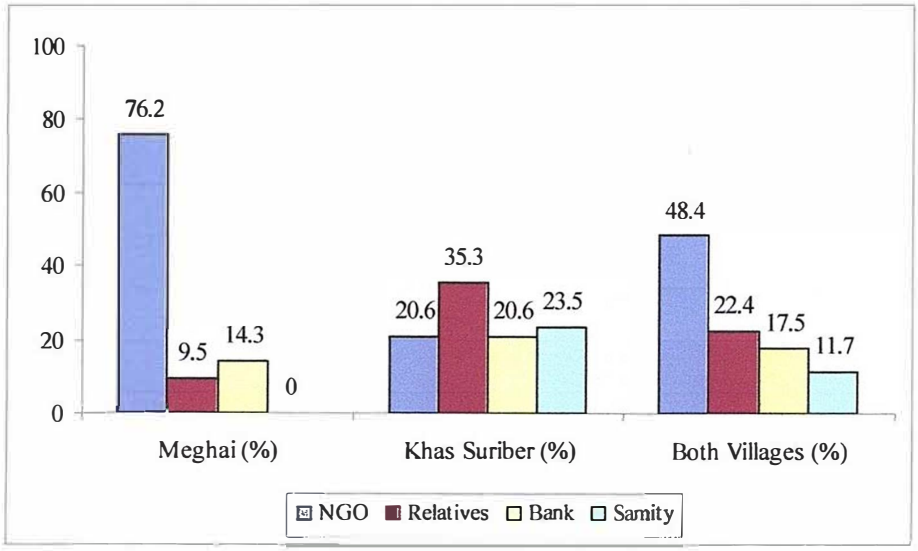
28% respondents have savings which is higher than the village Khas Suriber. The figure below shows the details.

Figure 5.4: Monthly Savings of the Respondents



The figure 5.5 below depicts the respondents' loan taking status. It is seen that 22% respondents of both villages have loan. The loan taker is higher in Khas Suriber (27.2%) than the village Meghai (16.8). The figure 5.5 depicts the source of loan taking of the respondents. It is seen that most (48.4%) of the respondent took loans from NGOs. 22.4% respondents took loan from relatives. However, taking loan from banks and *samity* is also seen. In Khas Suriber, most (35.3%) of the respondents' major source was relatives where as in Meghai most (76.2%) of the respondents' major source of loan was NGOs. The figure below shows the details.

Figure 5.5: Sources of Taking Loan among the Loan Taker Respondents



5.4.3 Household Assets, Homestead and Land Ownership of the Respondents

Table 5.15 shows the assets of the respondents of the villages. It is seen that 35% respondents have agricultural land and 22% have non-agro land. However, 74.4% respondents have livestock like cows, goats, hens, ducks. 43.6% of the households in both villages have vehicles like bicycle, rickshaw and van. 59.2% respondents have electric and electronic goods and 10% have agricultural equipments. The table shows the details below.

Table 5.15: Assets of the Respondents

Assets	% of the Households having Assets		
	Meghai	Khas Suriber	Total
Agriculture-Land	54	16	35
Non-Agriculture Land (fallen, not homestead land)	38.4	5.6	22
Livestock	80.8	68	74.4
Transport	52.8	34.4	43.6
Furniture	82.4	80	81.2
Agricultural-equipment	10.4	9.6	10
Electric & Electronic	71.2	47.2	59.2
Others	31.2	8.8	20

Source: Field Survey 2009. *Only percentage of 'yes' is shown in the table. (n=250)

Homestead Ownership and Amount of Land

Table 5.16 depicts the homestead ownership among the respondents of both villages. About 50% respondents do not have own homestead. Among the non-owned respondents in Meghai 41.6% live beside the dickey. These respondents are the victims or displacees of river erosion. In Khas Suriber, 48.4% respondents do not have own homestead and they live in rented or leased houses (*Kot*). The table below shows the details.

Table 5.16: Homestead Ownership among the Respondents

Homestead Ownership	Meghai (%)	Khas Suriber (%)	Total (%)
Own	55.2	48	51.6
Rented (Monthly)	3.2	3.2	3.2
Kot (Leased-yearly)	-	48.8	24.4
Temporary (dam, rent free places)	41.6	-	0.8
Total (n=250)	100	100	100

Source: Field Survey 2009.

Table 5.17 depicts that 48.4% respondents do not have own homestead land. They also do not have any cultivatable land. Among the respondents who have own homestead land, 26.2% respondents have 0.01-0.1 acres of homestead land. The proportion of respondents who have more than 0.15 acres of homestead land is 8.8% in both villages.

Table 5.17: Amount of Homestead Land of the Respondents

Area (in acre)	Meghai (%)	Khas Suriber (%)	Total (%)
<0.01	16	2.8	9.4
0.01-0.1	32	20.4	26.2
0.1-0.15	17.6	14.8	16.2
0.15>	7.2	10.4	8.8
No Own H.land	44.8	52.0	48.4
Total (n=250)	100	100	100

Source: Field Survey 2009, n=250

Respondents Category by Land Ownership

Table 5.18 depicts the respondents category based on overall land ownership. It is seen that 48.4% respondents are landless and 51.6% respondents have agro and non-agro lands. Among the land owner respondents, 30.5% respondents have 0.05-2.49 acres of lands and they have been categorized as 'Small Farmer'. 14% respondents have 2.50-7.49 acres of lands and they have been categorized as 'Medium Farmer' and 7.1% respondents have 7.50 acres of lands and they have been categorized as 'Large Farmer'. The table shows the details below.

Table 5.18: Respondents by Land Ownership

Respondents' Category (by land, in acre)	**Meghai (%)**	**Khas Suriber (%)**	**Total (%)**
Landless (No lands)	44.8	52	48.4
Small Farmer (0.05-2.49)	32	29	30.5
Medium Farmer (2.50-7.49)	15	13	14
Large Farmer (7.50 acres & above)	8.2	6	7.1
Total (n=250)	100	100	100

Source: Field Survey, 2009.

Homestead Structure

Table 5.19 shows the respondents' house structure. It is seen that most (97.6%) of the respondents' house is made of clay & tin in both villages. The house structure is not disaster resilient at all. The house which is made of brick & tin is only 4.8% in village Meghai. No such house structure was found in villages Khas Suriber. The table shows the details below.

Table 5.19: Homestead Structure of the Respondents

Homestead Made of	Meghai (%)	Khas Suriber (%)	Total (%)
Mud & Tin	95.2	100	97.6
Brick & Tin	4.8	-	2.4
Total (n=250)	100	100	100

Source: Field Survey 2009.

Table 5.20 depicts the height of homestead plinth of the respondents of both villages. It is seen that most of the respondents' height of homestead plinth is very low. It is seen that 74% respondents have very low height of house plinth where as 22.8% respondents have more than 3-4ft. height of homestead plinth. Households having 5ft. of homestead plinth in Khas Suriber is 1.6% but no such homestead found in the village Meghai. The proportion of the household having 6ft. of homestead plinth in the village Khas Suriber is 3.2% but no such height found in the villages Meghai. The average height of the plinth in both villages is 1.5ft. The table below shows the details below.

Table 5.20: Height of Homestead Plinth

Height (ft.)	Meghai (%)	Khas Suriber (%)	Total (%)
1	0.8	16.0	8.4
2	81.6	49.6	65.6
3	16.8	24.0	20.4
4	0.8	4.0	2.4
5	-	1.6	0.8
6	-	4.8	2.4
Total (n=250)	100	100	100
Avg. Height	1.5	1.6	1.5

Source: Field Survey 2009.

5.5 Conclusion

The objective of this chapter is to discuss the natural hazards and disasters of the study area and some features of the respondents. Among the different types of natural disasters, flood and river erosion are the foremost problems in the study area. These have made damaging impacts in this area. The chapter also described the socio-economic features of the study area and of the respondents. The socio-economic

condition of the respondents is vulnerable as they live in vulnerable areas, earn less (66%) and have little savings (20%) or even no savings (80%). Most of them (76.8%) have only one source of income. In most of the houses there is an earner but the number of the dependent is high. About 22% respondents have loans and of them 56% take loans as regular basis. 55.6% respondents' main income is agriculture and its related labour. The housing characteristic is also very poor and is not disaster resilient. In these socio-economic conditions they live in this area facing flood and erosion.

CHAPTER SIX

PEOPLE'S VULNERABILITY TO FLOOD DISASTER

6.1 Introduction

This chapter analyzes respondents' vulnerabilities to flood disaster identified in the study. The chapter also attempts to find out the factors of their vulnerabilities or causes of being vulnerable in flood disaster. Vulnerabilities have been categorized and discussed on the basis of social, economic and health aspects of the respondents. Analysis is performed based on primary data collected from the respondents.

This chapter contains three sections. The section 6.2 describes the respondents' vulnerabilities to flood disaster. This section is further subdivided into four sub-sections to discuss the vulnerabilities in terms of social, economic, health and other aspects. Section 6.3 illustrates the major factors that are responsible for vulnerabilities of the respondents. Section 6.4 provides the conclusion of this chapter.

6.2 Areas of Respondents' Vulnerabilities in Flood Disaster

The river-side areas are highly prone to severe flooding and river erosion. Yet the people have been living these areas for years mainly for their patriarchal livelihoods. Agriculture and agro-related labour have been the prime source of income in this area. Most of the people of these areas are not well-off. Majority of them are vulnerable to poverty in their day-to-day lives. The respondents face flood disaster almost every year. Flood makes them more vulnerable and poses several risks for the future. The present study finds different types of vulnerabilities of the respondents which are discussed below.

6.2.1 Economic Vulnerability

Table 6.1 presents the areas of respondents' economic vulnerabilities. The respondents think that flood disaster widens their economic insecurities more. It creates a state of joblessness, income reduction and income discontinuation. About 75% respondents in both villages say that they are vulnerable to flood because they become jobless during flood. Similarly, 32% respondents talked about job change. They think that they have to change their regular jobs if flood happens. For changing jobs they usually catch and sale fish, and work as day labourer. Some respondents become boatmen during flood.

A large number of respondents (51%) talked about income reduction during flood. They say that their income reduces during flood. They have to face discontinuation of income. 54% respondents talked about income discontinuation. As a result, they have to depend on their savings. 22% respondents said that they had to use their savings as they had no jobs and earnings during flood. 39.5% respondents expressed susceptibility about change in their economic status. They fear that flood may pose huge financial burden on them. They said that they had to face huge financial losses, assets damage etc. due to flood land erosion. As a result, their economic strength deteriorated a lot. They said that many of us became poor and migrated to cities due to flood and erosion. A large number of respondents feared about the probable impact on crop damage. About 69% respondents talked about probable impact on crops during flood. On the other hand, 39% respondents talked about increase in loan taking tendency during flood. They said that they had to take loans as their income stopped. About 68.5% respondents talked about the financial losses due to land erosion and 57.5% talked about financial losses due to house and assets damage. Similarly, about 19% respondents talked about the susceptibility of economic losses due to diseases and death of cattle during flood. The table below shows peoples' vulnerabilities during flood in the study area.

Table 6.1: Areas of Respondent's Economic Vulnerabilities in Flood Disaster

(by Village)

Specific Areas of Economic Vulnerabilities	Meghai (%)	Khas Suriber (%)	Total (%)
Job Change	28	36	32
Income Reduced	48	54	51
Jobless	72	78	75
Income Discontinuation	52	56	54
Saving Depletion	35	39	22
Economic Status Change	45	34	39.5
Crops Loss	70	68	69
Loan Taking Tendency	38	40	39
Economic Loss due to Land Erosion	72	65	68.5
Economic Loss due to House & Assets Damage	55	60	57.5
Economic Loss due to Death & Disease of Cattle	17	22	19.5

Source: Field Survey, 2009. (n=250)

Flood disaster affects the vulnerabilities of people differently. Vulnerabilities vary according to person or household. The table 6.2 depicts economic vulnerability by respondents' category. Different types of respondents talked about different types of their vulnerabilities in flood disaster. Landless and small farmers talked more about income vulnerability. It was found that landless and small farmers talked about income discontinuation most in flood. They fear that if flood happens they have to be unemployed. Among the respondents 68% landless, 56% small farmers, 25% medium farmers and 12% large farmers talked about income discontinuation during flood. They said that they were vulnerable to flood because it discontinued their daily income. On the other hand, 58% landless, 48% small farmers and 56% medium farmers talked about income reduction. They said that flood reduces their incomes. Only 12% large farmers talked about income reduction.

Most of the landless respondents talked about joblessness during flood. They think they are vulnerable to flood because it makes them jobless. In both villages landless (68%), small farmers (42%) and medium farmers (12%) talked about their joblessness during flood. The medium and large farmers did not talk about job change where as

landless (38%) and small farmers (32%) talked about the possibility of changing job during flood. On the other hand, landless (52%), small (58%) and medium farmers (15%) talked about the possibility of saving depletion but the large farmers did not talk about it. Among the respondents landless (56%), small farmers (45%), medium farmers (12%) and 10% large farmers talked about the possibility of changing economic status due to flood. However, a large number of respondents from the small (58%) and medium (52%) and large farmers (62%) talked about financial losses due to crop loss but the landless farmers did not talk about the possibility of financial losses rather they talked about loan and borrowing. most (Table 6.2). They said that as their incomes stopped during flood they had to depend on borrowing or taking loan. They fear that if flood happens again they have to depend on the borrowings again.

Table 6.2: Areas of Respondents' Economic Vulnerabilities in Flood Disaster
(by Respondent)

Economic Vulnerabilities	Landless (%)	Small Farmer (%)	Medium Farmer (%)	Large Farmer (%)
Income Discontinuation	68	56	25	12
Income Reduced	58	48	56	12
Jobless	68	42	12	-
Job Change	38	32	-	-
Saving Depletion	52	58	15	-
Economic Status Change	56	45	12	10
Crops Loss	-	58	52	62
Loan & Borrowing	62	48	18	-
Economic Loss due to Land Erosion	-	6	28	53
Economic Loss due to House & Assets Damage	54	64	35	25
Economic Loss due to Death & Disease of Cattle	8	15	27	-

Source: Field Survey, 2009.

6.2.2 Social Vulnerability

Table 6.3 depicts the respondents' areas of social vulnerabilities during flood. Flood widens the areas of social vulnerabilities. The respondents said that they might be displaced, migrated, fallen in food crisis due to flood. In both villages, 62% respondents talked about the possibility of displacement. They say that they may be displaced from their houses during flood again. About 48% respondents said that flood discontinued their children's education. About 57% respondents talked about the possibility of changing social status if they became victims of flood and erosion. They think that flood may change social status because of having huge impact on land and economy. They fear that if the river erosion swallows up their houses they may become landless poor in the society. They said that they had witnessed such scenario in the locality. However, majority of the respondents (86%) talked about the possibility of migration during flood and erosion. They said that they migrated to nearby village or city due to flood. They said that if flood happens again they have to be migrated to the nearby areas. On the other hand, about 21% respondents talked about crime incidents like looting and theft during flood (Table 6.3). They fear that during flood crimes like theft, looting may happen. They say that this is why they do not want to desert the house and try to stay at home as long as possible.

Table 6.3: Areas of People's Social Vulnerabilities during Flood Disaster (by Village)

Specific Areas of Social Vulnerabilities	Meghai (%)	Khas Suriber (%)	Total (%)
Displacement (within village during flood)	68	78	62
Education Discontinuation of children	42	52	48.5
Status Change	52	62	57
Crime	18	25	21.5
Migration (due to erosion)	84	88	86

Source: Field Survey, 2009.

Social vulnerabilities vary according to respondents. Different respondents talked about different types of social vulnerabilities. The table below depicts the respondents' social vulnerabilities by respondents' types (Table 6.4). The study finds that 92% landless respondents talked about displacement due to flood, among respondents 84% small farmers, 72% medium farmers and 68% large farmers also talked about displacement due to flood. A significant number of respondents (42%) talked about changing social status for flood. Among the small farmers the rate was 62% and 25% were of medium farmers. Moreover, a large number of respondents talked about the susceptibility of migration due to river erosion and flood (Table 6.4).

Table 6.4: Areas of People's Social Vulnerabilities in Flood Disaster (by Respondents)

Vulnerabilities	Landless (%)	Small Farmer (%)	Medium Farmer (%)	Large Farmer (%)
Displacement (within village during flood)	92	84	72	68
Status Change	42	62	25	-
Migration	65	68	38	-
Drop-out of school due to river erosion	22	-	-	-
Education Discontinuation of the children	12	27	45	25

Source: Field Survey, 2009.

6.2.3 Health and Other Vulnerabilities

Health, sanitation, nutrition are other areas of people's vulnerabilities. It was seen from the table 6.5 that 77% respondents talked about the possibility of food crisis during flood. They said that they were vulnerable because they had to face food crisis during flood. However, a large number of respondents talked about less food intake, drinking water problem and diseases like diarrhoea, dysentery, fever, cough. They fear that they may be affected to those diseases during flood disaster. However, a large number of respondents talked about the possibility of facing house and property damages. In both villages 72% respondents talked about house damages during flood

and 80.5% respondents talked about assets damage due to flood. In Meghai the proportion of the respondents was 78% and in Khas Suriber it was 83%. In both villages 95% respondents talked about land erosion during flood. They said that flood eroded a huge amount of land. So, they think that their land and property are vulnerable to flood disaster. Transport and communication is other area of peoples' vulnerabilities. In both villages 94% respondents talked about the possibility of disruption in transport and communication during flood (Table 6.5). The respondents said that flood disrupted entire transport and communication system.

Table 6.5: Areas of Respondents' Health and Other Vulnerabilities in Flood Disaster (by Village)

Category	Specific Areas of Vulnerabilities	Meghai (%)	Khas Suriber (%)	Total (%)
Health, Sanitation, Nutrition Vulnerability	Food Crisis & Less Food Intake	72	82	77
	Toilet Problem	85	78	81.5
	Drinking Water	82	85	83.5
	Life Loss	5	6	5.5
	Disease	35	30	32.5
Land, House & Property Vulnerability	House Damage	78	72	75
	Assets Damage	65	70	67.5
	Land Erosion	94	96	95
Transport & Communication Vulnerability	Daily Transport & Communication Disruption	92	96	94

Source : Field Survey, 2009.

People's social and health vulnerabilities vary according to respondents' economic conditions. It has been illustrated through the table 6.6. It is seen that 84% landless, 78% small farmers talks about the possibility of food crisis during flood. On the other hand, 82% landless, 88% small farmers and 32% medium farmers talked about the possibility of less food intake during flood. The landless and small farmers said that due to having less food in the house they had to eat less. They said that they also ate less during flood due to joblessness. A large number of respondents talked about the drinking water crisis. In spite of having tube-well in both villages 92% landless, 85% small farmers and 45% medium farmers talked about the problem of getting pure

drinking water due to flood. However, 95% landless, 87% small, 68% medium and 45% large farmers talked about toilet problem during flood. They said that their women members faced such problem most. 58% landless, 45% small, 27% medium and 25% large farmers talked about the susceptibility of flood induced diseases (Table 6.6). Among the respondents landless and small farmers talked about the possibility of illness and diseases most. They think that they may infect in water-borne diseases during flood.

Table 6.6: Areas of People's Health and Other Vulnerabilities in Flood Disaster (by Respondents)

Category	Vulnerabilities	Landless (%)	Small Farmer (%)	Medium Farmer (%)	Large Farmer (%)
Health, Sanitation, Nutrition	Food Crisis	84	78	-	-
	Less Food Intake	82	88	32	-
	Drinking Water	92	85	45	-
	Toilet Problem	95	87	68	45
	Life Loss	2	-	-	-
	Disease	58	45	27	25
House & Property	House Damage	76	68	43	32
	Assets Damage	78	83	35	12
	Land Erosion	55	78	82	92
Transport & Communication	Transport & Communication Disrupted/problem	66	72	55	35

Source: Field Survey, 2009.

On the other hand, 76% landless, 68% small, 43% medium and 32% large farmers talked about house damage. They think that their houses are vulnerable to flood. They made responsible to the weak house structure and flood for this. Similarly, a large number of respondents talked about assets damages during flood. 78% landless, 83% small, 35% medium and 12% large farmers talked about the possibility of assets damages due to flood. Moreover, most of the large farmers or respondents talked about the possibility of land erosion by flood. Among the respondents 55% landless, 78% small, 82%medium and 92% large farmers talked about the possibility of land erosion during flood. Again a great number of the respondents talked about disruption of transport and communication. They said that they were vulnerable to flood because

communication system was disrupted badly due to flood. 66% landless, 72% small, 55% medium and 35% large farmers talked about the possibility of transport and communication disruption during flood (Table 6.6).

6.3 Major Factors of Vulnerability of the Respondents

The respondents have expressed six major factors of their vulnerabilities to flood. They think that they are vulnerable to flood disaster because of having some factors. They said that these factors were basically their inabilities or weaknesses (Table 6.7). They think that their incapacities or weaknesses lead to more risks and severe impacts if flood hits them. People with low income themselves pave the way of many vulnerable situations for their day-to-day life. Flood widens such vulnerable situations more by creating some other risks during and after flood disaster like income discontinuation, joblessness, less food intake, homelessness etc. Due to having those factors they have to face huge flood impact each year.

Table 6.7: Factors of Vulnerability of the Respondents
(by Village)

Weaknesses of the Respondents	Meghai (%)	Khas Suriber (%)	Total (%)
Low Income	52	60	56
No Savings	40	48	44
Having Loan	36	42	39
Weak House Structure with Low Plinth	94	96	95
Lack of Flood & Erosion Protection Embankment	88	92	90
Severe Flooding and River Erosion	90	92	91

Source: Field Survey, 2009. (n=250)

The table 6.7 above depicts the major weaknesses of the respondents which make them vulnerable during flood. It is seen from the above table that majority (56%) of the respondents are vulnerable to flood because of their low income. Due to having

low income they can not save money for crisis period and can not bear the cost of damages after flood. About 44% respondents said that they were vulnerable because of having no savings and 39% identified loan as one of the causes of their vulnerabilities. On the other hand, most of the respondents had weak house structure with low height of plinth. The houses were made mainly with clay and tin. They said that due to having such type of house they faced flood impact most. About 95% respondents said that low plinth and weak house structure is the cause of their vulnerabilities. Similarly 90% respondents made responsible to severe flooding and erosion as the cause of their vulnerabilities. However, a large number of respondents (90%) said that the major causes of their vulnerabilities were lack of flood and river erosion protection dam in the area and 91% respondents said that severe flooding with erosion was one of the major causes of their vulnerabilities.

Factors of vulnerability vary by respondents. Table 6.8 below depicts the factors of vulnerability by respondents' types. Among the respondents landless and small farmers have made responsible to their income, savings and having loan. They also made responsible to weak house structure, flood and river erosion protection dam and severe flooding. On the other hand, Medium and large farmers made responsible to their weak house structure, lack of flood and river erosion protection dam and severe flooding as the factors of their vulnerabilities. Table 6.8 below shows the details.

Table 6.8: Factors of Vulnerability of the Respondents
(by Respondent)

Vulnerabilities	Landless (%)	Small Farmer (%)	Medium Farmer (%)	Large Farmer (%)
Low Income	78	56	-	-
No Savings	68	26	-	-
Having Loan	55	35	10	-
Weak House Structure with Low Plinth	15	10	45	55
Lack of Flood & Erosion Protection Embankment	65	74	85	82
Severe Flooding and River Erosion	72	75	62	72

Source: Field Survey, 2009. (n=250)

6.4 Comparative Discussion on Vulnerability

The study emphasizes on exploring respondents' vulnerabilities in flood disaster. In other studies such efforts have not been seen exclusively. Other researchers have viewed and analyzed vulnerability from theoretical perspectives. They emphasized more on defining vulnerability rather than identifying people's vulnerabilities. The present study has revealed various vulnerabilities of the respondents in flood disaster. These are economic vulnerabilities, social vulnerabilities, and health related and other vulnerabilities. Job change, income reduction, joblessness, income discontinuation, depletion of savings, change in economic status, crops loss, economic loss due to land erosion belong to economic vulnerability.

Displacement, discontinuation of education of children, social status change, crime, migration etc belong to social vulnerability category. Food crisis, less food intake, toilet problem of women, drinking water problem, life loss, disease, house damage, assets damage, disruption in daily transport & communication etc belong to health and other vulnerability category. Some of these vulnerabilities have also been explored by other researchers. Shoeb (2002), Dasgupta et al (2010), Quarantelli (1994), Ribot (2009) talked about social change and social vulnerabilities. They relate such vulnerabilities to policy issues. Other researchers like DeLaine et al (2003), Williams, Sumer (1993, 1994), Ikeda (1995), Nasreen (1995), Nizamuddin et al (2001) explored social and gender vulnerabilities. Some researchers like Fothergill (1998), Wilson et al (1998), Enarson (2000) also talked about gender violence, child abuse, and domestic violence of affected people during disaster.

The present study reveals that the respondents talked about various vulnerabilities due to flood disaster but all vulnerabilities do not expose to all people. It exposes when vulnerable people face it. Such casual relation has explored by Wisner et al (2003).
It is seen that all respondents are vulnerable to different scales and they have different types of vulnerabilities. The large farmers are financially vulnerable more because they talk about crops damage, assets damage, land loss due to flood and erosion. Similarly landless and small farmers are vulnerable and they have different types of vulnerabilities. Low income, less or no savings, having loan and having no effective

embankment have become the factors of their continuous vulnerabilities in flood disaster. Such vulnerabilities are the result of interaction among their social, economic and environmental settings. Such settings create a state of vulnerability and vulnerable groups usually are exposed to it.

6.5 Conclusion

The objective of this chapter is to explore respondents' vulnerabilities. Landless and small farmers talked about income and food vulnerabilities than the other groups of people. They talked about food crisis, less food intake, income discontinuation, savings depletion, loan taking, borrowing food and money. The small farmers' areas of vulnerabilities were the same like the landless farmers. They also talked about financial damages, income reduction, depletion savings and taking loan. On the other hand, medium farmers talked about financial damages due to crops and house damages, and land erosion. They talked about the less food intake due to lack of cooking arrangements and income reduction. They also talked about using savings. The large farmers were financially vulnerable more because they talked about crops damage and land loss due to flood and erosion. Low income, less or no savings, having loan and having no effective embankment have become the factors of their continuous vulnerabilities. As a result they become vulnerable to flood disaster. Peoples' weaknesses, limitations and inabilities make them helpless and increase the extent of vulnerabilities to flood disaster more.

CHAPTER SEVEN

IMPACTS OF FLOOD DISASTER

7.1 Introduction

The objective of this chapter is to assess the impact of flood disaster on the people of the study area. The impacts have been discussed in relation with economic, social and other affected aspects of the respondents based on primary data. Since this research has undertaken two villages for the study, impacts of flood on the people of both the villages are also presented.

The following sections highlight the impacts of the respondents in flood disaster. Section 7.2 depicts the economic impact of the respondents. It describes different aspects of respondents' economic impacts like income reduction, joblessness, job change. Section 7.3 provides impacts on homestead and assets of the households. Section 7.4 discusses social impacts of flood disaster and Section 7.4 provides other impacts of flood on the people of the study area.

7.2 Economic Impact

Flood has direct and comparatively long term negative impact on people's daily income and economic activities. Flood disaster reduces and even stops daily income of the people. It creates unemployment for a long period of time and dismantles the entire economic activities and system of the affected areas. However, flood disaster is also destructive because it damages other properties as well. There are different types of economic impacts that were found to fall on the people of the study area. These are discussed bellow.

7.2.1 Impact on Income

Figure 7.1 illustrates the job status of the respondents of both villages. It was found that 13.6% respondents in Meghai and 20% respondents in Khas Suriber remained

jobless or out of work due to flood. In both villages 62.8% respondents were disaster-unemployment.

Figure 7.1: Respondents Remained Jobless or Job Lost during Flood

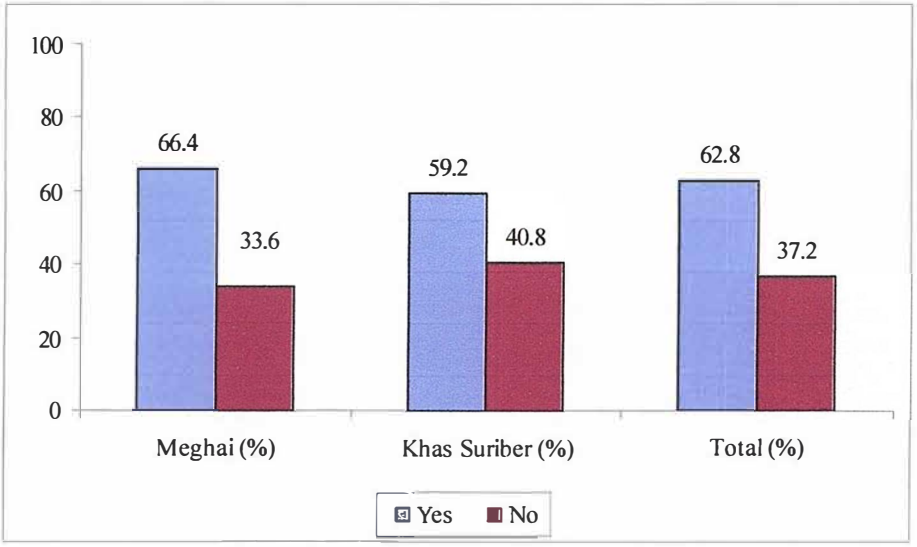
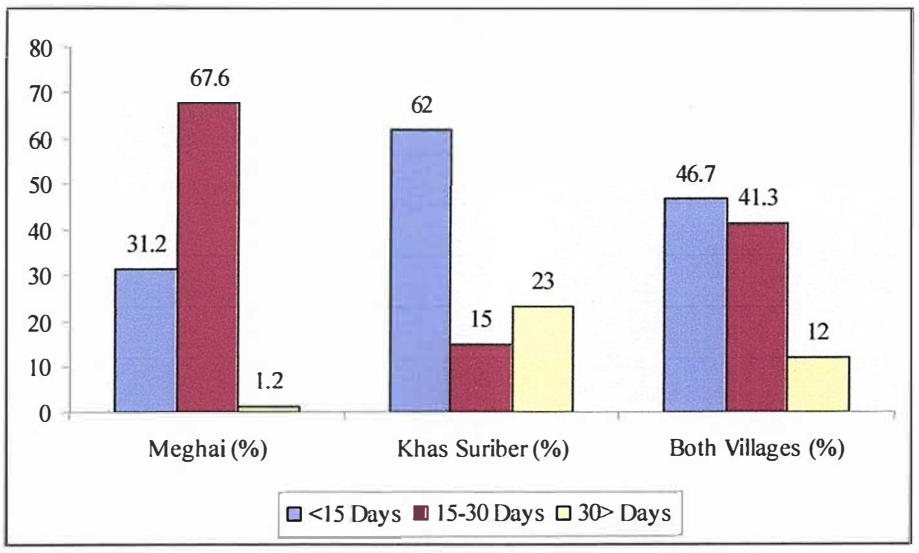


Figure 7.2 below shows the duration of joblessness of the respondents. It was seen that in both villages, 62.8% respondents were jobless during flood and of them 46.7% respondents remained economically inactive for less than 15 days due to flood. 41.3% respondents were jobless for 15 to 30 days and 12% respondents were jobless for over 30 days.

Figure 7.2: Number of Days Respondents Remain Jobless during Flood



7.2.2 Depletion of Savings

The respondents used savings as strategy to overcome economic crisis. In the study area it has been seen that only 27% respondents had savings but most of them depleted their savings for having no other income during flood. It was seen that among the respondents who had savings most of them (94%) depleted their savings during flood. The large farmers also used their savings but they did not deplete all the savings. The table below shows the details.

Table 7.1: Depletion of Savings during Flood, by Farmer

Respondents' Category	Total (%)	
	Yes	No
Landless	-	-
Small Farmers	47.5	2
Medium Farmers	40.5	4
Large Farmers	6	-
Total	94	6
Grand Total (n=50)	100	

Source: Field Survey, 2009.

7.2.3 Dependency on Borrowing

Respondents have a tendency to borrow to meet their daily requirement. They borrowed food, money, cooking goods etc during flood. It was found that in both villages 27.6% respondents borrowed money during flood. It was also seen that 26% respondents borrowed goods and cooking items during flood. In terms of the amount of money borrowed, it was seen that in Meghai 28% respondents borrowed money for flood and of them 17% respondents belonged to landless. In Meghai respondents borrowed 9,028/- Tk on average for flood. Both villages the average amount of borrowed money is about Tk 4,500/-. In Khas Suriber 39.2% respondents borrowed money for flood. Of them 28.6% were landless and 63.2% respondents were small farmers.

Table 7.2 depicts the amount of money the respondents borrowed money for flood. It was seen that among the borrowers, most respondents (60%) borrowed money less than Tk 5,000/-. However, 11.6% respondents borrowed a big amount of money which was more than Tk 15,000/-. The respondents or borrowers of the two villages took 3 to 7 months or even more to repay their dues. Many of them were unable to repay the dues after a year later. Most of the respondents borrowed money mainly for meeting the daily family expenses and for house repairing because their source of income stopped and savings ran out. The table below shows the detail about their borrowing amount.

Table 7.2: Amount of Borrowing Money during Flood, by Village

Amount	Meghai (%)	Khas Suriber (%)	Total (%)
< 5,000	48.6	71.4	60.0
5,000-10,000	40.0	8.2	24.1
10,000-15,000	2.9	6.1	4.5
15,000-20,000	5.6	6.1	5.8
20,000>	2.9	8.2	5.8
Total (n=69)	100	100	100

Source: Field Survey, 2009.

The amount of borrowing varies by respondents. The study finds that landless and small farmers borrowed money of different amounts. The medium and large farmers did not borrow money. The following table shows the details.

Table 7.3: Amount of Borrowing Money during Flood, by Respondents

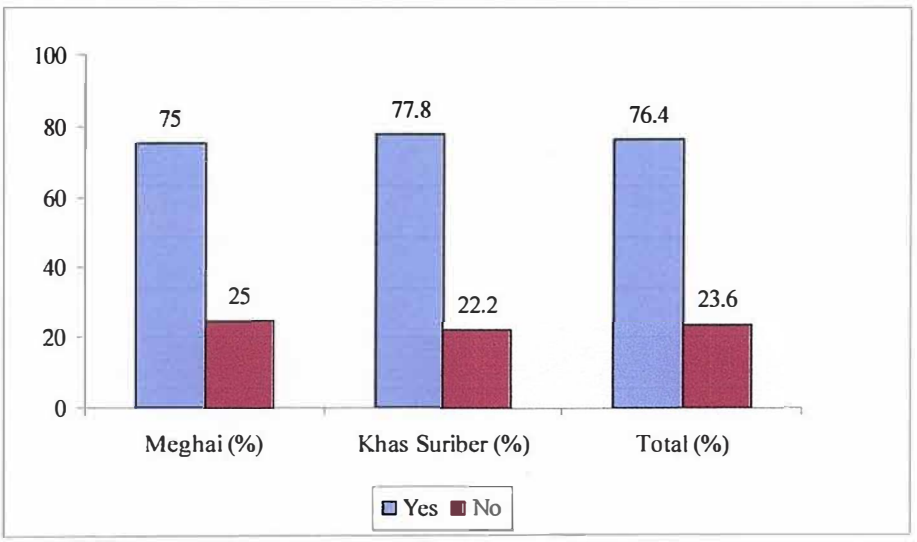
Amount Category (Tk)	Landless (%)	Small Farmers (%)	Medium Farmers (%)	Large Farmers (%)
<5,000	38	32	-	-
5,000-10,000	32	15	-	-
10,000-15,000	10	12	-	-
15,000>20,000	16	34	-	-
20,000>	4	7	-	-
Total (n=69)	100	100	100	100

Source: Field Survey, 2009.

7.2.4 Impact on Agriculture

Land and agriculture are the foremost source of livelihood of the study area. As the riverbank erosion occurs during flood it hampers the agro-production and reduces the amount of cultivatable land. In the study areas it is seen that there is a practice of cultivating crops in spite of threat of river erosion and flood. The people take chance if disaster does not happen this year. But they fall in disaster and their crops get damaged in most of the times. Among the land owner respondents, 31.6% respondents said that they incurred crops damage or loss each year's flood and 68.4% respondents incurred such losses occasionally, i.e. in excessive flooding years only. In Meghai 30% respondents incurred crops losses each year's flood and 70% respondents incurred such losses occasionally. In Khas Suriber, 33.3% respondents incurred losses from each year's flood and 66.7% respondents incurred crops damages occasionally. 76.4% respondents said that their crops damaged during last year's flood (Figure 7.3).

Figure 7.3: Crops Damaged during Flood



7.2.5 Financial Losses due to Crops Damage

Crops damage is one of the devastating losses and shocks for the households who grow crops. It is related to the food security of the households and also a source of

income. An attempt has been made to explore the extent of their economic losses due to crops damage. It was seen that 51.9% respondents' crops loss was of Tk 5,000/- to 10,000/- in both villages (Table 7.4) and 20.7% respondents economic value of crops loss was more than Tk 10,000/-. The medium and large farmers incurred such losses. The table shows the details below.

Table 7.4: Losses Incurred for Crops Damage
(by Village)

Amount Category (Tk)	Meghai (%)	Khas Suriber (%)	Total (%)
<5,000	33.3	21.4	27.4
5,000-10,000	46.7	57.1	51.9
10,000-15,000	13.3	14.3	13.8
15,000>	6.7	7.2	6.9
Total (n=72)	100	100	100

Source: Field Survey, 2009.

Table 7.5 below depicts that Medium and large farmers face huge financial losses due to crops damage during flood. Among the medium farmers 44% respondents faced financial losses and 36% large farmers faced financial losses due to flood. Landless farmers (5%) and small farmers (17%) faced crops damage due to lack of storage facility in the house. On the other hand, the medium and large farmers faced losses for the crops in field and in the house. The table shows the financial losses details below.

Table 7.5: Losses Incurred for Crops Damage
(by Respondents)

Amount Category (Tk)	Landless (%)	Small Farmers (%)	Medium Farmers (%)	Large Farmers (%)	Total %
<5,000	5	8	14	-	27
5,000-10,000	-	7	21	26	52
10,000-15,000	-	-	6	8	14
15,000>	-	2	3	2	7

Source: Field Survey, 2009, (n=72).

7.2.6 Loss due to Low Price Selling of Crops

Flood impact has its various forms. One of the impacts the respondents faced that they sold some of their belongings and got financial losses due to low price also. It has also seen that 11.2% respondents in village Meghai and 12.8% respondents in Khas Suriber had to sell jute, paddy, cow, goat and chilies during flood. They sold those for money and fear of damages due to flood water. The frequency of selling goods during flood in low price is seen. 14.3% respondents in Meghai faced such impact in every flooding year but the respondents of Khas Suriber did not face such impacts every consecutive flooding year. It is seen 48.8% respondents sold crops and other things below the normal price because of flood situation. The selling price is shown below.

Table 7.6: Price Level of Food Grain /Goods Sold during Flood

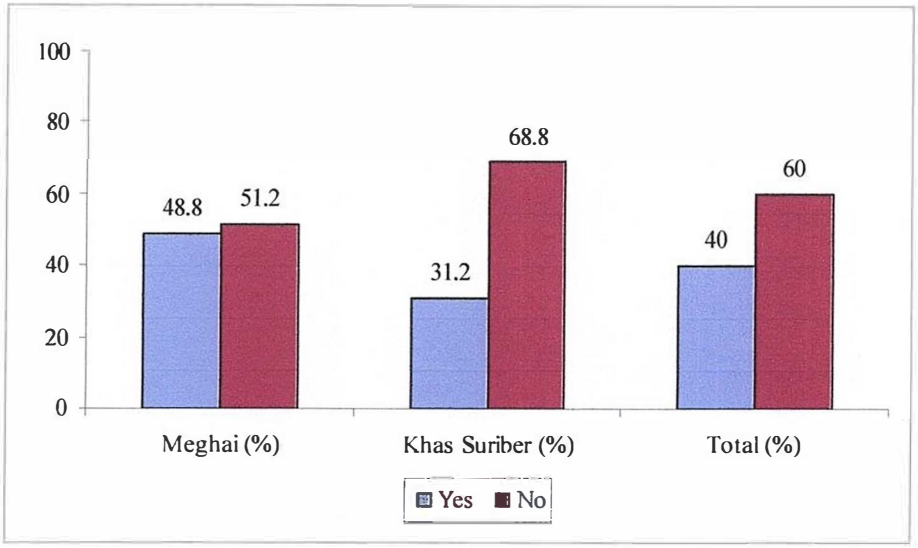
Price	Meghai (%)	Khas Suriber (%)	Total (%)
Normal Price	28.6	68.8	48.8
Less than normal	42.8	12.5	27.6
Very Low price	28.6	18.7	23.6
Total (n=72)	100	100	100

Source: Field Survey, 2009.

7.2.7 Land Erosion and Its Financial Losses

The people of the river-side areas face river erosion almost every year. Many villages have gone into river over the decades. It has been tried to estimate the economic losses occurred last year due to land erosion. Among the respondents who have lands (n=129), 40% respondents' land eroded partly or entirely during last years' flood. The proportion of affected respondents is higher in Meghai than Khas Suriber (Figure 7.4). The figure shows the details below.

Figure 7.4: Land Eroded during Flood
(among the land owners)



The amount of land eroded during flood was also very high. 17.2% respondents in both villages said that more than 15 *bighas* of lands eroded (Table 7.7). Majority of the respondent's (42.1%) land eroded between 5-10 bighas.

Table 7.7: Amount of Land Eroded during Last Year's Flood

Amount of Land (in *Bigha*)	**Meghai (%)**	**Khas Suriber (%)**	**Total (%)**
<5	10.9	35.9	23.4
5-10	50.9	33.3	42.1
10-15	21.8	12.8	17.3
15>	16.4	17.9	17.2
Total (n=129)	100	100	100

Source: Field Survey, 2009.

Table 7.8 depicts the financial loses happened due to river erosion during flood. The price of riverside lands is comparatively low because of threat of river erosion. The financial loss due to land erosion is devastating. It is seen that 44% respondents incurred financial losses more than Tk 40,000/-.

Table 7.8: Financial Losses due to Land Erosion

Total Economic Loss (in Tk)	Meghai (%)	Khas Suriber (%)	Total (%)
<20,000	35	16	25
20,000-30,000	37	5	21
30,000-40,000	4	16	10
40,000>	25	63	44
Total (n=129)	100	100	100

Source: Field Survey, 2009.

Table 7.9 shows financial losses by farmer category. It was seen that in both villages small farmers, medium farmers and large farmers faced financial losses most due to land erosion. The landless did not face erosion because they do not have land and the small farmers did not face erosion in that year. The table shows the details below.

Table 7.9: Financial Losses due to Land Erosion
(by Respondent)

Amount Category (Tk)	Small Farmers (%)	Medium Farmers (%)	Large Farmers (%)	Total (%)
<20,000	-	12	13	25
20,000-30,000	-	9	12	21
30,000-40,000	2.5	8	9.5	10
40,000>	-	10	34	44

Source: Field Survey, 2009. (n=129)

7.3 Impact on Homestead Structure and Assets

7.3.1 Homestead Structure Damage

Flood made severe damage to the homestead structure and household assets. As the homestead plinth was very low and made mainly with mud, it was eroded and damaged by flood easily. It was found that 95% respondents faced house damages on different scale. It has been tried to explore that how much money the respondents spend for repairing homestead structure after flood. It was seen that about 74%

respondents' repairing cost rose to Tk. 10,000/- in the last year flooding. It has also been seen that in Meghai all respondents repair homestead occasionally, it means not every flooding year. In Khas Suriber 4% respondents repaired their assets every year and 96% respondents repaired their homestead occasionally or not every year. In both villages, 2% respondents repaired homestead every year and 98% respondents repaired occasionally i.e. not consecutive flooding year but in major flooding years. The repairing cost was mainly for repairing homestead plinth, lower part of the homestead structure. In both villages, 43.9% respondents spent Tk. 1,000-5,000, 30.5% spent Tk. 5,000-10,000 during last year's flood. The average repairing cost was BDT 8,000/-. The table shows the repair cost of the respondents below.

Table 7.10: Expense to Repair Homestead (Structure) After Flood

Repair Cost	Meghai (%)	Khas Suriber (%)	Total (%)
<5,000	21.5	66.4	43.9
5,000-10,000	50.6	10.4	30.5
10,000-15,000	11.3	10	5.7
15,000-20,000	13.5	2.4	7.9
20,000>	3.1	0.8	2
Not Damaged	-	10	5
Total (n=250)	100	100	100

Source: Field Survey, 2009.

7.3.2 Household Assets Damage

Flood has damaging impact on household assets like furniture, machinery. A huge number of household assets were damaged by flood in every flooding year. It was found that the assets damage was high in the study area. About 91% respondents in both villages faced assets damage entirely or partly. The table below shows the proportion of households faced assets damages during last year's flood.

Table 7.11: Assets Damage during Flood

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Yes	88	95.2	91.6
No	12	4.8	8.4
Total (n=250)	100	100	100

Source: Field Survey, 2009.

The respondents faced another problem with the damaged household resources after flood. They had to repair the goods. In both villages 59.4% respondents repaired the goods. Some respondents did not repair the goods. Having insufficient money was the main cause of not repairing damaged goods. The repairing cost of the assets was also on varied amounts (Table 7.12). The table below shows the details.

Table 7.12: Cost of Repairing Goods or Assets

Response	Meghai (%)	Khas Suriber (%)	Total (%)
<2,000	61.4	56.7	59.1
2,000-4,000	7.1	8.1	7.6
4,000-6,000	24.8	28.4	26.6
6,000-8,000	7.1	6.8	6.9
Total (n=149)	100	100	100

Source: Field Survey, 2009.

7.3.3 Impact on Livestock

The people faced problems with their domestic animals during flood and the livestock suffer a lot during flood. They got less food, infected with diseases and also died of disease or drown in flood water. It has been seen that only 15% respondents have livestock in their houses. In the study areas the impact of livestock like cows, goats found remarkably less in last year's flood. The cause of livestock death and disease found almost none. In both villages 3.2% respondents said their domestic animals died during flood. The cost was about Tk. 10,000/-. The table shows the details below.

Table 7.13: Death of Domestic Animals

Response/Cause	Meghai (%)	Khas Suriber (%)	Total (%)
Yes, for disease	2	1.4	1.6
No/ Not infected	98	98.6	98.4
Total (n=250)	100	100	100

Source: Field Survey, 2009.

7.4 Social Impact

Table 7.14 represents that a large proportion of people have been displaced within villages during flood. 72% respondents in both villages displaced during food. On the other hand, 28.5% respondents in both villages said that their social status has changed due to both flood and river erosion they have faced in their lives. Crime incidents happened during flood. Only 4.5% in both villages were victimized by looting. However, discontinuation of education of children has been seen. 4.5% respondents said that their children had been discontinued from education due to migration. 75% respondents in both villages said that during last year's flood their children could not go to school because school was closed for a few weeks due to flood. The table shows the details.

Table 7.14: Respondents' Social Impact in Flood Disaster
(by Villages)

Social Impacts	Meghai (%)	Khas Suriber (%)	Total (%)
Displacement within village during flood	68	76	72
Status deteriorated due to flood and river erosion	32	25	28.5
Crime during flood	4	6	5
Dropped Out of school due to river erosion	4	5	4.5
Education Discontinuation of children during flood	78	72	75

Source: Field Survey, 2009, n=250.

The social impacts vary by respondents. Table 7.15 below represents the respondents' social and other impacts. It is seen that landless and small farmers have been socially victimized most. About 92% landless respondents displaced within village during flood. A large number of respondents said that their social status deteriorated due to flood and erosion. Discontinuation of education and drop out of schools were also seen. The table shows the details below.

Table 7.15: Respondents' Social Impact in Flood Disaster

Social Impacts	Landless (%)	Small Farmer (%)	Medium Farmer (%)	Large Farmer (%)
Displacement within village during flood	92	84	72	68
Status deteriorated due to flood and river erosion	12	62	25	-
Crime during flood	4	6	5	-
Dropped Out of school due to river erosion	22	-	-	-
Education Discontinuation of children during flood	35	45	55	30

Source: Field Survey, 2009. n=250.

7.4.1 Impact on Vulnerable Group

As vulnerable group women and children faced flood impact more than men. Women faced several problem during flood. These were less food intake, cooking, toilet, privacy and diseases. 32% respondents said that their women members ate less food than the men during flood. Moreover, 13% respondents in Meghai and 40% respondents in Khas Suriber said that their women members were ill due to flood induced diseases.

Table 7.16: Impacts on Women during Flood

Types of Problems	Meghai (%)	Khas Suriber (%)	Total (%)
Less Food Intake	28	36	32
Cooking	68	77	72.5
Toilet	75	84	79.5
Privacy	12	22	17
Disease or Illness	13	40	26.5

Source: Field Survey, 2009. (n=250)

Flood has severe impact on the children also like less food intake, diseases, education and insecurity. 39% respondents said that their children faced problem with lees food intake. 82% respondents talked about insecurity with their children. About 26.5% respondents said that their children became ill during flood and 62% respondents said that their children faced problem with education.

Table 7.17: Impacts on Children during Flood

Type of Problems	Meghai (%)	Khas Suriber (%)	Total (%)
Food	38	40	39
Insecurity	85	79	82
Disease or Illness	25	28	26.5
Loss of Education	58	66	62

Source: Field Survey, 2009. (n=250)

7.5 Impact on Health and Nutrition

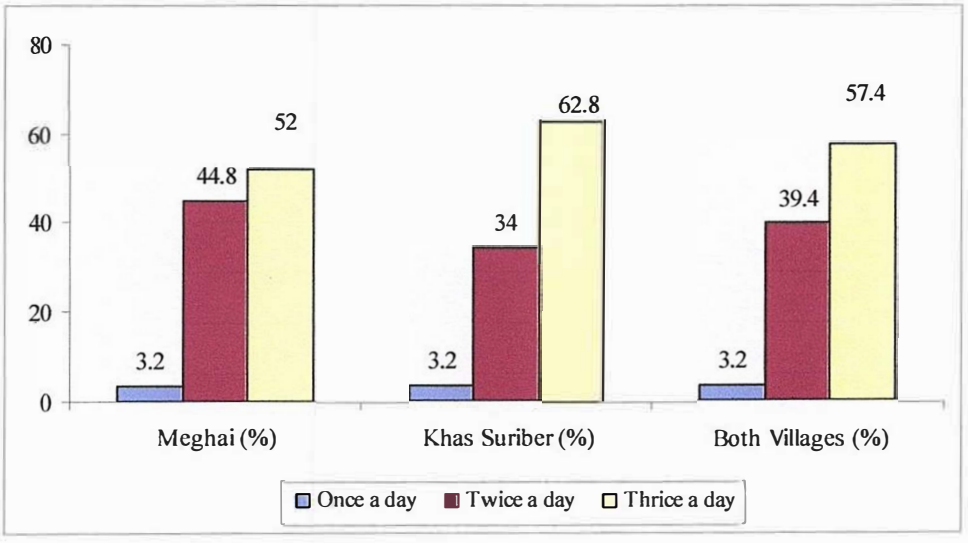
7.5.1 Food Consumption

Flood has devastating impact on people's food intake or consumption. It was seen that people eat less and unusual foods, reduced number of meals and frequency of cooking a day. The respondents borrowed food and money to meet their daily food requirements. Cooking three times a day was a challenging task for them during flood. It has been seen that 28% respondents did not eat three times meals a day. In

both villages 81.6% respondents depended on less expensive or unusual food during flood. Among the respondents majority (78%) depended on less expensive or unusual food irrespective of their income category. Such dependency was for more than a month. On the other hand, in both villages 86% respondents reduced the number of curry and 72.4% respondents reduced the amount of food they took daily. In both villages 13.6% respondents borrowed food during flood, 4% respondents sold food grain to buy another food. Among the respondents in both villages 56.8% respondents had food crisis during flood. Such food crisis was seen after receding flood water. On the other hand, in both villages 20% respondents borrowed money to buy food.

Figure 7.5 depicts the proportion of respondents ate meals a day during flood. About 39% respondents ate twice meals a day. They reduced the number meal a day because of reduction of income, having insufficient food and lack of dry places for cooking. In both villages 3.2% respondents ate meal once a day and 57.4% respondents ate meal thrice a day during flood.

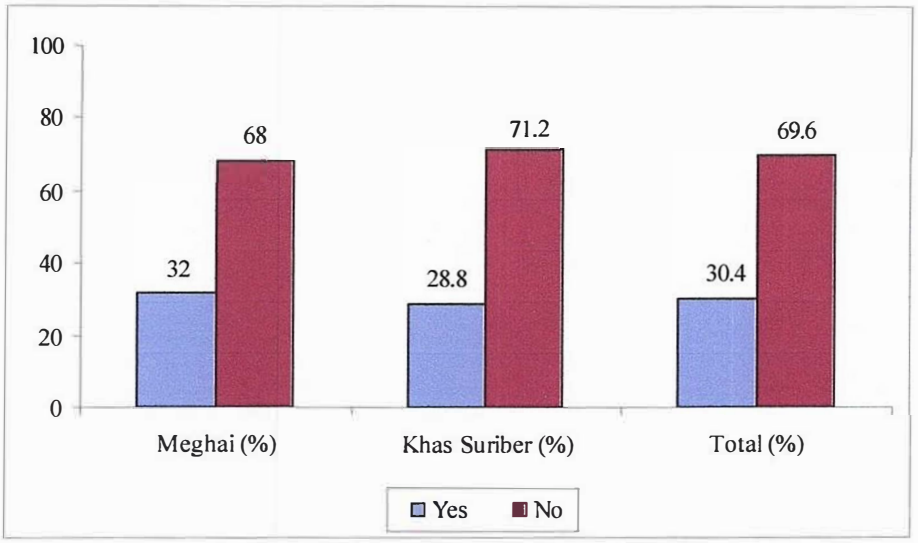
Figure 7.5: Number of Meals Eaten a Day



7.5.2 Threat to Life and Health

Flood has huge impact on people's lives especially threat to life, disease and treatment cost and other health complexities during flood. Women, children and elderly people faced such health complexity to a great extent. It was seen that 30.4% respondents became sick or infected with diseases due to flood in both villages (Figure 7.6).

Figure 7.6: Illness during Flood



The table 7.18 depicts the persons got infected with diseases during flood. It was seen that Children and women affected most due to flood induced diseases. 61% respondents' said that their children became sick and 27.5% respondents said that their wife became sick due to flood. The table shows the details below.

Table 7.18: Persons' Illness due to Flood Induced Diseases

Diseases	Meghai (%)	Khas Suriber (%)	Total (%)
Myself	5	11	8
Wife	13	42	27.5
Son / Daughter	82	40	61
Father/Mother	-	7	4
Total (n=76)	100	100	100

Source: Field Survey, 2009.

It was seen in the study areas that about 76.5% respondents spent Tk. 2,000/- and less for the treatment of flood induced diseases (Table 7.19). Such suffering from diseases and expense for treatment reduced their economic strength, made them debtors and also made them physically weak. It has been found that the respondents suffered from fiver, dysentery, diarrhoea during flood days. In the study areas the cases of death during flood has been found. 1.6% respondents said family members died due to sever illness during flood. The buried the diseased in flood free grave yard in other area.

Table 7.19: Expense for Treatment during Flood
(Flood induced diseases)

Expense of Treatment	Meghai (%)	Khas Suriber (%)	Total (%)
< 1000	37.5	41.7	39.6
1000-2000	35	38.9	36.9
2000-3000	12.5	16.7	14.6
3000>	15	2.7	8.8
Total (n=76)	100	100	100

Source: Field Survey, 2009.

The Table 7.20 depicts the problem faced by the respondents in getting medicine and treatment during flood. It was seen from the above table that in both villages, 20.5% respondents faced problem for having no money, 4.5% respondents faced problem for having no medicine in the dispensary, 2.5% respondents faced communication problem to get medicine and 72.5% respondents did not face any problem in getting medicine during flood.

Table 7.20: Problem Faced by the Respondents in Getting Medicine during Flood

Problems in Getting Medicine or Treatment	Meghai (%)	Khas Suriber (%)	Total (%)
Want of Money	27	14	20.5
No Medicine	3	6	4.5
Communication	3	2	2.5
Did not Face any Problem	67	78	72.5
Total (n=76)	100	100	100

Source: Field Survey, 2009.

7.5.3 Drinking Water Crisis

Most of the respondents faced drinking water crisis in both villages. In both villages 77.5% respondents faced drinking water crisis during flood (Table 7.21). They said that in spite of having community tub-well they faced water crisis. The tube-well water was contaminated with flood water.

Table 7.21: Crisis of Drinking Water during Flood

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Yes	70	80	77.5
No	15	10	22.5
Total (n=250)	100	100	100

Source: Field Survey, 2009.

7.6 Conclusion

The objective of this chapter is to assess the flood impact. The chapter showed that flood had severe impact on the study people. The impact of flood touched every aspect of life. It affected respondents' income, savings, agro-production, food consumption, health and nutrition, household goods and the domestic animals. It made people displaced, debtor, and even homeless and landless. The study finds that income, food consumption, homestead structure, crops, household assets and lands are the prime areas of flood impact. It also discontinued and reduced the income and made the respondents borrower. Impact on food consumption was also very high. Some of them remained unfed, some borrowed food, some reduced food intake to pass the disaster days. A large number of respondents' land eroded and crops damaged due to flood. Most of the respondents displaced during flood. However, from the perspective of social and economic impact, they have lost their economic strength. The landless poor and small farmers have major impact on income and food while the middle and large farmers incurred financial losses most due to land erosion and crops damage during flood. In the study areas it is seen that all respondents especially the landless and small farmers have been affected by flood badly. Flood affects all households irrespective of economic class in varied forms of impact or loss.

CHAPTER EIGHT

COPING STRATEGIES OF THE FLOOD AFFECTED PEOPLE IN THE STUDY AREA

8.1 Introduction

The main objective of this chapter is to identify peoples' coping strategies and to gain insight about how people cope with flood disaster and come back to normal life. So, this chapter analyzed the coping strategies adopted by the respondents in different phases of flood disaster. Coping strategies of the people are discussed in view of economic, social, health and other related aspects. Moreover, the determinants which affect people's adoption of different coping strategies are also discussed in this chapter.

Section 8.2 of this chapter describes the coping strategies the respondents have used to overcome economic insecurity. The section has six sub-sections. Section 8.3 deals with the strategies to cope with food insecurity or crisis. The section has nine sub-sections. Section 8.4 describes the coping strategies to secure household assets. The section has three sub-sections. Coping strategies for life and health safety has been describes in the section 8.5. The section has two sub-sections. Section 8.6 describes the strategy to grow crops. Coping strategy for livestock safety has been described in section 8.7. Section 8.8 depicts coping with the disrupted communication and transportation system and section 8.9 shows the summary of all the coping strategies adopted by the respondents in different phases of flood disaster. The role of stakeholders in coping strategies has been presented in section 8.10. Section 8.11 describes the factors that influence people to adopt different coping strategies. Section 8.12 describes vulnerability and coping strategy and section 8.13 shows the impact of coping strategy adopted. Section 8.14 concludes the chapter.

8.2 Coping with Economic Insecurity

8.2.1 Occupation and Income during Flood

The people of flood-prone study area have less income. They earn less and virtually save less or have almost no savings. Flood disaster discontinues the continuation of the earnings and depletes savings. The flood days become hard for the day labourers. They became almost or completely penniless in those days. They depended either on their savings or they had to change the job. They became fishermen from day labourers. There was lack of alternative job except catching and selling fish, becoming boatman for the majority of the respondents. Moreover, a great number of respondents borrowed money and took loan to tackle the income insecurity during flood.

In both villages, 13% respondents changed job usually from day labourer to catching fish or fish seller, and boatman. 94% respondents used their savings, 47% took loan, 20% borrowed money from relatives and neighbour, and 7% respondents engaged their family members in economic activities during flood (Table 8.1).

Table 8.1: Major Strategies to Cope with Income Insecurity during Flood

Strategies	Meghai (%)	Khas Suriber (%)	Total (%)
Change Job or Adopt new Jobs	16	10	13
Use of Savings (who have savings)	92	96	94
Take Loans	52	43	47
Borrow Money	30	28	29
Family Members Engaged for Earnings	6	8	7

Source: Field Survey, 2009, (n=250).

Keeping the main source of income intact was a challenging task among the respondents. The source of earnings was reduced. Most of the respondents were jobless and some of them changed the job during flood. In both villages 75%

respondents remained out of work where 13% respondents changed their jobs and 12% respondents did their regular jobs during flood days (Table 8.2).

Table 8.2: Source of Income during Flood

Source of Income	Meghai (%)	Khas Suriber (%)	Total (%)
Did the Same Job	14	10	12
Changed Job	16	10	13
Jobless	70	80	75
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.2.2 Using of Savings

Using saving is another coping strategy the respondents used to cope with flood. Among the respondents 20% respondents have savings (Figure 5.4). Those who have savings of them 94% respondents spent their savings due to flood in both villages. For Meghai, 92% respondents spent their savings for flood and in Khas Suriber 96% respondents spent their savings for flood to meet the daily expense (Table 8.3).

Table 8.3: Using Savings during Flood or Savings Spent for Flood

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Yes	92	96	94
No	8	4	6
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.2.3 Engaging Family Members for Earnings

As the regular source of earnings is stopped, a proportion of respondents engage their family member to earn like catching and selling fish, boatman etc. Among the respondents in booth villages 7% respondents engaged their family members for earnings. For Meghai, 6% respondents in village Meghai engaged their sons for extra income during flood and in Khas Suriber it was 8% (Table 8.4). In both villages catching and selling fish, boat plying were the main source of alternative income during flood.

Table 8.4: New Members Employed for Job during Flood/Extra Income

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Yes	6	8	7
No	94	92	93
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.2.4 Borrowing Goods and Its Source

The table 8.5 depicts the number of respondents used borrowing strategy during flood. About 26% respondents used this strategy for borrowing paddy, rice, jute, fuel, bamboo etc. Among the respondents landless (16%), small farmers (10%) used the strategy most. The medium and large farmers did not use the strategy.

Table 8.5: Goods/things Borrowing during Flood

Respondents Category	Total (%)	
	Yes	No
Landless	16	32.4
Small Farmers	10	12.6
Medium Farmers	-	14
Large Farmers	-	15
Total	26	74
Grand Total (n=250)	100	

Source: Field Survey, 2009.

Amid the borrowing things, the respondents borrowed money and food most. In both villages 61% respondents borrowed money and food. Paddy, rice, jute and fuel also borrowed to cope with the flood (Table 8.6).

Table 8.6: Types of Goods/things Borrowing during Flood
(among the borrowers)

Goods	Meghai (%)	Khas Suriber (%)	Total (%)
Food (Paddy/ Rice)	62	60	61
Jute	6	3	5
Fuel	8	6	7
Others (Bamboo etc)	24	31	28
Total (n=65)	100	100	100

Source: Field Survey, 2009.

Relatives were the prime source of borrowing during the crisis period. In both villages most of respondents (60%) borrowed things from their relatives, 12% from their neighbours. A large number of respondents (28%) were dependent on NGOs for borrowing money or getting loan (Table 8.7).

Table 8.7: Source of Borrowing Goods during Flood

Goods	Meghai (%)	Khas Suriber (%)	Total (%)
Relatives	61	58	60
Neighbour	11	12	12
NGO	28	30	28
Total (n=65)	100	100	100

Source: Field Survey, 2009.

8.2.5 Borrowing Money and Its Source

Among the respondents, 53% respondents borrowed money for flood and of them landless and small farmers were most in number. It was seen that landless (38%) and small farmers (15%) were the main money borrowers (Table 8.8).

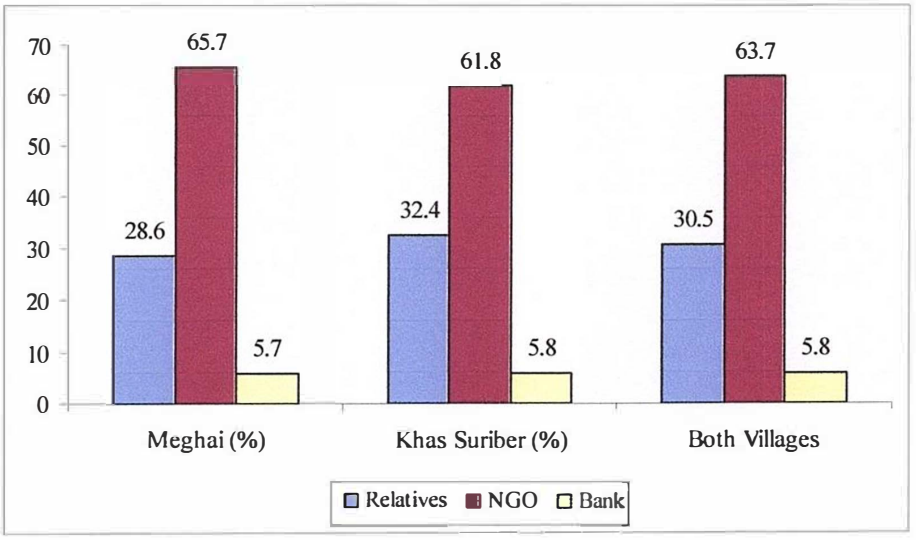
Table 8.8: Taking Loan During Flood

Respondents Category	Total (%)	
	Yes	No
Landless	38	10.4
Small Farmers	15	7.6
Medium Farmers	-	14
Large Farmers	-	15
Total	53	47
Grand Total (n=250)	100	

Source: Field Survey, 2009.

The figure 8.1 depicts the source of borrowing money among the money borrowers. NGO was the main source of borrowing. 63.7% respondents borrowed money from NGO, 30.5% borrowed from relatives and 5.8% from bank (Figure 8.1).

Figure 8.1: Source of Borrowing Money during Flood



8.2.6 Strategies to Resume Earnings after Flood

The table 8.9 illustrates the earning strategies after flood disaster. Most (30%) of the respondents depended on new jobs and business. On the other hand, 47% respondents went for cultivating short-terms crops or vegetable gardening. For villages, 42% respondents in Meghai started cultivation with short-term crops, 32% respondents started searching for new jobs and 24% respondents began business by taking loan. In Khas Suriber, 52% respondents started cultivation with short-term crops, 28% started searching for new jobs and 20% respondents began business by taking loan (Table 8.9).

Table 8.9: Strategies to Resume Earnings after Flood
(by Village)

Strategies	Meghai (%)	Khas Suriber (%)	Total (%)
Cultivate Short-term Crops (vegetables gardening mainly)	42	52	47
Search for new job	32	28	30
Begin business by taking loan	24	20	23
Total (n=250)	100	100	100

Source: Field Survey, 2009

The table 8.10 below depicts the income generating strategies among the respondents or farmers. It had been seen that landless and small farmers went for searching new jobs and began business by taking loan as they had no alternatives. On the other hand, small, medium and large farmers went for cultivating short-term crops to get the money and food early after the flood disaster.

Table 8.10: Strategies to Resume Income Generating Activities
(by Respondents)

Strategies	Landless (%)	Small Farmers (%)	Medium Farmers (%)	Large Farmers (%)
Cultivate Short-term Crops	-	10	35	53
Search for new job	65	35	-	-
Begin business by taking loan	45	55	-	-

Source: Field Survey, 2009

8.3 Coping with Food Crisis or Food Insecurity

Flood is a serious and direct threat to life. Facing crisis with food is common. The affected people faced problem to maintain daily food requirements for the family members. Unavailability of sufficient food is a common scenario in normal days to the landless respondents. Flood creates more insecurity in food availability. Most of the respondents faced insufficient food in their households especially during flood. Securing the food security becomes a crucial challenge for the flood affected people. This is aggravated more if the entire homestead is inundated by water and they are to move elsewhere. Again they face fuel crisis to cook. They are to depend on dry food or borrowing cooked-food in many times. Cooking three times is not possible always. Some households become able to arrange for cooking for once or at best twice a day.

8.3.1 Coping Strategies to Overcome Food Crisis

The respondents adopted ten types of strategies to meet their requirements during flood. Of which five strategies used by a large number of respondents in both villages (Table 8.11). About 70% respondents reduced the amount of food or ate less and 45% respondents reduced the number of meal intake to pass the disaster days. However, a great number of respondents (78%) changed the number of curry items while cooking

and depended on less expensive foods. Unusual foods remained their prime foods during flood. They ate bread, biscuit, hotchpotch, maize, boiled potato and fried rice. The dependency on less expensive food is high during flood days. 80% of the respondents said that they had to depend on less expensive food. On the other hand, borrowing tendency was also seen. They borrowed money and cooking materials to buy and cook foods. Storing food for flood was hardly seen. Only 14% respondents stocked food for flood.

Table 8.11: Coping Strategies Employed to Overcome the Food Crisis (By Villages)

Coping Strategies	Meghai (%)	Khas Suriber (%)	Total (%)
Money borrowing to Buy Food	16	24	20
Borrowing Foods	11	16	14
Borrowing Cooking Items	24	28	26
Reduce the amount of Food Eaten per meal/ Less Food Intake	66	73	70
Reduce the Frequency of Food Intake (number of meals a day)	48	37	45
Change in Number of Curry Items	67	88	78
Selling crops to buy other foods or get money	7	4	6
Trend in Stock food for flood	14	13	14
Dependency on Less Expensive Food	65	94	80
Reduce Frequency of Cooking	92	94	93

Source: Field Survey, 2009.

Coping with the food crisis is a challenge for almost all households. The well-off households or farmers faced difficulty a little bit especially during flood but the landless and small farmers faced such situation a lot in both situations, during and after flood. The cause of difficulty among the medium and large farmers are lack of dry place for cooking while the causes of the landless and small farmers are lack of cooking arrangements, depletion of stocked-food, fuel etc. The quantity of stocked-food depletes gradually in spite reducing food intake. Those who do no have much

money they go for starving or hardship during flood. They eat less or remain unfed for once a day.

The table 8.12 depicts the coping strategies employed to overcome the food crisis. It was seen from the above table that landless and small farmers were the prime victims of food crisis during flood. It was seen that 65% respondents who were landless used borrowing strategy for coping with food crisis. The small farmers borrowed money to buy foods and 35% respondents borrowed money to buy food. The medium and large farmers did not take such strategy. On the other hand, 58% landless and 42% small farmers borrowed foods to meet their food needs. Borrowing cooking items used by landless (47%), small farmers (38%) and medium farmers (15%). The well-off farmers did not take such strategy. The strategy 'reducing the amount of food eaten' used by landless (48%), small farmers (40%) and medium farmers (12%). The rich farmers did not use such strategy. Reducing the frequency of food intake or number of meals a day was used mainly by the landless (56%) and small farmers (44%). 62% landless respondents reduced number of curry, among the small farmers the rate was 23%, among the medium farmers it was 15%. Well-off farmers did not take such strategy. Selling crop to buy other foods was other strategy to meet food requirements. Among the respondents 23% small farmers, 42% medium farmers and 35% large farmers used this strategy. On the other hand, medium farmers (42%) and large farmers (58%) stocked food before flood to avert food crisis during flood. 78% landless farmers and 22% small farmers reduced frequency of cooking. They did not cook three times a day (Table 8.12).

Table 8.12: Coping Strategies to Overcome the Food Crisis
(By Respondent Category)

Coping Strategies	% Respondents			
	Landless	Small Farmers	Medium Farmers	Large farmers
Borrowing Money to Buy Food	65	35	-	-
Borrowing Foods	58	42	-	-
Borrowing Cooking Items	47	38	15	-
Reduce the amount of Food Eaten per meal/ Less Food Intake	48	40	12	-
Reduce the Frequency of Food Intake (number of meals a day)	56	44	-	-
Reduce the Number of Curry	62	23	15	-
Selling crops to buy other foods or money or fear of damage	-	23	42	35
Trend in Stock food for flood	-	-	42	58
Dependency on Less Expensive Food	60	35	5	-
Reduce Frequency of Cooking	78	22	-	-

Source: Field Survey, 2009.

8.3.2 Dependency on Less Expensive or Less Preferred Food

The table 8.13 illustrates the dependency of less expensive foods among the farmers or respondents. It was vivid from the table that in both villages 79% respondents depended on less expensive or unusual food during flood. Among the respondents landless (48.4%) and small farmers (22.6%) depended on less expensive or unusual food. Only 8% medium farmers also depended on less expensive foods.

Table 8.13: Dependency on Less Expensive/Unusual Food During Flood Disaster

Respondents Category	Total (%)	
	Yes	No
Landless	48.4	-
Small Farmers	22.6	-
Medium Farmers	8	6
Large Farmers	-	15
Total	79	21
Grand Total (n=250)	100	

Source: Field Survey, 2009.

The duration of dependency on less preferred foods has been seen in varied period. Most of the respondents depended on less preferred food for more than two weeks (Table 8.14). In both villages, 1.6% and 15.4% respondents depended on unusual or less preferred food for less than 1 weak and 2 weeks respectively, 12.6% respondents depended on unusual or less preferred food for 3 weeks, 23.9% respondents depended on unusual or less preferred food for 4 weeks, 12.9% respondents depended on unusual or less preferred food for 5 weeks, 3.7% respondents depended on unusual or less preferred food for 6 weeks, 13.5% respondents depended on unusual or less preferred food for 7 weeks, 16.6% respondents depended on less preferred food for 8 weeks (Table 8.14).

Table 8.14: Duration of Dependency on Unusual /Less Preferred Food during Flood

Week(s)	Meghai (%)	Khas Suriber (%)	Total (%)
1	3.2	-	1.6
2	20	10.8	15.4
3	14.4	10.8	12.6
4	24.8	22.9	23.9
5	11.2	14.5	12.9
6	-	7.3	3.7
7	4	22.9	13.5
8	22.4	10.8	16.6
Total (n=198)	100	100	100

Source: Field Survey, 2009.

8.3.3 Reducing the Amount of Meal Intake and Number of Food Items

A large number of respondents reduced the amount of meal intake for flood. In both villages 70% respondents reduced the amount of food (Table 8.15). Among the respondents, landless and small farmers used the coping strategies most (48% and 22% respectively). They said that they reduced the amount of meal because their incomes were stopped and foods were depleting gradually. They tried to pass some more days by eating less during each meal time. The medium and large farmers did not use this strategy as they had sufficient

Table 8.15: Change in Reducing the Amount of Meal Intake

Respondents Category	Total (%)	
	Yes	No
Landless	48	-
Small Farmers	22	2
Medium Farmers	-	14
Large Farmers	-	14
Total	70	30
Grand Total (n=250)	100	

Source: Field Survey, 2009.

As one of the coping mechanisms, many respondents used changing the number of curry during flood. They said that they had eaten meals with a single curry item. Among the respondents, landless (48%), small (23%) and a small portion of medium farmers (5%) used this strategy in both villages. Only 2% large farmers used such strategies (Table 8.16). It was seen that in both villages 78% respondents reduced the number of curry and 22.4% respondents did not reduce the number of curry during flood. Such respondents depended on less expensive food but did not reduce the number of curry in meals.

Table 8.16: Change in Number of Meal Items (Curry) during Flood

Respondents Category	Total (%)	
	Yes	No
Landless	48	-
Small Farmers	23	-
Medium Farmers	5	9
Large Farmers	2	13
Total	78	22
Grand Total (n=250)	100	

Source: Field Survey, 2009.

8.3.4 Reducing Frequency of Cooking

Because of lack of dry place cooking was a challenging task for the respondents. Most of the respondents reduced the frequency of cooking during flood days. Among the respondents in both villages, 91% respondents cooked twice a day. On the other hand, 6% respondents cooked thrice a day and 3% respondents cooked once a day (Table 8.17).

Table 8.17: Reducing Frequency of Cooking

Frequency of Cooking a day	Meghai (%)	Khas Suriber (%)	Total (%)
Once	3	3	3
Twice	89	93	91
Thrice	8	4	6
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.3.5 Borrowing Foods and Source of Borrowing

To meet the daily food requirement, some respondents (14%) used borrowing strategies to pass the disaster days. Among the respondents landless (12%) and small (2%) farmers used the strategy. The medium and large farmers did not adopt the strategy (Table 8.18).

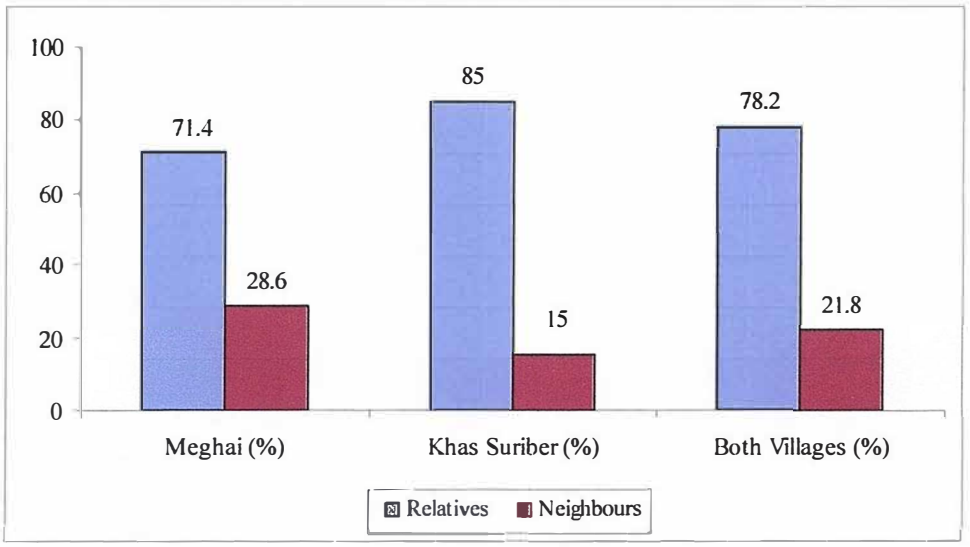
Table 8.18: Tendency in Borrowing Food/Meal during Flood

Respondents Category	Total (%)	
	Yes	No
Landless	12	36
Small Farmers	2	21
Medium Farmers	-	14
Large Farmers	-	15
Total	14	86
Total (n=250)	100	

Source: Field Survey, 2009.

Relatives and neighbours were the prime source of assistance during flood. Majority of the respondents took food assistances from their relatives. About 78% respondents borrowed foods and cooking items from their relatives and 21.8% borrowed from neighbours.

Figure 8.2: Source of Borrowing Foods during Flood



8.3.6 Storing Foods before Flood and Its Duration

Though the people faced flood almost every year most of the respondents were not used to store foods before flood as pre coping strategy. It was seen that in both villages only 13% respondents stocked food for flood. Among the respondents, the landless did not stock food for flood as they did not have sufficient food and money so that they could not store extra foods for flood. On the other hand, a very small number of the respondents used storing foods as pre strategy for flood.

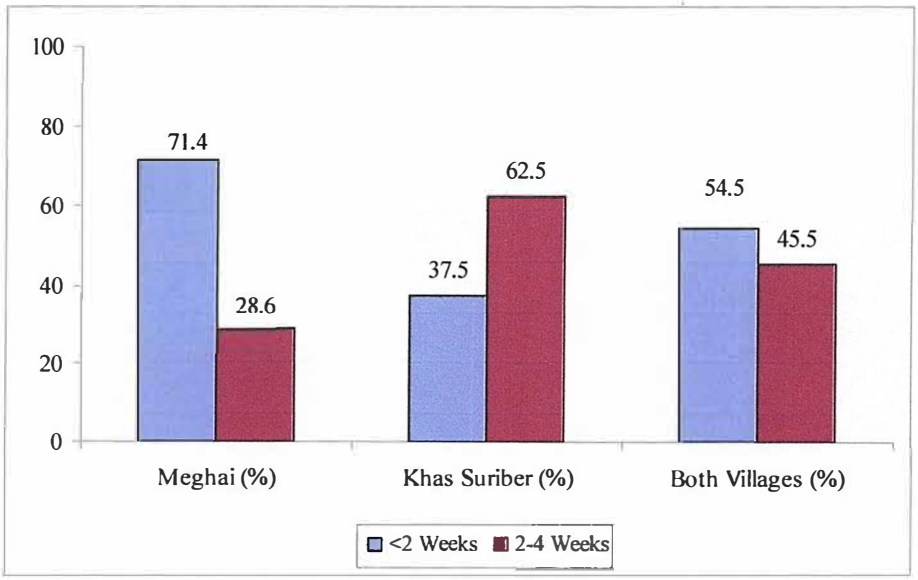
Table 8.19: Store Foods before Flood as Pre-Strategy

Respondents Category	Total (%)	
	Yes	No
Landless	-	48.4
Small Farmers	-	22.6
Medium Farmers	5	9
Large Farmers	8	7
Total	13	87
Grand Total (n=250)	100	

Source: Field Survey, 2009.

The figure 8.3 depicts the duration of food stock among the respondents. It was seen that in Meghai, 71.4% respondents stocked food for one month and 28.6% respondents stocked food for two months ahead of flooding. In Khas Suriber 37.5% respondents stocked food for one month and 62.5% respondents stocked food for two months for flood. In both villages 54.5% respondents stocked food for one month and 45.5% respondents stocked food for two months for flood.

Figure 8.3: Duration of Food Stock among the respondents who stocked Food for Flood



8.3.7 Crops Selling for Fear of Damages

Selling crop was another coping strategy the respondents used to cope with flood. They used the strategy mainly for saving the crops from damages. In both villages

5.6% respondents sold crops for the fear of damage due to flood (Table 8.20). Among the respondents, the medium and large farmers used the strategy.

Table 8.20: Crops Selling during Flood

Respondents' Income Category	Total (%)	
	Yes	No
Landless	-	48.4
Small Farmers	-	2.6
Medium Farmers	4.4	9.6
Large Farmers	1.2	13.8
Total	5.6	94.4
Grand Total (n=250)	100	

Source: Field Survey, 2009.

8.3.8 Borrowing Money to Buy Foods

Borrowing money to buy food was another coping strategies the respondents adopted during flood disaster. In both villages 20% respondents used the strategy. Among the respondents landless (14%) and small farmers (6%) used the strategy (Table 8.21). The medium and large farmers did not use the strategy.

Table 8.21: Borrowing Money to buy Foods during Flood

Respondents' Category	Total (%)	
	Yes	No
Landless	14	34.4
Small Farmers	6	16.6
Medium Farmers	-	14
Large Farmers	-	15
Total	20	80
Grand Total (n=250)	100	

Source: Field Survey, 2009.

8.3.9 Coping with Water Crisis

Source of safe water for drinking and cooking was the foremost challenging task during flood. Though the majority did not have own tube-well they used community tube-well to meet their demand of water. During flood there was a chance to mix or enter flood water into tube-well water. So there was a need of purifying the water for health safety. It was seen that the majority did not take any measure or boil water. Only 1.3% respondents adopted measures to purify water. The table shows the details below.

Table 8.22: Measures Taken to Purify Water

Measures	Meghai (%)	Khas Suriber (%)	Total (%)
Boiled	2	1.6	1.8
Medicine	1	-	0.5
No Measures	97	98.4	97.7
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.4 Coping Strategies for Household Assets Safety

8.4.1 Protecting House

In general, the flood-torn people have limited resources. Yet the resources are very valuable to them in terms of maintaining their daily necessities and livelihoods. Almost every flooding year they loss some household resources and gradually the assets is decreased for a period of time. Sometimes these limited resources become a burden for them to save from the devastating impacts of flood disaster in the coming year. Some respondents take measures, some remain inactive. Protecting house is also a challenging task for the respondents because almost all houses are built with mud. As the house is built with clay they are reluctant to take any measure. It was seen that in both villages 2.8% respondents took measures and 97.2% did not take any measure to protect house before or after flood (Table 8.23).

Table 8.23: Measures Taken to Protect House before Flood
(Plinth and Structure)

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Yes, repair the Plinth	0.8	4.8	2.8
No, do nothing	99.2	95.2	97.2
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.4.2 Protecting Household Goods and Assets

Though the respondents did not take any preventive measure to protect house from flood they took measures to protect household assets like furniture, machineries, and necessary documents. They devised some strategies to protect them from loss or damage. People used safer place and *Macha* (high platform) to protect their household assets. The table 8.24 depicts the measures taken by the respondents to save the households goods and assets during flood. Most of the respondents (66%) sent the household goods or assets to safer place like embankment and bridge. On the other hand, 18.8% respondents kept the good or assets within the house by making a high place with bamboo (*Macha*) and 15.2% respondents did not take any measure. The respondents of village Meghai were comparatively inactive in taking measures than Khas Suriber. The proportion of respondents who did not take any measure was high in the village Khas Suriber.

Table 8.24: Measures Taken to Save Household Goods and Assets at the Advent of Flood

Measures	Meghai (%)	Khas Suriber (%)	Total (%)
Sent Goods or assets in Safer Places (dam)	69.6	62.4	66
Kept Goods or assets in the High places in the house	28.0	9.6	18.8
No Measures Taken	2.4	28.0	15.2
Total (n=250)	100	100	100

Source: Field Survey, 2009.

Time is a crucial factor for saving the household goods or assets. Taking actions or measures before flood is a safe strategy for saving assets from damages. It was seen from the table 8.25 that in Meghai 14.4% respondents moved their household goods before flood and 85.6% respondents moved household goods during flood. In Khas Suriber, 100% respondents moved their household goods during flood. In both villages 7.2% respondents moved household goods before flood and 92.8% respondents moved household goods during flood.

Table 8.25: Time of Moving Household Assets

Time to Shift Goods	Meghai (%)	Khas Suriber (%)	Total (%)
Before Flood	14.4	-	7.2
During Flood	85.6	100	92.8
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.4.3 Strategies to Make Temporary Shelter during Flood

The respondents usually remained inactive until the flood water entered into the house or submerged the homestead. As there was no flood shelter or alternatives they took shelter in roads, dam etc. at the last time. Temporary shelters were made there. They tried to shift the household assets at the last time as well. Some respondents kept the resources with them. It was seen that most of the respondents had to leave the house after entering the flood water. Most of them took shelter on the roads and embankment. They made temporary shelter there. Most (72%) of the respondents made tin-shade small room and some (17.1%) respondents used polythene to make a temporary shelter. Only 2.6% respondents remained under open sky. They did not take any measure to make a temporary shelter (Table 8.26).

Table 8.26: Type of Temporary Shelter Made during Flood

Type of Shelter	Meghai (%)	Khas Suriber (%)	Total (%)
Make Tin-House	64.9	79	72
Under Open Sky	2.5	2.7	2.6
Straw Made shelter	1.6	-	0.8
Using Polythene	16	18	17
Other (*Machan, using bamboo*)	15	-	7.5
Total (n=204)	100	100	100

Source: Field Survey, 2009.

8.5 Coping Strategy for Life and Health Insecurity

8.5.1 Protecting Life

It was seen that 37.5% respondents took shelter in high roads and 42.5% respondents took shelter in embankment after entering flood water in the house. On the other hand, 1.5% respondents took shelter in relatives' house, 9.5% respondents took shelter in rented house, 9.5% respondents did not move rather took shelter in their own house by making *Macha,* high place within house, and 8% respondents sent their children to relatives house.

The people adopted coping strategies in different disaster phases. They usually took during flood disaster measure most. Pre and post disaster measures were hardly seen. The medium and large farmers were seen taking pre and post flood measures like repairing the house, send children to safer places. On the other hand, landless and small farmers were seen taking during flood disaster measures. They employed measures for securing their daily food requirements and income mainly.

Table 8.27: Measures Taken after Entering Flood Water in the House
(At the last stage)

Places Used as Shelter	Meghai (%)	Khas Suriber (%)	Total (%)
Move to High Roads	36	39	37.5
Move to Embankment	40	45	42.5
All Moves to Relatives' House	2	1	1.5
Other (Rented house)	-	2	1
Remain in Own House making *Machan*	12	7	9.5
Sent children to relative's house	10	6	8
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.5.2 Diseases and Treatment

The family members usually children and women are the main victims of flood. During and after flood, spread of diseases like diarrhoea, dysentery becomes a common scenario and poses a direct threat to health and life. It has been seen in Meghai that 32% respondents were found ill during flood. In Khas Suriber 28.8% were found ill. In both villages 30.4% respondents were sick during flood. Among the respondents, most (63.7%) respondents suffered from diarrhea and fever with cough (25.6%). The table below shows the details.

Table 8.28: Types of Diseases during Flood

Diseases	Meghai (%)	Khas Suriber (%)	Total (%)
Diarrhoea	52.5	75.0	63.7
Fever and Cough	40.0	11.1	25.6
Dysentery	2.5	8.3	5.4
Others (Paralysis, tumor etc.)	5.0	-	2.5
Diarrhoea and Fever	-	5.6	2.8
Total (n=76)	100	100	100

Source: Field Survey, 2009.

The table 8.29 depicts the measures taken for treatment during flood. It is seen that most (78.6%) respondents went to local doctors for treatment in both villages. On the other hand, 4.1% respondents went to local clinic, 6.7% respondents went local hospital and 10.7% respondents went to town hospital for treatment during flood.

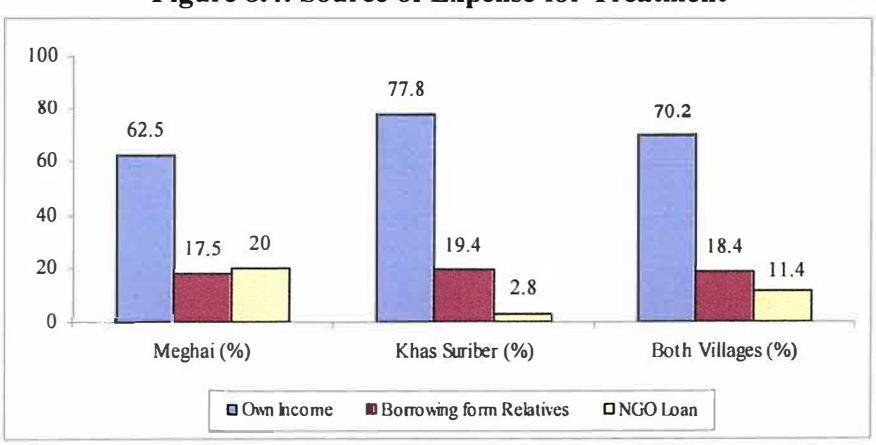
Table 8.29: Measures Taken for Treatment

Measures	Meghai (%)	Khas Suriber (%)	Total (%)
Local Clinic	2.5	5.6	4.1
Local Doctor	85	72.2	78.6
Local Hospital	5	8.3	6.7
Town Hospital	7.5	13.9	10.7
Total (n=76)	100	100	100

Source: Field Survey, 2009.

Most of the earners daily earnings were stopped during flood. In this circumstance it was difficult for them to bear the treatment cost. To meet their treatment cost they used their savings or own income, borrowing and loan taking strategy. It was seen that in both villages 70.2% respondents used savings as on of the main strategies to meet the treatment cost, 18.4% respondents used borrowing strategy and 11.4% respondents used loan taking strategy from the NGOs (Figure 8.4).

Figure 8.4: Source of Expense for Treatment



Among the respondents 30.4% respondents suffered from diseases during flood. Among the sufferers children suffered most. It was seen that 60.7% respondents said

that their children were ill during flood. However, among the sufferers 8.7% respondents were head of the household and 28.5% were their female counterparts or wives (Table 8.30).

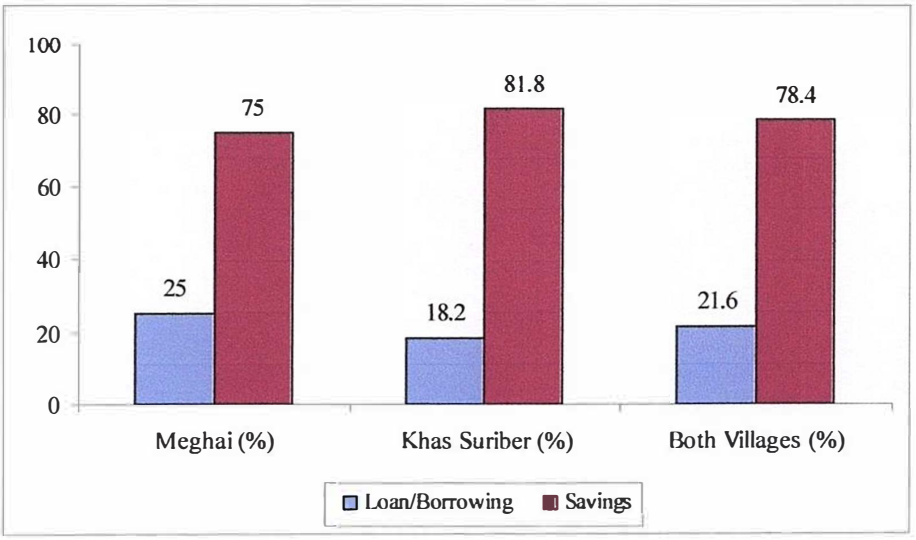
Table 8.30: Persons who suffered from Illness during Flood

Diseases	Meghai (%)	Khas Suriber (%)	Total (%)
Myself (Household Head)	5	12.4	8.7
Wife	12.5	44.5	28.5
Son/Daughter	82.5	38.9	60.7
Father/Mother	-	2.8	1.4
Total (n=76)	100	100	100

Source: Field Survey, 200.9

It was seen that 30.4% respondents were ill during flood. Among them 8.7% respondents were the head of household. They were the main or only earner of the family. During their illness they were dependent on borrowing, loan taking and savings. It was seen that in both villages, 78.4% respondents used their savings and 21.6% respondents used borrowing or loan taking strategy while they were ill during flood (Figure 8.5).

Figure 8.5: Ways of Family Expenses when the Main Earner was ill



After receding the flood water, the main task become cleaning the entire house to keep it clean and hygienic. For doing so most (99.2%) of the respondents cleaned the house normally and only 0.4% used medicine to keep the house clean and hygienic and 0.4% did not use any measure (Table 8.31).

Table 8.31: Measure Taken to Clean the House and Assets after Receding the Flood Water

Measures	Meghai (%)	Khas Suriber (%)	Total (%)
Clean the house Normally	98.4	100	99.2
Clean the house with Medicine	0.8	-	0.4
Do nothing	0.8	-	0.4
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.6 Agriculture Related Coping Strategy

Agriculture is the prime source of livelihood in the study area. It is the backbone of the households of the study area. Though flood comes each year they don't stop cultivating crops. They take chances to grow crops but no measures are taken to protect from flood. They give it up to the nature as they have nothing to do except pre-harvesting. They take chance if flood doesn't occur this year. Sometimes they are succeeded but sometimes they fail to have good harvest or even none due to flood.

As flood is unpredictable the respondents take a risk or chance to grow crops. It was seen that in spite of crops damage 19.7% respondents in both villages cultivated land to grow crops. For villages, 25% respondents in Meghai and 14.4% respondents in Khas Suriber cultivated land during the flood season In both villages 80.3% of the respondents did not go for cultivation. (Table 8.32).

Table 8.32: Cultivation during Flood Period

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Yes	25	14.4	19.7
No	75	85.6	80.3
Total (n=250)	100	100	100

Source: Field Survey, 2009.

The respondents have no options remain to protect crops if flood happens except the two choices. The one is pre-harvest it and do noting with it, keep it in the filed. After the flood the farmers began to prepare the lands. They cultivated short-term crops usually lentil, mustard, vegetables and later on paddy to get early crops so that they can sell them to get money.

8.7 Coping Strategy for Livestock Safety

Livestock is the source of income and food of the respondents. It is seen in both villages that 43.6% households have livestock like hen, duck, goat, cow etc. These resources become burden to them during flood. It is a challenge for them to save the lives of those cattle because everywhere is water. It is also a challenge to feed them as scarcity of livestock food prevails. They remain in dilemma what to do with the cattle. The whole flood period is a serious threat for livestock. The flood affected people cannot maintain their own food let alone the food for the livestock in many cases. Yet the people try their best to feed and to save them. They collect straw, paddy, rice or wheat to feed the cattle. On the other hand, some respondents (15%) soled the cattle due the threat of death and disease. Some respondents (3%) ate the cattle for not falling in loss. However, a large number of respondents kept the cattle with them and some (8%) sent the cattle to flood free safer places (Table 8.33). The death and spread of diseases among the livestock during flood is common. In the study areas it was seen that only 0.7% of the respondents faced death of their livestock. The loss incurred due to the death of cow was Tk 10,000/-.

Table 8.33: Measures Taken to Protect Animals during Flood

Measures	Meghai (%)	Khas Suriber (%)	Total (%)
Sold	20	10	15
Sent to Safer Place	10	5	8
Eaten	-	6	3
Kept with	70	78	74
Total (n=190)	100	100	100

Source: Field Survey, 2009.

8.8 Coping with the Disrupted Communication and Transportation System

In the study area, the entire transport and communication system were disrupted badly. Among the respondents two types of communication were needed to cope with the situation, mainly during flood. The first one is to inform the family members, who reside in city, about their situations during flood and the second one is to move the household resources to safer places. During flood raft was commonly used as it had no cost. However boats were used by many respondents with paying fair but about one-third respondents did not have any sort of transportation during flood. The table 8.34 below depicts the measures were taken by the respondents who had no own means of transportation during flood. It was seen that most (64.7%) respondents used boat for fare, 18% respondents used lending raft, 12.3% respondents used other means of transportation like swimming and 5% respondents did not need any sort of transport.

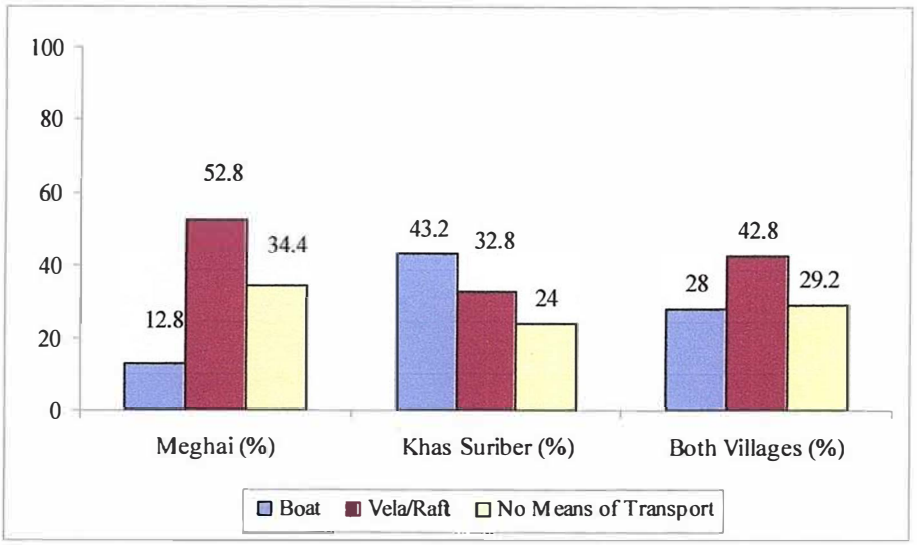
Table 8.34: Measures Taken for Transportation who had no Own Means of Transport

Means of transport	Meghai (%)	Khas Suriber (%)	Total %
Fare Boat	86.1	43.3	64.7
Lending Raft	9.3	26.7	18
Others (swimming)	4.6	20	12.3
Did not Need	-	10	5
Total (n=73)	100	100	100

Source: Field Survey, 2009.

The figure 8.6 depicts the possession of transportation of the respondents. In both villages 28% respondents used boat, 42.8% respondents have rafts and 29.2% respondents did not have any sort of transportation.

Figure 8.6: Transport Ownership during Flood



8.9 Summary of All Coping Strategies

The table 8.35 depicts the coping strategies adopted by the respondents in different phases of disaster. The study reveled that most of the respondents adopted during flood measures. Pre and Post disaster measures were hardly seen. It was also seen that landless and small farmers adopted unsafe strategies and during flood strategies. They tried to cope with income and food insecurity most during flood. The respondents also borrowed or took loan after flood to start business or income generating job. The respondents continued less food intake, borrowing money to buy food, cooking materials after flood. Landless, small farmers and medium farmers used such strategies after flood most. Almost all respondents faced house damages but medium and large farmers repaired the house after flood as post strategy. Pre-measures were seen for sending children to safer place and keeping household goods in upper place in the house. The table shows the details of the coping strategies below.

Table 8.35: Summary of Coping Strategies Adopted by the Respondents in Different Phases of Flood Disaster

Category	Household Coping Strategies		
	Coping Strategies	**Disaster Phase**	**Respondents Types**
Income	Use of Savings	During Flood	Small, Medium & large Farmers
	Engage family members for Earnings	During Flood	Landless & Small Farmers
	Money Borrowing	During & After Flood	Landless & Small Farmers
	Take Loan	During & After Flood	Landless & Small Farmers
	Change Job	During & After Flood	Landless & Small Farmers
	Go for Short term crops or gardening	After Flood	Medium & Large Farmers
Food	Less food intake or Reduce the amount of food eaten per meal	During & After Flood	Landless, Small
	Reducing frequency of meal, 1/2 times a day	During Flood	Landless, Small Farmers
	Reduce the number of curry items	During Flood & After Flood	Landless, Small & Medium Farmers
	Less Expensive or Unusual Food, Eat Dry Food	During Flood	Landless, Small Farmers
	Remain Unfed (eat once a day)	During Flood	Landless
	Borrowing Food	During & After Flood	Landless & Small Farmers
	Crops Selling for Fear of Spoiling	During Flood	Medium & Large Farmers
	Money borrowing to Buy Food	During-Post Flood	Landless, Small Farmers
	Trend in Food Stock for Flood	Before Flood	Large Farmers
	Borrowed Cooking Items	During & After Flood	Landless, Small Farmers
	Crops selling to buy other foods	During Flood	Small & Medium Farmers
	Measure Taken to Purify Water	During Flood	Medium & Large Farmers
Domestic Animals	Sold	During Flood	Landless & Small Farmers
	Kept with	During Flood	Small Farmers
	Sent to Safer Place	Pre & During Disaster	Small & Medium Farmers
	Eaten	During Flood	Landless & Small Farmers
Household Goods/Asset	Repairing House plinth	Before & After Flood	Medium & Large Farmers
	Household Goods Moved /sent to safer place	During Flood	Small, Medium & Large Farmers

	Keep Household goods in Upper Place within household	Pre-During Flood	Medium & Large Farmers
Health/ Sanitation	Treatment to Local Doctor	During Flood	Landless & Small Farmers
	Water purifying	During Flood	Medium & Large Farmers
Taking Shelter or Life Saving Strategies	Move to relatives' house	During Flood	Medium & Large Farmers
	Sent children to relative's house	During Flood	Medium & Large Farmers
	Take shelter on embankment, Roads, Bridges	During Flood	All Types of Households
	Take shelter in rented house	During Flood	Medium Farmers
	Remain in own house making *Machan*	During Flood	Small & Medium Farmers
	Making Tin made temporary house on the Embankment, Roads	During Flood	Large& Medium Farmers
	Making Straw-made shelter, Polythene, Other (*Machan*) shelter	During Flood	Landless & Small Farmers

8.10 Role of Stakeholders in Coping Strategy

Receiving external help from local government bodies, MP, leaders, elite persons was a great alternative coping strategy during flood. It was seen that most of the respondents received during flood assistances. Pre and Post disaster assistances were absent. Though the amount of assistance was little it helped a lot for a few days. According the respondents those assistances were untimely and insignificant to pass disaster crisis well. About 82.4% respondents said that they were needed external assistance. The respondents expected financial assistances during and after flood situation most.

Table 8.36: Need of External Help during Flood

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Yes	88.8	76	82.4
No	11.2	24	17.6
Total (n=250)	100	100	100

Source: Field Survey, 2009.

The table 8.37 below depicts the type of assistance received by the respondents. It was seen that most (65%) of the respondents received food assistance. 13% respondents received financial assistance, 11% respondents received house building materials, 7.5% respondents received medicine assistance and 3.5% respondents received evacuation help during flood.

Table 8.37: Types of Assistance Received by the Respondents from Out Side during Flood

Type of Assistance	Meghai (%)	Khas Suriber (%)	Total (%)
Dry Food	58	72	65
Money	20	6	13
House building Materials	7	15	11
Medicine	10	5	7.5
Evacuation or help in Moving Goods	5	2	3.5
Total (n=155)	100	100	100

Source: Field Survey, 2009.

Most of the respondents received external assistances during flood. In both villages 88.4% respondents received flood during flood and 8.2% respondents received assistance before flood. Only 3.4% respondents received assistance during post disaster situation.

Table 8.38: Time of Getting/Receiving External Assistance

Period	Meghai (%)	Khas Suriber (%)	Total (%)
Pre-Flood	16.3	-	8.2
During-Flood	76.8	100	88.4
Post-Flood	6.9	-	3.4
Total (n=155)	100	100	100

Source: Field Survey, 2009.

Relatives play an important role in the crisis period. It is seen from the table 8.39 that in both villages 57.5% respondents said that relatives helped most during flood crisis. 22.5% respondents said that neighbor helped them most during flood and 20% said that NGO and other institution helped them most during flood.

Table 8.39: Respondents' Perception about who Helped Most during Flood

Sources	Meghai (%)	Khas Suriber (%)	Total (%)
Relatives	60	55	57.5
Neighbour	25	20	22.5
NGO/Other bodies, organization	15	25	20
Total (n=250)	100	100	100

Source: Field Survey, 2009.

Most of the respondents expected financial assistance. They expected that someone would help them financially during flood. In both villages 73.5% respondents expected financial help during flood, 17.5% expected food and water, 4.5% expected treatment and 4.5% respondents expected assistance in moving household goods during flood.

Table 8.40: Respondent's Expectation about Getting Assistance during Flood

Type of Assistance	Meghai (%)	Khas Suriber (%)	Total (%)
Financial Assistance	72	75	73.5
Food and Water	22	13	17.5
Treatment	4	5	4.5
Moving Household Assets or Goods	2	7	4.5
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.11 Factors Influence People to Adopt Coping Strategies

Coping with flood is not an easy task. It becomes more difficult when the socio-economic condition of a family remains vulnerable to poverty and does not support

them to take a safe coping strategy or preventive measure during flood. The following sections find the factors that influence the respondents to adopt certain strategy.

8.11.1 Factors Influencing Strategies Related to Income

The Table 8.40 below illustrates factors that influence respondents to adopt coping strategy. 62.5% respondents said that they borrowed goods, money and took loan, engaged family members for earnings during flood due to lack of alternative jobs. On the other hand, 67% respondents said that they had to go to cities. They also had to change jobs after flood because there was lack of income generating activities during the period. 51.5% respondents said that they had loans. 58.5% respondents made responsible excessive flood as the factors of adopting coping strategies. The table below shows the details.

Table 8.41: Factors Influencing Strategies Related to Income

Causes	Meghai (%)	Khas Suriber (%)	Total (%)
Lack of Alternative Jobs during Flood	56	69	62.5
Lack of Income Generating Activities after Flood	62	72	67
No Savings	45	58	51.5
Excessive Flood with long stay period	55	62	58.5

Source: Field Survey, 2009.

8.11.2 Factors Influencing Strategies Related to Food

The table 8.41 depicts the major factors that influenced or forced the respondents to adopt strategies to cope with food crisis during flood. According to the respondents having insufficient food in the household, lack of money and lack of cooking material were the prime factors that influenced them to adopt various harmful coping strategies

like less food intake, remain unfed, borrowing foods. Most (54.2%) of the respondents said that they adopted those strategies for lack of money in hands. On the other hand, 30.6% respondents said that having insufficient foods in the house which is for having low income and 15.2% respondents talked about the lack of cooking materials like fuel, dry cooking place and cooker.

Table 8.42: Factors Influencing Strategies Related to Food

Causes	Meghai (%)	Khas Suriber (%)	Total (%)
Insufficient Food	32.2	29	30.6
Lack of Money	58.9	49.5	54.2
Lack of Cooking Materials (Fuel, cookers, dry place)	8.9	21.5	15.2
Total (n=250)	100	100	100

Source: Field Survey, 2009.

In village Meghai 84.7% respondents said that having no dam was the prime cause of not taking any measure to protect homestead, 12.1% mentioned river erosion as cause of remaining inactive, 0.8% mentioned remote working place as a cause and 2.4% said having no money was one of the cause of not taking any measure in protecting homestead. In Khas Suriber 94.9% stated that having no dam was the foremost cause of their inactiveness, 4.3% said that having insufficient money to protect their homestead. In both villages 89.8% said that having no dam was the prime cause of their inactiveness, 6.1% mentioned river bank erosion as cause, 0.4% remote working place, 3.7% said that due to lack of money they could not take safe measures.

Table 8.43: Factors Influence in Taking Preventive Strategy

Causes	Meghai (%)	Khas Suriber (%)	Total (%)
Having No Embankment	84.7	94.9	89.8
Flood with River Erosion	12.1	-	6.1
Remote Working Place	0.8	-	0.4
Lack of Money	2.4	5.1	3.7
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.11.3 Causes of Suffering Most in Flood

An attempt has also been made to see the respondents' perception about causes of sufferings in flood disaster. The respondents talked about three causes of their sufferings most. It is seen that though height of plinth is one of the main causes of their sufferings. The respondents' perceptions about flood disaster are shown below.

Table 8.44: Respondents' Opinion about Causes of Sufferings most in Flood

Response	Meghai (%)	Khas Suriber (%)	Total (%)
Sever flooding with Riverbank Erosion	68	27.2	47.6
No Embankment	32	67.2	49.6
Low Height of House Plinth	-	5.6	2.8
Total (n=250)	100	100	100

Source: Field Survey-2009

It is vivid from the above table that in Meghai majority (68%) respondents think riverbank erosion is the prime cause of their sufferings, 32% respondents think that having no embankment in the locality is the main cause of their sufferings. On the other hand, in Khas Suriber, 27.2% respondents think riverbank erosion is the main cause of their sufferings, 67.2% think that having no embankment is the cause of their suffering from flood, 5.6% think that low height of house plinth is the major cause of their sufferings. In both villages 47.6% respondents think riverbank erosion is the main cause of their sufferings, 49.6% having no dam is the cause of their suffering from flood, 2.8% think that low height of homestead plinth are the major causes of their sufferings.

8.12 Vulnerability and Coping Strategy

The respondents talked about 83 types of their vulnerabilities in flood disaster (Table 6.1, 6.3, 6.5). They were susceptible that if flood disaster happened those areas might be affected badly. On the other hand, it was seen that the respondents talked about 6

types of major causes or factors of their vulnerabilities (Table 6.7). Due to having those factors or limitations they did not take better alternative coping strategies to minimize the disaster impacts. They did not take comparatively permanent measures or coping strategies in spite of knowing their vulnerabilities. 77% respondents talked about susceptibility of falling in food crisis during flood but they did not take any better measures rather they took harmful coping strategies like reducing food intake (15%). Similarly, almost all respondents talked about economic insecurity like income reduction (51%), joblessness (75%). In tackling the income insecurity they borrowed money (15%), changed jobs (5%) during flood. In post disaster period they went to cities for searching jobs (5%), some respondents (15%) went for farming or gardening after flood. During the crisis period they actually took measures for temporary basis to pass the crisis in spite of having knowledge on the susceptibility of impending impacts. On the other hand about 57% respondents talked about the susceptibility of asset damages during flood but they actually did not take any secure measure to protect assets. It was seen that 13.6% respondents took initiative to move household assets while flood water was in the house. The respondents also talked about the fear of falling in diseases (32.5%) in flood. Only 5% respondents took measures for purifying water to avert diseases. They knew about the lack of drinking water during flood. In spite of having such experience they (95%) used contaminated tub-well water and did not boil water. However, the respondents feared about safety of their children during flood. In minimizing possibility of such threat to their children only 8% adopted strategy by sending their children to safer places before flood. So it was seen that they were well aware of their vulnerabilities but in practical they were not much proactive in minimizing the vulnerabilities before flood and they did not take better alternative coping strategies during flood disaster.

8.13 Impact of Coping Strategy Adopted

It was found that the coping strategies the respondents adopted in different phases of flood disaster were basically to pass the crisis period. The strategies they took were experienced induced. Most of the strategies were harmful in general point of view but they had no other option available. They knew their areas of vulnerabilities but most

of them virtually did not take secure measures like storing food for flood, making the plinth high and flood resilient house, leaving the house before flood etc. Their intention was to bypass the crisis period somehow. As a result they had to face flood impact most. The medium and large farmers faced less on food impact because they had food grain stocked. They also kept their household goods in upper places in the house and faced a little damage than the landless and small farmers. The medium and large farmers began short term cultivation after the flood and they came back to normal life very early. On the other hand, the landless and small farmers took time to come back in normal life because they had no better job available.

Time taken to come back to normal life after facing flood was other indicator of flood disaster impact. In spite of taking some measures they took long time to come back after flood. An attempt has been made to explore peoples' resiliency period after facing flood disaster. The table 8.44 below depicts the time people take to come back normal life again after facing flood disaster. In both villages it was seen that 44.4% respondents took one and a half month to come back to their normal activities after flood. However, the proportion of respondents who took two months to come back was 38% in both villages. Such bounce-back does not indicate that they have repaired their all losses or their sufferings and came back to normal life. If a household takes long time to come back to normal life or daily activities it usually indicates greater disaster impact. The table below shows the details about time taken to come back after flood disaster.

Table 8.45: Time Taken to Return to Normal Life after Flood

Time (Days)	Meghai (%)	Khas Suriber (%)	Total (%)
<30	24.8	10.4	17.6
45	33.6	55.2	44.4
60>	41.6	34.4	38
Total (n=250)	100	100	100

Source: Field Survey, 2009.

However the duration of coming back to normal life varies according to the income or economic status of the households (Table 8.45). Those who were large farmers took less than a month to come back to normal life and daily activities. The landless households or respondents took more than 1 to 2 months and even more times to come back in normal life. The average time of bounce back was 45 days. The table shows the details below.

Table 8.46: Time Taken to Return to Normal Life after Flood
(by Farmers)

Respondents' Category	Duration or Time Taken (months) and % of Respondents in both Villages				Total (N=250)
	<1 Month	1-1.5 Month	1.5-2 Months	2> Months	
Landless	0	4.6	20	23.8	48.4
Small Farmers	0	16.5	14	0	30.5
Medium Farmers	8	6	0	0	14
Large Farmers	7.1	0	0	0	7.1
Total (n=250)	15.1	27.1	34	23.8	100

Source: Field Survey, 2009.

It was clear from the table below that 47.6% respondents in Meghai took long time because of want of money, 20.6% respondents took long time for long duration of flood, 16.8% respondents took longer time due to excessive losses and 15% respondents took time to come back in normal life due to lack of income generating activities. In Khas Suriber 16.8% respondents took longer time due to want of money, 24.4% respondents took longer time due to long duration of flood, 38.8% respondents took longer time for excessive loses and 20% respondents took time due to lack of job or income generating activities. In both villages 37.2% respondents took longer time for want of money, 30% respondents took time for longer flood duration and 32.8% respondents took longer time for excessive losses or damages and 17.5% respondents took time more due to having lack of jobs.

Table 8.47: Respondents' Opinion about Causes of Taking Long Time to Come Back in Normal Life after Flood

Causes	Meghai (%)	Khas Suriber (%)	Total (%)
Want of Money	47.6	16.8	37.2
Long Duration of Flood	20.6	24.4	30.0
Excessive Loss	16.8	38.8	32.8
Lack of Job or Income Generating Activities	15	20	17.5
Total (n=250)	100	100	100

Source: Field Survey, 2009.

It is seen from the table below that in both villages 19.5% respondents think that they can save themselves if they make home in a flood free area. 41% respondents think about building a good embankment can save them, 39.5% respondents think that making the homestead high can save them from food. In Khas Suriber, 20% respondents think that they can save themselves if they make home in a flood free area, 28% respondents think building a good embankment can save them, 52% respondents think that making the homestead high can save them from flood. For Meghai 19% respondents think that they can save themselves if they make home in a flood free area, 54% respondents think building a good dam can save them, 27% respondents think that making the homestead high and building a good dam can save them from food. The table below shows the details.

Table 8.48: Opinions of the Respondents about Measures that Can Save Their Family from the Impact of Flood

Measures	Meghai (%)	Khas Suriber (%)	Total (%)
Making Home in Flood Free Area	19	20	19.5
Building a Good Embankment	54	28	41
Making the Plinth of House High	27	52	39.5
Total (n=250)	100	100	100

Source: Field Survey, 2009.

8.14 Comparative Discussion on Coping Strategy

The present study finds different coping strategies. Based on the research findings in this study, the coping strategies can be categorized as 'dependency strategy', 'consumption strategy', 'selling strategy' and 'reduction strategy'. As a 'dependency strategy', the respondents increase their dependency on others. They depend on the others for taking loan, borrowing money, food and fuel, taking shelter to other's places or houses, depend on less expensive foods and relief materials. As a 'consumption strategy', they consume stored foods, cattle, savings etc. They sell grains, cattle and other valuable assets which is categorized as 'selling strategy'. They reduce food intake, amount of meal or less food intake, reduce frequency of cooking, reduce spending etc. These can be categorized as 'reduction strategy'.

This categorization in this study is different from those found in other studies. A study conducted by Rashid et al. has categorized it differently. According to Rashid et al. (2006), coping strategies of flooded households in Bangladesh are categorized into three stages: 'current adjustment', 'unsecured borrowing', and 'secured borrowing/divestment'. Current adjustment strategies include reducing household food consumption, shifting to less preferred foods with lower cash cost, and reallocating household labour to increase current income, borrowing from moneylenders, merchants, and NGOs. Finally, households may cope with flood shocks by divestment or borrow against their liquid and productive assets.

The present study finds that use of savings or spending money from deposit is one of the major coping strategies. The strategy used mainly by the medium and large farmers. They use such strategy during flood because of their joblessness. Such strategy is helpful to pass the disaster period somehow but their economic conditions are deteriorated gradually. However, they have to spend more money in post disaster period to recover from crisis by repairing houses, start income generating activities or cultivation. The strategy 'use of savings' has also been explored by Frankenberger (1992), Rashid et al (2006) and Rahman (2010) in their studies. To them it is divestment, or the gradual disposal of assets. But those researchers did not categories the respondents and factors of taking such strategy. Similarly, the present study finds that borrowing money is another important coping mechanism which is practiced by

landless and small farmers mainly. They use such strategy at the beginning of flooding. The respondents took such strategy as their earnings stopped during flood. The prime sources of borrowing money were relatives and neighbours.

Borrowing money to pass the flood disaster helps to overcome crisis period but it is a harmful coping strategy, because it increases dependency on others and creates extra financial pressure after post disaster period and their economic conditions begins to deteriorate gradually. Because of having borrowing practice, they take a long time to come back to normal lives. The strategy 'borrowing money' has also been explored by Rashid et al (2006), Rahman (2010), Del Ninno et al (2004), Yasmin et al (2013), Islam et al (2012) and Rayhan (2005). Such strategy is practiced by landless and small farmers mainly. Borrowing food and borrowing money to buy foods are important coping mechanisms. Landless, small farmers use such strategy to avoid food crisis during flood (Rahman, 2010).

Coping with the daily food requirement is a challenging one. The study reveals that the respondents have used various coping strategies to cope with food insecurity. Reduction of food intake is one of major coping strategies during flood. The landless and small farmers use this strategy. Similar findings on the strategy 'reduction of food intake' has explored by some other researchers like Rashid et al (2006), Opondo (2013), Rahman (2010), Abrar and Azad (2004), Ahmed (2010), Islam et al (2012). Other studies did not mention the cause of taking such strategy and other relevant coping strategies along with it. The respondents use some other strategies along with the reduction of food intake. They remain unfed for once or twice a day and reduce the frequency of cooking also. They increase dependency on inexpensive foods.

The present study finds that selling cattle or livestock is a coping strategy. The strategy id used to avoid financial loss due to death or disease, problem of feeding during flood. The small and medium farmers used the strategy. The strategy has also explored by Rahman (2010), Rashid et al, 2006, Islam et al (2012). Engaging family members for earnings during flood is a coping strategy which is used by landless and small farmers mainly. The strategy has been found by Rahman (2010). The landless farmers change the job and the medium and large farmers go for short time cultivation

or gardening after flood to start earnings early. Such strategy has been explored by Islam (1995) and Islam et al (2012).

The landless farmers or households have inability to cope with flood disaster due to having limited or no resources. Households' income plays an important role in this matter. They face food crisis most and take a long time to come back in normal lives. Other studies have found such cause. According to them it is the ultra poor rural households who seem to have least coping ability (Islam, 2005), while high level of food insecurity affects their livelihoods (Rahman, 2010). Households' income level has a close link to coping strategies (Islam et al, 2012). Households with a higher income or with savings can readily help themselves in a flood event and hence are less vulnerable to flood impacts (Penning-Rowsell and Fordham, 1994).

Pre-coping strategy has also taken by some respondents. They raise house plinth, store food grains, keep the goods in upper places or safer places, and send children to safer areas. The strategy has also been explored by Yasmin et al (2013), Haque et al (1994), Islam et al (2012).

8.15 Conclusion

The objective of this chapter is to identify the coping strategies the respondents took in different phases of flood disaster. It is seen that the strategies the respondents take are basically from their own experiences and capacities. The strategies they devise and employ are harmful from a general point of view but actually they had no other suitable and secured options to adopt. They prefer to take during flood measures rather preventive measures. It is a fact that deserting own house during flood usually lead to adopt more harmful coping strategy. As there was no such alternative strategy viz. flood shelter, they remained inactive. Yet coping strategies have been seen as a very important mechanism that saves them from dangerous impact of flood. It has become an important 'first aid mechanism' for the flood-prone people. It has been found that the socio-economic condition of the respondents were not only the prime deciding factor of adopting coping strategy during flood but also the ways they lived and they ways they responded traditionally to flood disaster. Threat of river erosion has also been seen as the foremost deciding factor in terms of adopting any secure and preventive measure.

CHAPTER NINE

CONCLUSION AND POLICY SUGGESTIONS

9.1 Introduction

The objective of the last chapter is to summarize the present research. This chapter analyzes and discusses the research findings emerged from all the earlier chapters. Based on the findings of the research, policy options for reducing vulnerability and impacts of flood disaster, and coping strategies in this connection have been identified and suggestions for further policy formulations towards reducing the flood impacts are forwarded in this chapter.

This chapter is organized as follows. Section 9.2 describes the research findings based on the research objectives. The section 9.3 illustrates the policy suggestions based on the research findings. The section 9.4 concludes the research.

9.2 Summary of the Research Findings

The socio-economic condition of the river-side people of the study area remains vulnerable traditionally. They have been confined by limited resources or means of living in the area with each year's natural disasters. Those limitations have been the prime causes of ailments throughout their living process. These limitations make them vulnerable every year and make them exposed to many sufferings. Economic condition has been seen as one of the foremost factors to withstand with the natural disasters by people in the study area. Besides, economic and resource conditions, house building pattern is also a factor that is related to disaster impact. It has also been seen that the foremost lackings of the people are having a low height of homestead plinth, weak house structure and the threat of excessive flooding with river

erosion. These have created a complex situation for them to cope with flood disaster and poverty as well. In these backgrounds of the people of the study area, this research obtained the following findings.

1. The first objective of this study is to analyze the nature and frequency of natural disasters in the study area which has been illustrated in chapter five. The study finds that the study people face different natural hazards and disasters with different scales every year. These are flood, river erosion, cyclone or nor'wester and mild drought. It is learnt from the secondary sources and from the local people that flood and river erosion are the most occurring natural hazards to them and these hazards turn into the deadliest natural disasters. A huge number of damages have been recorded in the study area. 57% of the respondents faced river erosion in their lives and of the 70% face river erosion 4 times in their entire lives. For flood disaster, 68% respondents faced flood every year and 32% respondents faced flood in major flooding years. In addition to this, chapter five also presents the socio-economic and demographic features of the respondents. The study finds that the major source of livelihood of the study people is agriculture and agriculture related labour. Most of them (39%) are farmer and agro-labourer (16.4%) by profession and 22.4% are engaged in small business and 10% respondents are service holders. Majority (74%) of them have only one source of income and only one wage earner. Most of the respondents (65%) earn less, only 20% respondents have savings, 22% have loans and 30.8% households have economically active but unemployed members. The housing characteristic of the respondents was *kutcha,* mainly made of 'mud and tin' (97.6%) and 'brick and tin' (2.4%). The average height of house plinth has been found 1.5 feet. The respondents have been categorized into four like landless, small farmer, medium farmer and large farmer. Among the respondents 48.4% were landless poor farmers or labourers, 22.6% small farmers, 14% medium farmers and 15% were large farmers.

2. The second objective of this research was to identify people's vulnerabilities associated with flood disaster. By Chapter six, this study finds that the people are vulnerable due to their poor socio-economic conditions and incapacity to deal with disaster. The study identifies twenty five major areas of vulnerabilities for the people living in the study area. Economic vulnerability including chance of income reduction, job loss, food shortage, crop damage and asset damage is the main vulnerability of the people in the study area. Main social vulnerabilities include schooling discontinuation of the children, family status change, chance of forced migration etc. Moreover, other vulnerabilities such as health and disease related vulnerabilities were also found. The study also explored six major causes or factors of their vulnerabilities. Landless and small farmers talked more about income and food vulnerabilities than the other groups of people. They talked about food crisis, less food intake, income discontinuation, savings depletion, loan taking, borrowing food and money while they face flood. On the other hand, medium and large farmers talked about financial damages due to crops and house damages, and land erosion. Some respondents talked about depletion of savings. The large farmers were financially vulnerable more because they talked about crops damage and land loss due to flood and erosion. The respondents were well aware of their vulnerabilities but the coping strategies they took were mostly unsafe.

3. The third objective of this study is to assess the impact of flood disaster the respondents faced. In chapter seven, this study finds socio-economic, health and other impacts of flood on the respondents. The study reveals that 62.8% respondents became jobless due to flood and of them 53% respondents were jobless for more than 15 days. About 94% respondents forced to deplete their savings due to flood disaster. They depended on borrowing money (53%). The landless and small farmers were the money borrowers. About 76% respondents incurred crops losses due to flood and 28.8% respondents sold food grain for the fear of flood. 40% respondents faced land erosion and about 76% respondents incurred financial losses of more than 5 *bighas* of land. Among the respondents medium and large farmers incurred financial losses most. About 95% respondents faced house damages in various degrees and spent about Tk

8,000/- on average. Similarly, about 91% respondents incurred various types of assets damage due to flood.

The study finds that flood has devastating impacts on people's food consumption. The landless and small farmers were the worst sufferers of it. In both villages about 28% respondents did not even eat three time meals a day. 81.6% respondents depended on less expensive or unusual food during flood. 72.4% respondents reduced the amount of food they took daily. In both villages 14% respondents borrowed food during flood, 4% respondents sold food grain to buy another food. Among the respondents in both villages 56.8% respondents had food crisis during flood. Such food crisis was seen after receding flood water. On the other hand, 20% respondents borrowed money to buy food. It was found that 30.4% respondents became sick during flood disaster and women and children were the victims of flood induced diseases most.

The study finds that a large number of respondents become homeless and displaced. About 72% respondents have been displaced within villages during flood. They took shelter on the roads, bridges, embankments etc. The impact of flood on education, law and order situation was also seen. 4.5% respondents said that their children dropped out of school due to migration. The study finds that crimes happed during flood disaster. 5% respondents were victimized by theft and looting. About 28% respondents said that their social status have been deteriorated due to flood and erosion. Their economic conditions were not the same as before.

4. The study finds that being a vulnerable group, women and children face flood impact more than men. It was found that the women and children faced food crisis, get infected with diseases, faced problem in cooking arrangements, security and privacy. About 32% respondents said that their female counterpart took less food intake as they had crisis with food and cooking arrangements. 72% respondents said that their women faced problem in cooking. About 79% respondents said that their women members faced toilet

problem and 17% said about privacy problem. About 82% respondents said about their children's insecurity and 39% said about less food intake and 26% respondents talked about diseases of their children during flood.

5. The main or fourth objective of this study is to explore and analyze the coping strategies people adopt in different phases of flood disaster and to explore the factors influencing people's adoption of different coping strategies. The study finds that the respondents adopt many coping strategies in different phases of flood disaster. The study explores 34 major coping strategies of the respondents. The coping strategies can be categorized as 'dependency strategy', 'consumption strategy', 'selling strategy' and 'reduction strategy'. They used such strategies mainly to pass the flood days somehow. The strategies they employed mainly for maintaining the daily food requirements and income insecurities. These were the prime concern of their coping efforts in the flood disaster. The landless and small farmers cope with food crisis and income insecurity during and after flood most. Among the respondents, the landless and small farmers used harmful coping strategies like borrowing food and money, reducing amount of meal and number of meals a day, selling food grains to buy foods etc. On the other hand, the medium and large farmers did not take such strategies largely. They took household assets saving strategy, taking shelter on embankment, protecting cattle, selling crops for fearing of flood damage etc. Almost all respondents took during flood measures mostly. The presence of adopting pre and post coping strategy was hardly seen. It was found that 96.2% respondents did not leave the homestead before flood but at the last stage they took shelter in the roads and embankments (87.4%). They took shelter when the flood water entered into house and could not stay there any longer.

   Ensuring economic security is a challenging task during flood. As the earnings stopped during flood, they begin to use their savings. Among the respondents, 94% spent their savings during flood (among the respondents who had savings), 13% changed jobs, 29% borrowed money, 7% respondents engaged their family members to earn during flood and 47% went for short time

cultivation to resume earnings early after flood. For ensuring the daily food security during flood they use some unsafe coping strategies. They borrowed foods (14%) and took loan (47%), ate less food (70%) and reduced frequency of food intake (45%), increased dependency on less expensive foods (80%), borrowed money to buy foods (20%) and reduced the frequency of food intake (45%).

6. Coping Strategy is influenced by various intra-household and external factors apart from the severity and duration of hazard. Among the intra-household and external factors, pattern of house building, insufficient food, income and savings, having no effective local flood resistant infrastructures have been seen as dominant factors in deciding and adopting safe coping strategy in the study areas. Those who had low income and savings they faced the food crisis most. Coping strategy is also influenced by the capacities they have to cope with flood disaster. On the other hand, flood impact is influenced by the coping strategies they take. It has been seen that the coping strategies they use are mainly 'experience induced and driven'. It means during flood decisions are made mainly from their previous flood experiences. They react from their experiences and act with whatever they have within their surroundings. Pre-planning is absent there irrespective of all respondents. However, low income is also a prime factor of adopting safe coping strategy for the landless and small farmers, especially for coping with food crisis during flood. On the other hand, the well-off or large farmers did not have to face food crisis too badly as the others. It has been found that there is a lack of alternative coping strategy in the study area. As a result people adopted harmful coping strategies like taking shelters on embankment, bridges, remote places etc. On the other hand, because of having no provision of community feeding during flood the people face food crisis.

The landless and the small farmers take more time to come back to normal life due to low economic condition and lack of jobs or income generating activities after flood. 83% respondents took more than a month to come back in normal life. Money is a matter for them to come back to normal life early after flood

and to repay their loans as well. It has been seen that money matters especially in two cases here. The first one is to meet the food crisis during flood well and the second one is money matters to come back to normal life very early after flood.

7. According the respondents external assistance plays an important role during flood. They expected voluntarily help from outside. 82.4% respondents said that they had needed external help during flood. It indicates that they could not cope with flood with their own capacities. 57.5% respondents said that relatives were the prime source of help, especially for borrowing foods during flood though financial assistance was their prime need. 73.5% respondents expected financial assistance than food, medicine during flood. But 65% respondents received dry food as assistance from outside during flood. 88.4% said that they had received such assistance during flood where as only 3.4% received post-flood assistance.

   On the other hand, the respondents willingly sought assistances from relatives, neighbours and NGOs. It has been seen that 78% respondents borrowed food from their relatives and 22% borrowed food from neighbour. In case of taking money or loan they preferred NGOs most. 63.7% respondents took loan from NGOs and 30.5% from relatives and 5.8% from Banks.

8. In the study areas the average height of the plinth of 89% households has been found 1.5 feet on average and the plinth is made of mainly clay. Making low plinth house is a culture in the study area. Almost all people irrespective of economic class have low height of homestead plinth. Such height is not standard for that area. The height of the homestead of these areas should be at least 4 ft according the flood water level observed in those villages. The low plinth is the major factor of flood impact and even adopting unsafe coping strategies. If they had 4 ft. of plinth height they could have saved themselves from flood impact to a great extent. The people have built up a culture of not making the high plinth of their houses which has been proved as the prime source of their sufferings. It has been seen that 78% did not build high plinth

for fear of riverbank erosion. They think that making a high plinth is waste of money if river erosion erodes it. Such mentality or culture is seen among all households irrespective of economic condition. On the other hand, the villages were too close to the river Jamuna. This closeness is another cause of the flood impact and indifference to take safe coping strategies. Because of such closeness and low plinth they were flooded very early and easily.

9. People usually do not take preventive measures especially pre and post disaster rather they prefer 'during-flood coping strategy'. Decisions are taken by the intensity of hazards they face and the problems they face during crisis time. It means they take decision when they face crisis or problem. People are aware of their vulnerabilities and sufferings and the causes of their sufferings also. In spite of such attitudes, they did not build preventive measures and could not reduce the flood losses.

9.3 Policy Suggestions

From the above findings this study has drawn the following policy implications, and therefore, suggests the following policy option for different stakeholders at different level in the country:

Firstly, household should be the first and foremost unit of disaster management and there is a need of building disaster management capacity of the households. Both structural and non-structural measures should be taken at the household level. Every house should be a disaster resilient house and making a disaster resilient house should be the first priority. There is a need of external intervention in this regard so that they can identify their problems, limitations and resources they have to minimize risks and overcome the disaster situation with very less or no damage. As an important tool of household intervention, there is a need of developing coping skills or life saving skills during flood disaster. Building capacity is similar to increase the knowledge and skills for adopting safe coping strategy and also to identify own limitations and resources. Developing the skills should be based on both aspects disaster 'prevention and mitigation' and 'poverty reduction'. However, knowledge and skills should be

developed and disseminated, for example, how to ensure food security and cooking arrangement during flood days, how to protect household resources and homestead, how to build flood or disaster resilient house etc.

Secondly, the landless and small farmers face food crisis during flood and they take a long time to come back to normal life due to lack of jobs and income generating activities after flood. So the initiatives on food security and income generating activities should be provided just after flood. Building disaster enduring house, especially the high plinth, should be built and there is a need of helping the people to build those houses financially and technologically considering their economic conditions. As it has been proved that a disaster resilient household faces very less or even no impact of natural hazards the priority should be given on that. Similarly, a 'disaster saving scheme' or programme can be taken for those who are landless and have less income so that they can use their savings during flood and start income generating activities after flood as well.

Thirdly, it has widely been established that natural hazards can not be stopped from its source rather the effect or impact can be minimized to a great extent by enhancing people's capacity. As a part of preventive measure to minimize the degree and intensity of hazards there is a need of building planned and integrated structural measures at the household level and the community level as well. On the other hand, disaster resilient house is another preventive structural measure that can save people from natural disaster to a great extent. So research on new and innovative flood resilient house should be carried out.

Fourthly, local community should be the secondary unit of disaster management. As secondary level of disaster mitigation the community must provide some alternative coping strategies for their people so that the people can avail those alternatives if they fail within their own households. Among the alternative coping strategies multi-purpose flood shelter, community feeding, rescue efforts are important. If some structural measures like river erosion protection embankment, multipurpose flood shelter and standard height of plinth of local infrastructures are taken the flood impact can be reduced to a great extent. So building flood resilient infrastructure such as

making high roads, bridges, schools, Union Parishad building, etc should be built and used as flood shelter during flood, but in normal days 'the specially built flood shelters' can be used as 'community centre'. However flood shelters should be built up based on population size and should have some basic facilities like cooking arrangements, toilet and safe drinking water.

Fifthly, the local disaster management bodies should be equipped with different logistic supports viz. rescue boats, medicine, dry foods, safe drinking water, volunteers etc. The provision of alternative safe coping strategy in the community should be built so that the crisis time can be passed or overcome with minimal impact. It means the less food intake can be minimized if the provision of community feeding is arranged by community during excessive flooding. In addition, the local disaster management culture, which is against adopting the safe coping strategies such as not leaving the places, not building high plinth should be broken. The local authority should take measures against building houses in risky or vulnerable places. The government and the NOGs should come forward to help the people in this regard.

Sixthly, there is no alternative way to lessen the impact of flood disaster without making river erosion embankment or dike in the river side areas. So, structural measures will be needed, but it must be in a proper and planned way. There is also a need of dredging the river bed as one of the main mechanisms in preventing river erosion. However, the external support should be in more coordinative way and timely before and during severe flooding. Monitoring the flood situation and dissemination of real flood and river erosion information timely can have less impact on flood victims. Volunteers or rescue workers are very much needed during excessive flood mainly to evacuate people and supply foods. These should be incorporated in local disaster management process properly especially for the landless poor and small farmers.

Seventhly, there is a need of integrated and farsighted efforts to minimize the impact and maximize the protection of the people. There is a need of both structural and non-structural measures for doing that in the light of household level and community level disaster management. These strategies will reduce the degree of natural hazards and

help them to take as alternative coping strategy during excessive flooding. Disaster management should be a continuous effort. It is not tough to make a disaster resilient and well-managed community but removing impediments on that path is a tough one. So there is a need of external intervention in this regard.

Lastly, it is difficult to build the capacity of a community if the community faces multiple hazards or disasters simultaneously a year. So, collective and all-sides measures are needed for protecting the people from natural disasters. The efforts should be multi-dimensional. Flood is desirable but not the flood disaster. So the efforts for reducing the impact of natural disaster should be from all sides. Linkage between structural and non-structural measures, bringing the community people in the front, integration the issue of natural disaster in all development efforts, policies, linkage and coordination among GO and NGOs should be the prime consideration of natural disaster management.

9.4 Concluding Remarks

The riverside people face flood and river erosion every year. They struggle to survive in these areas. They try to emancipate from poverty and natural disasters as well. They have been losing their resources and capacities gradually by dint of natural disasters and becoming landless and falling into poverty. Natural disasters have been breaking their vitalities gradually by weakening their economic and mental strength. In this way, becoming 'rich to poor' and 'poor to the poorest' has been a common scenario in this area. Like the study area, the people in flood prone areas of Bangladesh have to face many suffering during and after flood disaster. The experience of the study area indicates that flood results in several impacts on the lives of the people from economic, social, health related and other aspects of life. Disaster prone people of Bangladesh adopt some traditional coping strategies in their bids to recover the losses due to flood disaster. To cope with the disasters and to survive they do not go for comparatively permanent measures whether they have the capacity or not. They are directed by the culture of disaster they have practiced over generations. People have acted what the other people have acted in the community. They have

built their houses what the other people have built. They have responded what the other people have responded to disaster for years. They are surrounded and controlled fully by the overall culture of disaster of their communities and the limitations they have. There is a need of breaking the culture of disaster and building a new one but there is a need of minimizing the threat of natural hazards and areas of vulnerabilities as well. There is a need of strengthening the coping capacities of the households towards building a disaster resilient community. Coping strategies have been their survival strategies as they practice the coping strategies to save themselves for years.

LIMITATION OF THE STUDY

There are few limitations of this research study which need to be mentioned for clarity of research. This research has dealt with natural disasters in Bangladesh. Every year various types of disasters occur in Bangladesh. This research has only taken care of the case of flood disaster. Therefore, the findings of this research may not be taken to generalize for all disasters in Bangladesh. Moreover, the case study that this research has undertaken was limited to a specific area (two villages) of Bangladesh, and nature of flood disaster, its vulnerabilities and impacts, found in these two villages may not resemble to those found in other area of Bangladesh. Coping strategies adopted by people in the study area as found in this research may also vary with other areas. Therefore, although the findings of this study are very informative and interesting, taking them for policy implications require these findings to be validated and compared with findings from other's research. Thus, new research need to be undertaken and this research may serve to provoke future researchers.

Reference

Ahmed, Mohiuddin, ed. *Flood in Bangladesh.* Dhaka: Community Development Library, 1989.

Ahmed, Asib, "Women's Coping with Flood in the Ganges Dependent Area of Bangladesh", *ASA University Review*, Vol. 4 No. 2, July–December, 2010 p-245-250)

Ahern M, Kovats RS, Wilkinson P, Few R, Matthies F. (2005) Global health impacts of floods: Epidemiologic evidence. Epidemiologic Reviews; 27:36-46, in Stanke C, Murray V, Amlôt R, Nurse J, Williams R. The Effects of Flooding on Mental Health: Outcomes and Recommendations from a Review of the Literature. PLOS Currents Disasters. 2012 May 30 [last modified: 2012 Nov 27]. Edition 1.

Alam, S.M. Nurul. 'Perception of Flood among Bangladeshi Villagers.' *Disasters.* Vol. 14 (4): 354-357, 1990.

Ammann, Walter J. Stefanie Dannenmann, and Laurent Vulliet. *Risk 21-Coping with Risks due to Natural Hazards in the 21st Century.* London: Taylor & Francis, 2006.

Bankoff, G. Rendering the World Unsafe: 'Vulnerability' as Western Discourse. *Disaster,* Vol. 25. No. 1, 2001. pp-19-35.

Beyhun N, Altintas KH and Noji, E. Analysis of registered floods in Turkey. International Journal of Disaster Medicine. 2005; 3(1-4): 50-54, in Doocy S, Daniels A, Murray S, Kirsch TD. The Human Impact of Floods: a Historical Review of Events 1980-2009 and Systematic Literature Review. PLOS Currents Disasters. 2013 Apr 16 [last modified: 2013 Apr 17]. Edition 1.

Biswas A, Rahman A, Mashreky S, et al. Unintentional injuries and parental violence against children during flood: a study in rural Bangladesh. Rural and Remote Health. 2010; 10:1199, in Doocy S, Daniels A, Murray S, Kirsch TD. The Human Impact of Floods: a Historical Review of Events 1980-2009 and Systematic Literature Review. PLOS Currents Disasters. 2013 Apr 16 [last modified: 2013 Apr 17]. Edition 1.

Bich TH, Quang LN, Ha LTT, Hanh TTD, Guha-Sapir D. Impacts of flood on health: epidemiologic evidence from Hanoi, Vietnam. Global Healh Action. 2011; 4:6356, in Doocy S, Daniels A, Murray S, Kirsch TD. The Human Impact of Floods: a Historical Review of Events 1980-2009 and Systematic Literature Review. PLOS Currents Disasters, 2013 Apr 16 [last modified: 2013 Apr 17]. Edition 1.

Blaike, P., Cannon, T., Davis, I. and Winsner, B. *At Risk: Natural Hazards, People's Vulnerability and disasters.* Routledge: London, 1994.

Britton, N.R. 'Developing an Understanding of Disaster' *The Australian and New Zealand Journal of Sociology.* Vol. 22(2): 255-271, 1986.

C. Clarke, Guarnizo. 'Living with Hazards: Communities' Adjustment Mechanisms in Developing Countries', in *Environmental Management and Urban Vulnerability.* A. Kreimer and M. Munasinghe eds., (Washington DC: The World Bank, Discussion Paper 168, 1992), pp. 93–102.

C. del, Ninno, P.Dorosh, L. Smith, and D. Roy. *The 1998 Floods in Bangldesh: Disaster Impacts, Household Coping Strategies, and Response.* Research Project 112, International Food Policy Research Institute, 2001.

C. Haque, and M. Zaman, Vulnerability and responses to riverine hazards in Bangladesh: A critique of flood control and mitigation processes, In: A. Varley (ed.), *Disasters, Development and Environment, John Wiley and Sons*, New York, pp. 65–79, 1994.

C. K. Songok, E. C. Kipkorir, E. M. Mugalavai, A. C. Kwonyike and C. Ng'weno, 2011. —Improving the Participation of Agro-Pastoralists in Climate Change Adaptation and Disaster Risk Reduction Policy Formulation: A Case Study from Keiyo District, Kenya,|| *Experiences of Climate Change Adaptation in Africa*, W. Leal Filho (ed.), Climate Change Management.

Cannon, T., Twigg, J. and Rowell, J. *Social Vulnerability, Sustainable Livelihoods and Disasters: Report to DFID, Conflict and Humanitarian Assistance Department (CHAD) and Sustainable Livelihoods Support Office*. London: DFID, 2003.

Chambers, R. *'Editorial Introduction: Vulnerability, coping and Policy' Institute of Development Studies Bulletin.* Vol. 20. No. 2. 1989. pp. 1-7.

Chaudhuri, S. *Empirical Methods for Assessing Household Vulnerability*, New York University, 2000.

Choudhury, Nusha Yamina; Alak Paul; and Bimal Kanti Paul, "Impact of costal embankment on the flash flood in Bangladesh: a case study", Applied Geography, Vol. 24, No. 3, 2004, pp. 241-258.

Choudhury, Waziul Alam; Firoz Ahmed Quraishi; and Ziaul Haque, "Mental Health and Psychosocial Aspects of Disaster Preparedness in Bangladesh", International Review of Psychiatry, Vol. 18, No. 6, December, 2006.

Corbett, J. Famine and Household Coping Strategies. *World Development Report*, Vol. 16, No. 9, 1988. pp.1099-1112.

Delor, F. and Hubert, M. 'Revisiting the Concept of Vulnerability', *Social Science and Medicine*, Vol. 50. 2000. pp. 1557-1570.

Dercon, S. 'Income Risk, Coping Strategies, and Safety Nets'. *Background Paper for the World Development Report 2000/2001.* World Bank : Washington D.C. 1999.

Dercon, S. and Krishnan, P. Vulnerability, Seasonality, and Poverty in Ethiopia" *Journal of Development Studies,* vol. 36. No.6. pp. 25-53.

Elahi, K.M.. Riverbank Erosion, Flood Hazard and Population Displacement in Bangladesh : An Overview. in *Riverbank Erosion, Flood and Population Displacement in Bangladesh.* K.M. Elahi, K.S. Ahmed and M. Mafizuddin eds. Dhaka: REIS, 1991.

Ellis, F. "Household Strategies and Rural Livelihoods Diversification", *Journal of Development Studies*, vol.35, no.1, 1998. pp.1-38.

Guarnizo Clarke C. 'Living with Hazards: Communities' Adjustment Mechanisms in Developing Countries.' in *Environmental Management and Urban Vulnerability.* A. Kreimer and M. Munasinghe eds. (Washington DC: The World Bank, Discussion Paper 168, 1992, pp.93-102.

Gaillard, C.J, 2010. Policy Arena: Vulnerability, Capacity and Resilience: Perspectives for Climate and Development Policy. *Journal of International Development* 22, 218–232.

Gaillard, C.J., Pangilinan, R.M., Cadag, R.J., &Masson, L.V. 2008. Living With Increasing Floods: Insights from a Rural Philippine Community. *Disaster Prevention and Management* Vol. 17 No. 3, pp. 383-395

Greenberg, C. and M.Z. Hossain, 1987: Adjustment of Riverbank Erosion Displacees: A Case of Serajganj in Bangladesh. In V.S. Pendakur and O.P. Dwivedi (eds.), South Asian Horizons, Canadian Asian Studies Association, Montreal, 5:27-33.

Halls, A. S.; A. I. Payne; S. S. Alam; and S. K. Barman (2008) "Impacts of flood control schemes on inland fisheries in Bangladesh: guidelines for mitigation" Hydrobiologia, Vol. 609, No. 1 (September), pp. 45-58.

Haque, C.E. and M.Q. Zaman. 'Coping With Riverbank Erosion Hazard and Displacement in Bangladesh: Survival Strategies and Adjustment. *Disasters.* Vol. 13. No. 4 September-December, 1989.

Haque, Emdad Chowdhury. *Hazards in a Fickle Environment: Bangladesh.* Boston: Kluwer Academic Publishers, 1997.

Haque, C.E., 1988: Impacts of Riverbank Erosion Hazard in the Brahamaputra-Jamuna Floodplain: A Study of Population Displacement and Response Strategies. A Ph.D. Thesis (mimeo.), Department of Geography, University of Manitoba, Canada.

Huq, Saleemul and Mozaharul Alam, "Flood Management and Vulnerability of Dhaka City", in: Alcira Kreimer; Margaret Arnold; and Anne Carlin (eds.) Building Safer Cities: The Future of Disaster Risk (Washington, DC: World Bank), 2003, pp. 121-135;

Hewitt, K. Excluded Perspectives in the Social Construction of Disaster. in *What is a Disaster: Perspectives on the Question.* Quarantelli, E.L 1998. Routledge: London, UK. 1998.

Hofer, Thomas and Bruno Messerli, Are the Causes of Floods in Bangladesh Natural or Man-made?", Geographische Rundschau, Vol. 55, No. 11, 2003, pp. 28-33.

Hossain, H., C.P. Dodge and F.H. Abed. *From crisis to Development: Coping with Disasters in Bangladesh.* Dhaka: UPL, 1992.

Hossain, S. M. Moazzem and Patrick Kolsteren (2003) "The 1998 Flood in Bangladesh: Is Different Targeting Needed During Emergencies and Recovery to Tackle Malnutrition?", Disasters, Vol. 27, No. 2, (June) pp. 172-184.

Hossain, M. *et al. Flood in Bangladesh: Recurrent Disasters and Peoples Survival.* Dhaka: University Research Centre, 1987.

Hossain, M.Z., 1984, Riverbank Erosion and Population Displacement: A Case of Kazipur in Pabna. Unpublished thesis, Jahangirnagar University, Savar, Dhaka.

Huq, Saleemul; S. I. Ali; and A. A. Rahman (1995) "Bangladesh Is Used to Coping but Rising Seas Pose New Dangers", Climate Alert, Vol. 8, No. 2 (March-April).

Huraera J., Cassidy J., & Adriana A. 2010. Built-in Resilience: Learning from Grassroots Coping Strategies for Climate Variability. *Environment and Urbanization* 22: 415.

Hussain, A.M. 'Anthropological Approach to the Study of Natural Disaster' in *Nribiggan Potrika.* Proshanta Tripura ed. *Vol.* 6. Dhaka: Jahangirnagar University, 2001.

Ikeda, K. Gender Differences in Human Loss and Vulnerability in Natural Disasters : A Case Study from Bangladesh. *Indian Journal of Gender Studies.* Vol. 2 (2), 1995. pp.172-193.

International Federation of Red Cross and Red Crescent Societies. *World Disaster Report 2007.* Geneva: IFRCRCS, 2007.

Islam, Aminul, M. 'Tropical Cyclones: Coastal Bangladesh' in G.F. White (ed) *Natural Hazards*: *Local, National, Global.* New York: Oxford University Press, 1974.

Islam, Md. Zulfiquare Ali, Environmental Adaption and Survival Strategies of the Riverbank Erosion Displacees in Bangladesh : A Study of two Villages in Nawabganj Districts, Unpublished PhD. Dissertation, Institute of Bangladesh Studies, University of Rajshahi,1995.

Islam, Mohammad Najmul, Islam, Md. Zahurul and Fujita, Koichi, "Coping with flood disaster: household level responses by the char-dwellers on the river Padma in Bangladesh", *Indian Journal of Power and River Valley Development,* Vol. 61 (9&10), Sep-Oct 2011.

Islam, M. S. et al, "Coping Techniques of Local People to Flood and River Erosion in *Char* Areas of Bangladesh", *J. Environ. Sci. & Natural Resources,* 5(2): 251 - 261, 2012.

Karim, Nehal. Disasters in Bangladesh. *Natural Hazards II* :1995, 247-258.

Karim, M. F.; T. Tingsanchali; and K. Tanimoto, "Flood Risk Assessment for the Ganges Floodplain in Bangladesh", Proceedings of the International Coastal Engineering Conference, Vol. 28, No. 3, 2002, pp. 3581-3593.

Karim, Mohammed Fazlul and Nobuo Mimura, "Impacts of climate change and sea-level rise on cyclonic storm surge floods in Bangladesh", Global Environmental Change, Vol. 18, No. 3 (August), 2008, pp. 490-500.

Kates, R.W. *Hazard and Choice Perception in Flood Plain Management.* Research Paper No. 78. Chicago: Department of Geography, University of Chicago, 1962.

Kates, R.W. 'Natural Hazard in Human Ecological perspective: Hypotheses and Models' *Economic Geography.*1971, pp. 47:438-451.

Khalequzzaman, Md. 'Recent Floods in Bangladesh: possible causes and solutions' *Natural Hazards* 9:65-80, 1994.

Latif, A. 'Control of Flood in Bangladesh: Need for International Co-operation for solution of problem' in Mohiuddin Ahmad ed. *Flood In Bangladesh.* Dhaka: Community development Library, 1989.

Messerli, Bruno and Thomas Hofer, Floods in Bangladesh: History, Dynamics and Rethinking the Role of the Himalayas (Tokyo: United Nations University Press), 2006.

Mirza, M. Monirul Qader, "Three Recent Extreme Floods in Bangladesh: A Hydro-Meteorological Analysis", Natural Hazards, 2003, Vol. 28, No. 1, (January) pp. 35-64.

Morduch, J. Poverty and Vulnerability. *The American Economic Review.* Vol. 84. No. 2. 1994.pp. 221-225.

Murshid, K.A.S. An Analysis of Survival: Floods and Food Crisis. in *From Crisis to Development : Coping with Disasters in Bangladesh.* Hameeda Hossain, Cole P. Dodge, and F.H. Abed eds. Dhaka: UPL, 1992.

N. Dahal. 'Coping with Climatic Disasters in Isolated Hill Communities of Nepal: The Case of Rampur Village in Okhadhunga'. In. *Understanding Vulnerability*: *South Asian Perspectives.* J. Twigg and M.R. Bhatt eds. (London : Intermediate Technology Publications/Duryog Nivaran, 1998), pp. 47-67.

Nasreen, Mahbuba. 'Coping with Floods: Structural Measures or Survival Strategies?' in Imtiaz Ahmed (ed.) *Living with Floods: An Exercise in Alternatives.* Dhaka: The University Press Limited, 1999.

——, *Coping with Floods: The Experience of Rural Women in Bangladesh.* Unpublished PhD. Dissertation, Massey University, New Zealand, 1995.

Oliver-Smith, A. Anthropological Research on Hazards and Disaster. *Annual Review of Anthropology.* Vol. 25. 1996. pp. 303-328.

Opondo, D.O. (2013) 'Erosive coping after the 2011 floods in Kenya', Int. J. Global Warming , Vol. 5, No. 4, pp.452–466.

Paul, B.K. Coping with the 1996 Tornado in Tangail, Bangladesh : An Analysis of Field Data. *The Professional Geographer.* Vol. 50. 1998, pp. 287-301.

Paul, Bimal Kanti and Harun Rasid (1993) "Flood Damage to Rice Crop in Bangladesh", The Geographical Review, Vol. 83, No. 2, pp. 151-159.

Paul, S. K., and Routray, J. K. (2009). Flood Proneness and Coping Strategies: the Experiences of two Villages in Bangladesh, Disasters, 34(2), 489-508.

Peters, G., McCall, M., and Westen, V. C. 2009. Coping Strategies and Manageability: how participatory geographical information systems can transform local knowledge into better policies for disaster risk management. Aon Benfield UCL Hazard Research Centre, *Disaster Studies Working Paper* 22, February 2009.

Pradhan EK, West KP, Katz J, et al. Risk of flood-related mortality in Nepal. Disasters. 2007; 31(1):57-70, in Doocy S, Daniels A, Murray S, Kirsch TD. The Human Impact of Floods: a Historical Review of Events 1980-2009 and Systematic Literature Review. PLOS Currents Disasters. 2013 Apr 16 [last modified: 2013 Apr 17]. Edition 1.

Q. K. Ahmad, "Climate Change, Flood, and Flood Management: The Case of Bangladesh" in *the special issue The Geopolitics of Land and Water Management in the Deltas of the Asian Monsoon Belt*, French Geopolitical Institute of the University of Paris, France, 2006.

——, "Flood Management and Local Adaptation and Response Strategies," in *Mandira Shrestha ed. Regional Cooperation for Flood Disaster Mitigation in the Hindu Kush-Himalayan Region: Technical Papers,* International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal/World Meteorological Organization (WMO), Geneva, Switzerland, 2003.

——, *"Flood, Climate Change, and Disaster Management",* presented at the South Asia Water Forum-III (SAWAF-III), organized by South Asia Water Forum-III (SAWAF-III), Dhaka, 13-15 July 2004.

——, *"Implication of Socio-Economic Scenarios for Regional Water Resource Needs",* presented at the workshop on Water Resources in South Asia: An Assessment of Climate Change-Associated Vulnerability and Coping Mechanisms, organized by APN, held in Kathmandu, 7-9 January 2003.

Quarantelli, E.L. ed. *Disasters: Theory and Research.* Beverly Hills, California: Sage, 1978.

——, *What is Disaster: Perspectives on the question.* Routledge: London, UK. 1998.

Rahman, M. Vulnerability Syndrome and the Question of Peasents' Adjestment to Riverbank Erosion and Flood in Bangladesh. in *Riverbank Erosion, Flood and Population Displacement in Bangladesh.* K.M. Elahi, K.S. Ahmed, and M. Mafizuddin eds. Dhaka: REIS, 1991.

Rahman, M. Hammadur, "Ultra Poor Households' Flood Coping Strategies towards Food Security in Two Flood Prone Regions", Department of Agricultural Extension Education Bangladesh Agricultural University, Mymensingh, 2010.

Rasid, Harun and A. Mallik, "Flood adaptations in Bangladesh: Is the compartmentalization scheme compatible with indigenous adjustments of rice cropping to flood regimes?", Applied Geography, 1995, Vol. 15, No. 1, pp. 3-17.

Rasid, Harun and Wolfgang Haider, "Floodplain Residents' Preferences for Water Level Management Options in Flood Control Projects in Bangladesh", Natural Hazards, Vol. 28, No. 1, (January, 2003) pp. 101-129.

Rashid SF. The urban poor in Dhaka city: Their struggles and coping strategies during the floods of 1998. Disasters. 2000; 24(3); 240-253, in Doocy S, Daniels A, Murray S, Kirsch TD. The Human Impact of Floods: a Historical Review of Events 1980-2009 and Systematic Literature Review. PLOS Currents Disasters. 2013 Apr 16 [last modified: 2013 Apr 17]. Edition1.

Rashid, Dewan Arif, Mark Langworthy and Satheesh Aradhyula, Livelihood Shocks and Coping Strategies: An Empirical Study of Bangladesh Households, Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006.

Rayhan, Md. Israt, and Ulrike Grote, Assessing Household Vulnerability and Coping Strategies to Floods: A Comparative Study of Flooded and Non-flooded Areas in Bangladesh, Cuvillier Veralg GÖttingen, 2005.

Rayhan, Md. Israt, and Ulrike Grote, Assessing Poverty, Risk and Vulnerability: A study on the Flooded Households in Rural Bangladesh, Centre for Development Research, University of Bonn, Germany, 2005.

Reganit, M.P. *Analysis of Community's Coping Mechanisms in Relation to Floods: A Case Study in Naga City, Philippines.* International Institute for Geo-Information Science and Earth Observation, Msc Thesis, Enschede, The Netherlands, 2005.

R. Hughes, S. Adnan and B. Dalal-Clayton, *Flood Plains or Flood Plans? A Review of Approaches to Water Management in Bangladesh* (London: International Institute for Environment and Development/Research and Advisory Services, 1994), pp. 29–30.

Ribot, Jesse C. 2009. "Vulnerability does not just Fall from the Sky: Toward Multi-Scale Pro-Poor Climate Policy," In Robin Mearns & Andrew Norton (Eds.), Social Dimensions of Climate Change: Equity and Vulnerability in a Warming World. Washington, DC: The World Bank.

Royal Haskoning, Controlling or Living with Floods in Bangladesh: Toward an Interdisciplinary and Integrated Approach to Agricultural Drainage (Washington, DC: The World Bank), 2003.

Samson, W. A. 2008. *Floods and Health in Gambella region, Ethiopia: An Assessment of the strength and weakness of the coping mechanism.* LUMES – Lund University International Master Programme in Environmental Studies and Sustainability Science.

Sarkar, Haque and Alam. "River, Chars and Char Dwellers of Bangladesh." *International Journal of River Management*, Vol. 1, No. 1. 2003. pp 61-81.

Scanlon, J. Gender and Disaster: A Second Look. *Natural Hazards Observer.* Vol. 21 (5), 1997. pp.1-2.

Schechter Laura. *Identifying Vulnerable Households.* Draft. Dept of Agricultural Economics , University of California at Berkeley, 2001.

Schmuck-Widmann, H. *Facing the Jamuna River: Indigenous and engineering knowledge in Bangladesh.* Dhaka: Bangladesh Resource Center for Indigenous Knowledge, 2001. pp. 242.

——, *Living with the Floods: Survival Strategies of Char-Dwellers in Bangladesh* (Berlin: ASA-Programm of the Carl-Duisberg-Gesellschaft, 1996), p. 68.

Shaw, R., 'Nature, Culture and Disasters: Floods and Gender in Bangladesh.' in *Bush Base, Forest Farm: Culture, Environment and Development.* E.Croll and D. Parkin eds., (London: Routledge, 1992), p. 204.

Siddiqui, Kamal Uddin and A. N. H. Akther Hossain (eds.) (2006) Options for Flood Risk and Damage Reduction in Bangladesh (Dhaka: University Press Ltd.). Singh, O. P. (2001)

Siddique AK. Baqui AH. Eusof A, et al. 1988 floods in Bangladesh - pattern of illness and causes of death. Journal of Diarrhoeal Diseases Research. 1991; 9(4):310-314, in Doocy S, Daniels A, Murray S, Kirsch TD. The Human Impact of Floods: a Historical Review of Events 1980-2009 and Systematic Literature Review. PLOS Currents Disasters. 2013 Apr 16 [last modified: 2013 Apr 17]. Edition 1.

Skoufias, E. 2003. Economic Crises and Natural Disasters: Coping Strategies and Policy Implications. *World Development* Vol. 31, No. 7, pp. 1087–1102.

Sridhar, S.. Coping with the Disaster in J & K: Looking Beyond the Security Forces. Mainstream, 2005, 43(46), 3 – 4.

Yasmin, Tahmina and Ahmed, Khaled Masud, The Comparative Analysis Of Coping In Two Different Vulnerable Areas In Bangladesh, International Journal of Scientific & Technology Research, Vol. 2, Issue 8, August 2013.

Thapa, R. 2005. *Impacts of Flood Hazard and Coping Strategies: A Case Study of Jagatpur Village Development Committee in Chitwan District, Nepal.* Department of Geography. University of Bergen, Norway.

Twigg, John 2001. *Sustainable Livelihoods and Vulnerability to Disasters.* Benfield Grieg Hazard Research Center, for the Disaster Mitigation Institute (DMI).

—— Technology, *Post-disaster Housing Reconstruction and Livelihood Security.* Benfield HRC Disaster Studies Working Paper No. 15. London: Practical Action/Benfield HRC, 2006/2002.

Tingsanchali, T. and M. F. Karim (2005) "Flood Hazard and Risk Analysis in the Southwest Region of Bangladesh", Hydrological Processes, Vol. 19, No. 10, pp. 2055-2070.

UN/ISDR. 2002. Living with Risk: A Global Review of Disaster Reduction Initiatives. *United Nations International Strategy for Disaster Reduction*: Geneva.

UNFCCC. 2007. *Climate change: Impacts, Vulnerabilities, and Adaptation in Developing Countries.* United Nations Framework Convention on Climate Change.

Valdiya, K S. ed. *Coping with Natural Hazards: Indian Context*. Delhi: Oriental BlacksSwan, 2004.

Webb, P. and Harinarayan, A. A Measure of Uncertainty: The nature of Vulnerability and its relationship to Malnutrition. *Disasters*. Vol. 23. No. 4, 1999. pp. 292-305.

White, Gilbert F. ed. *Natural Hazards: Local, National, Global*. New York: Oxford University Press, 1974.

White, Gilbert F. *Choice of Adjustment to Floods*. Chicago: University of Illinois Press, 1964.

White, Gilbert F. *Human adjustment to floods: a geographical approach to the flood problem in the United States.* Chicago,1945.

Wijkman, A. and Timberlake, L. *Natural Disasters Acts of God or Acts of Man?* London: Earthscan, 1984.

Wisner, B. Disaster Vulnerability: Scale, Power and Daily Life. *GeoJournal*. Vol. 30. No. 2, 1993. pp. 127-140.

Wisner, B., Piers B., Cannon T., and Davis I. 2003. (eds). *At Risk: Natural Hazards, People's Vulnerability and Disasters*, Routledge, London, 320 pages.

Zaman, M.Q. Vulnerability, Disaster, and Survival in Bangladesh: Three Case Studies. in *the Angry Earth : Disaster in Anthropological Perspective*. eds. A. Oliver-Smith and S.M. Hoffman. 1999. pp. 192-212.

——, The Displaced Poor and Resettlement Policies in Bangladesh Disasters: *The Journal of Disaster Studies and Management.* Vol. 15 No. 2. June, 1991.

——, 'The Social and Political Context of Adjustment to Riverbank Erosion Hazard and Population Resettlement in Bangladesh' *Human Organization* 48(3):196-205. 1989.

ANNEX-I

Schedule (Questionnaire) for the field survey of the Research of

Coping with Disasters in Bangladesh : People's Vulnerability and Survival Strategy

(Collected data will be used for research purposes only)

A. Respondent's Personal, Demographic, Economic & Other Household Information

1) Respondent's Personal Information

1.1	Respondent's Name (Head of the Household)	
1.2	Age	
1.3	Sex	① Male ② Female
1.4	Education	① Illiterate ② Primary ③ High School ④ SSC ⑤ HSC ⑥ Degree ⑦ Honors ⑧ Master
1.5	Marital Status (If Different)	① Widow ② Divorced ③ Separated ④ Others.....
1.6	Religion	① Islam ② Hindu ③ Christian ④ Others.....

2) Family Profile

2.1	Number of Children (By Dependency)	Age	Male	Female	Total
		< 14			
		15-59			
		60 >			
		Total			
2.2	Member(s) with Disability	① Yes ② No			
2.3	Member(s) Economically Active				
2.4	Member(s) Competent but Unemployed				
2.5	Employed members Work in	① City ① Nearby Town ③ Village Area ④ Abroad			
2.6	Main Expense bearer in the family				

3) Homestead and Assets Information

3.1	House/Dwelling Unit	① Own ② Rent	
3.2	Year(s) of living	.....Year(s)	
3.3	Reasons for leaving previous place		
3.4	Area of Homestead Land	.....(acre).	
3.5	Homestead Made of	① Clay & Tin ② Clay & Straw ③ Brick & Tin ④ Building ⑤	
3.6	Height of homestead plinth	.....(foot)	
3.7	Other Properties	Properties	No./Qty./Area
	Land	① Agricultural	
		② Non-agricultural	
	Livestock	① Goat	
		② Cows	
		③ Hens	
		④ Ducks	
		⑤	
	Ornaments	① Gold	
	Transportation	① Bye-Cycle	
		② Motor Cycle	
		③	
	Furniture	① Wooden	
		② Steel/Metal	
		③	
	Agricultural Equipments	① Tractor	
		② Shallow Machine	
		③ Husking Machine	
		④	
	Electric & Electronics goods	① TV	
		② Radio	
		③ Mobile	
		④ Cassette Player	
		⑤	

4) Occupation, Income and other Economic Information

<table>
<tr><td>4.1</td><td>Occupation</td><td colspan="4">① Farmer ② Labour ③ Business
④ Service ⑤ Fisherman ⑥.....</td></tr>
<tr><td>4.2</td><td>For how many years</td><td colspan="4">..... year(s).</td></tr>
<tr><td>4.2</td><td>Previous occupation</td><td colspan="4">① Farmer ② Labour ③ Business ④ Service
⑤ Fisherman ⑥..... ⑦ Same as present</td></tr>
<tr><td>4.3</td><td>Why have you changed?</td><td colspan="4"></td></tr>
<tr><td>4.4</td><td>Other Source of present income</td><td colspan="4">① Farming ② Rent ③ Business
④ Labour ⑤ Fishing ⑥.....</td></tr>
<tr><td>4.5</td><td>Income Sources</td><td colspan="4">① Single ② Double ③ More than two</td></tr>
<tr><td rowspan="9">4.6</td><td rowspan="9">Income (in Tk.)</td><td>Category</td><td>Daily</td><td>Monthly</td><td>Yearly</td></tr>
<tr><td>Farming</td><td></td><td></td><td></td></tr>
<tr><td>Fishing</td><td></td><td></td><td></td></tr>
<tr><td>Labour</td><td></td><td></td><td></td></tr>
<tr><td>Business</td><td></td><td></td><td></td></tr>
<tr><td>Service</td><td></td><td></td><td></td></tr>
<tr><td>Rent</td><td></td><td></td><td></td></tr>
<tr><td>Other.....
.....</td><td></td><td></td><td></td></tr>
<tr><td>4.7</td><td>Average income daily</td><td colspan="4">Tk.</td></tr>
<tr><td>4.8</td><td>Savings</td><td colspan="4">① Yes ② No</td></tr>
<tr><td>4.9</td><td>If yes, where?</td><td colspan="4">① NGO ② Personally ③ Bank ④ Samity/Association</td></tr>
<tr><td>4.10</td><td>Amount of Savings</td><td colspan="4">① Weekly.....Tk. ② Monthly.....Tk.</td></tr>
<tr><td rowspan="7">4.11</td><td rowspan="7">Family Expenditure</td><td>Category</td><td>Daily</td><td>Monthly</td><td>Yearly</td></tr>
<tr><td>Food</td><td></td><td></td><td></td></tr>
<tr><td>Cloths</td><td></td><td></td><td></td></tr>
<tr><td>Education</td><td></td><td></td><td></td></tr>
<tr><td>Treatment</td><td></td><td></td><td></td></tr>
<tr><td>Other.....
.....</td><td></td><td></td><td></td></tr>
<tr><td>Total Expenditure</td><td></td><td></td><td></td></tr>
<tr><td>4.12</td><td>Do you have loans</td><td colspan="4">① Yes ② No</td></tr>
<tr><td>4.13</td><td>Amount of loans</td><td colspan="4">Tk.</td></tr>
<tr><td>4.14</td><td>From whom</td><td colspan="4">① NGO ② Relatives ③ Bank ④ Samity ⑤ Neighbour</td></tr>
<tr><td>4.15</td><td>Do you depend on loan</td><td colspan="4">① Yes ② No</td></tr>
<tr><td>5.16</td><td>How often do you take loan</td><td colspan="4"></td></tr>
</table>

B. Flood, Its Impacts and Peoples' Vulnerabilities

1. Did the flood water enter in your homestead?
   ① Yes ② No
2. What was the highest level of flood water in your room?
   ① .....(in foot) ② Submerged the entire homestead
3. Where did you take shelter?
   ① Bridge ② High Road ③ Embankment ④ School ⑤ Relatives' House
   ⑥ Others.....
4. If bridge or road, how did you stay?
   ① Making tin-shade shelter, ② Under open sky ③ Making straw-made shelter
   ④ Making polythene-made shelter ⑤ Others.....
5. Have you faced any damage? ① Yes ② No
6. What things were damaged?
   ① House ② Crops ③ Furniture ④ Electric/Electronics Goods ⑤ Vehicle
   ⑥ Agro-Machinery ⑦ Others.....
7. Do you face such damages each year? ① Yes ② No, Not in every year
8. Have you repaired the repairable things? ① Yes ② No
9. If yes, what was the repairing cost? Tk .....
10. If no, why did you not repair the things?
    ① Lack of money ② Repair was useless ③ Unnecessary ④ Others.....
11. Do you have to repair such things every year?
    ① Yes ② No, Not in every year
12. Did you sell anything during last year's flood?
    ① Yes ② No
13. What did you sell due to flood?

Before Flood:

.....

During Flood:

.....

After Flood:

.....

14. How was the selling price?

① At a very low price ② At the normal Price ③ Less than the normal price

15. Why did you sell these assets?

① Fear of damage ② Want of money ③ Others.....

16. Do you have to sell those things ever flooding year?

① Yes ② No, not in every year

17. Have borrowed anything during flood?

① Yes ② No

18. What things were you borrowed for flood?

Before Flood:

.....

.....

During Flood:

.....

.....

After Flood:

.....

.....

19. From whom have you borrowed?

① Relatives ② Neighbour ③ NGO ④ Bank ⑤ *Samity* ⑥ Others.....

20. Do you have to borrow those things ever flooding year?

① Yes ② No, not in every year

21. Have borrowed money during last year's flood?

① Yes ② No

22. From whom have you borrow money?

① Relatives ② Neighbour ③ NGO ④ Bank ⑤ *Samity* ⑥ Others.....

23. If yes, what was the amount? Tk .....

24. For what reasons have you borrowed money?

.....

25. Have you paid the money? ① Yes ② No

26. If yes, after how much time did you repay your loan? .....

27. If no, why? .....

28. Do you have to borrow money each year's flood?

① Yes ② No, not in every year

29. Did you keep anything to others as mortgage during flood?

① Yes ② No

30. If yes, what things did you keep as mortgage during flood?

Before flood:

.....

.....

During flood:

.....

.....

After flood:

.....

.....

31. To whom have you keep the mortgage things?

① Relatives ② Neighbour ③ Friend ④ *Samity* ⑤ Others.....

32. Were you able to bring back the mortgaged assets? ① Yes ② No

33. If yes, after how many days/months/years? .....

34. If no, why?

.....

.....

35. How was the mortgage price?

①At a very low price ② At normal or usual price ③ less than the normal price

36. Do you have to keep such things as mortgage during flood each year?

① Yes ② No, not in every year

37. Have you lost land by river erosion last year?

① Yes ② No

38. If yes, what was the amount? Tk.....

39. How was the approximate total economic loss from the previous flood? Tk.

.....

C. Coping Strategies and Vulnerabilities

1. Agriculture

1.1 Did you cultivate paddy or other crops during previous flood?

① Yes ② No

1.2 If yes, did you take any measure to protect your paddy or crops from flood?

① Yes ② No

1.3 If yes, what did you do?

Before Flood:

.....

.....

During Flood:

.....

.....

After Flood:

.....

.....

1.4 If no, why did you not take any measure?

.....

.....

1.5 Have you cultivated flood resilient crops? ① Yes ② No

1.6 If no, why did you not cultivated such crops?

.....

1.7 Did your crops get damaged during previous flood?

① Yes ② No

1.8 If yes, how was the approximate loss from the standing crops damaged by flood? Tk .....

1.9 Does your crop damage by flood each year?

① Yes ② No, not in every year

1.10 If yes or occasionally, why do you cultivate during flood each year?

.....

.....

2. Livestock

2.1 Did you have any livestock during last flood?

① Yes ② No

2.2 If yes, what did you do to protect them during flood?

Hens/Chicken : ① Sold ② Eaten ③ Kept with us ④ Move to safer place ⑤ Other .....
Cows : ① Sold ② Eaten ③ Kept with us ④ Move to safer place ⑤ Other .....
Bullocks : ① Sold ② Eaten ③ Kept with us ④ Move to safer place ⑤ Other .....
Ducks : ① Sold ② Eaten ③ Kept with us ④ Move to safer place ⑤ Other .....
Others : ① Sold ② Eaten ③ Kept with us ④ Move to safer place ⑤ Other .....

2.3 What did you feed them during flood?

Hens/Chicken: .....Cows:

..... Bullocks:

.....Ducks:

.....

Others:

.....

.....

2.4 Was any of your livestock die during previous flood?

① Yes ② No

2.5 If yes, specify ....and their number.....

2.6 What was the cause of death of cattle? ① Lack of treatment ② Drowned ③ Disease ④ Other .....

2.7 Does your livestock die or suffer illness by flood each year?

① Yes ② No, not in every year

2.8 Was any of your cattle get infected with disease during flood? ① Yes ② No

2.9 If yes, what did you do? .....

3. Food Security

3.1 In the normal days what is your daily meal?

Morning:

.....

.....

Noon:

.....

.....

Night:

.....

.....

3.2 What did you eat during flood?

Morning:

.....

.....

Noon:

.....

.....

Night:

.....

.....

3.3 Please mention the name of foods that you ate during flood but you normally did not eat?

.....

.....

3.4 When din you dependent on that? ① During Flood ② After Flood

3.5 How long have you depended on that foods? ① During Flood .....week ② After Flood .....week

3.6 Did you eat less food than necessary during flood? ① Yes ② No

3.7 If yeas, why did you eat less? ①No sufficient food ② Cooking problem ③ Others .....

3.8 Have all members of your family eaten three times meal a day? ① Yes ② No

3.9 If no, how often did you/family members eaten? ① Once a day ② Twice a day

3.10 How long have you/they spent such way? .....days.

3.11 Was there any member of your family remain unfed? ① Yes ② No

3.12 If yes, who are they? ① Myself ② My wife/husband ③ Son ④ Daughter ⑤ Father ⑥ Mother

3.13 Why did you not eat properly?

① Want of money ② Lack of food ③ Lack of cooking materials ④ Others .....

3.14 Did the female members eat less than men? ① Yes ② No

3.15 Did you borrow food during flood? ① Yes ② No

3.16 From whom have you borrowed food?

① Relative ② Neighbour ③ Others.....

3.17 For how many days do you have food reserved?

① Normal Days..... ② During Flood.....days ③ After flood.....days

3.18 Did you stock food for flood? ① Yes ② No

3.19 If yes, for how many days did you store food? .....Days.

3.20 What short of food did you stored?

.....

3.21 If no, why? .....

3.22 Did you sell food grains (wheat, rice, paddy etc.) during last year's flood?

① Yes ② No

3.23 If yes, why?.....

3.24 Did you have any shortage of food?

① Yes ② No

3.25 If yes, how did you maintain your family food requirement?

.....

.....

3.26 Did you borrow money to buy food? ① Yes ② No

3.27 Did you cook during flood? ① Yes (1/2/3 times) ② No

3.28 If yes, where and how did you cook?

.....

3.29 What did you use as fuel? .....

3.30 If no, how did you meet food requirement? .....

3.31 What was the source of drinking water? ① Tube-well ② River water

③ Others.....

3.32 Did you purify it? ① Yes ② No

3.33 How did you purify it? ① Boiling ② by Medicine ③ Others.....

3.34 If no, why?

.....

.....

3.35 What was the source of cooking water? ① Tube-well ② River water

③ Others.....

3.36 Did you purify it? ① Yes ② No

3.37 How did you purify it? ① Boiling ② by Medicine ③ Others.....

3.38 If no, why?

.....

.....

3.39 Who fetched water? ① Myself ② Wife ③ Son ④ Daughter

3.40 What was the distance of fetching water? .....(minutes)

3.41 Did you face any problem with your children to feed them?

① Yes ② No

3.42If yes, what sorts of problem did you face?

.....

3.43 How did you do or solve the problems?

.....

4. Homestead Safety

4.1 Did you take any precaution before flood to protect your homestead?

① Yes ② No

4.2 If yes, what did you do?

Before flood:

.....

.....

How?

.....

.....

.....

.....

Why?

.....

.....

During Flood:

.....

.....

How?

.....

.....

Why?

.....

After Flood:

.....

How?

.....

.....

Why?

.....

4.3 If no, why did you not take any measure?

.....

4.4 Did your homestead get damaged during previous flood?

① Yes ② No

4.5 Does your homestead destroy or damage by flood each year?

① Yes ② No ③ Occasionally

5. Income & Economic Security

5.1 What did you do to earn during flood?

① Did the usual job ② Changed job ③ Did nothing ④ Moved to elsewhere for job

5.2 If changed, what did you do?

.....

5.3 What was the income per day at that time? Tk.....

5.4 If you did nothing, how did you manage your daily expenses during flood?

.....

5.5 If moved elsewhere, what did you do?

.....

5.6 What was the income per day at that time? Tk.....

5.7 If you move to other places for work, how did your family go on?

.....

5.8 Were you jobless during flood?

① Yes ② No

5.9 How many days were you jobless during flood? .....Day(s).

5.10 Was there any job available in your locality during flood?

① Yes ② No

5.11 If yes, what sorts of job were available?

.....

5.12 Did you need to use your savings during previous flood?

① Yes ② No

5.13 Do you spend money to recover from each year's disaster?

① Yes ② No ③ Sometimes

5.14 Was your savings sufficient or help you to recover from flood disaster?

① Yes ② No

5.15 Did you have to engage your family members to earn during previous flood?

① Yes ② No

5.16 Do you have to engage your family members to earn during each year's flood?

① Yes ② No ③ Sometimes

6. Life and Health Security

6.1 Did any of your family member been suffered from illness during flood disaster?

① Yes ② No

6.2 If yes, what was the illness?.....

6.3 Who were ill? .....

6.4 How many members got illness? ……..

6.5 Did any of the ill persons take any treatment?

① Yes ② No

6.6 If yes, where did you take them for treatment?

① Local Clinic ② Local Doctor ③ Town Hospital

④ Local Hospital ⑤ Take No Treatment

6.7 What did you do for the serious patient?

……

6.8 If the person is the main wage earner, how did your family go on?

……

6.9 What was the treatment cost? Tk.....

6.10 From where did you bear the treatment cost?

① My own source/income ② Browed from Relatives

③ Loan from NGO

6.11 What steps did you take to save lives of your family members from flood?

① Sent children to others…….. ② We all moved to safer place……

③ Did not move anywhere

6.12 If all moved or sent children to elsewhere, when did you move or sent?

① Just before inundation ③ After inundation

6.13 Where did you send them or take shelter?

① Highway ② Bridge ③ School ④ Relatives' house

⑤ Other……

6.14 Did any of your family members die during previous flood?

① Yes ② No

6.15 Who in you family died during flood?

……

6.16 What was the cause of death?

① Sever illness ② Drowned ③ Without treatment/medicine

④ For not being hospitalized ⑤ Other……..

6.17 When did he/she/they die?

① During Flood ② After Flood

6.18 If during flood, what did you do?

.....

6.19 Did you face any problem with your children during flood?

① Yes ② No

6.20 If yes, what problems did you face with your children during disaster?

① Diseases ② Less Food Intake ③ Insecurity (threat to life)

④ Other.....

6.21 Do all these happen (incidents of death, illness or diseases) during each year's flood?

① Yes ② No ③ Sometimes (not consecutive year)

7. Transport and Communication

7.1 Did you have any means or mode of transportation during flooding?

① Yes ② No

7.2 If yes, what is the mode of transportation you have?

① Boat ② Raft (Made by.....)

7.3 If no, what did you do then?

.....

7.4 Did you need to communicate to others living in the city or town during flood?

① Yes ② No

7.5 If yes, how did you do?

.....

7.6 Why did you need to communicate?

.....

8. Household Properties

8.1 What steps did you take to protect resources (furniture, vehicle etc.) from flood?

① Move valuable properties to others..... ② Keep the resources to elevated places

③ Did nothing

8.2 When did you move those properties?

① Before flood ② During flood

8.3 What is the elevated place?

.....

.....

8.4 If it is made by you, how did you make it?

.....

9. Help ad Support

9.1 Did you need any help from others during previous flood?

① Yes ② No

9.2 If yes, whom did you seek help?

① Neighbours ② Relatives ③ NGOs ④ GOs

⑤ Local Community

9.3 What sorts of help did you need?

.....

9.4 When did you need help?

① Before Flood ② During Flood ③ After Flood

9.5 Did anyone come forward to help you?

① Yes ② No

9.6 Who were they?

① Neighbours ② Relatives ③ NGOs ④ GOs

⑤ Local Community

9.7 What sorts of help did they help?

.....

9.8 When did they help?

① Before Flood ② During Flood ③ After Flood

9.9 If no, why?

.....

9.10 What sorts of assistances do you expect from others during flood?

.....

10. Others

10.1 How did you practice the religious duties?

.....

10. 2 Are you frightened of flood? ① Yes ② No

10. 3 If yes, why?

.....

10. 4 If no, why?

.....

10. 5 What sorts of insecurity did you face during flood?

.....

10.6 What measures do you think can save you and your family from harmful impact of flood?

.....

10.7 Why do you not take such measure?

.....

10.8 Why (for what weaknesses) are you affected by each year's flood?

.....

10.9 Did you see any crime happen during flood? ① Yes ② No

10.10 What sorts of crime did you see during flood?

.....

10.11 How many days did it take to return to normal life from flood disaster?.....Day(s).

10.12 If longer time, why did it take so much time to return to normal life?

.....

10.13 How did you adjust the after flood situation?

.....

.....

Interviewer

ANNEX II

Table 1: Top 10 Natural Disasters in Bangladesh
(1900-2013)
(By People Killed)

Disaster	Date	People Killed
Drought	1943	1,900,000
Epidemic	1918	393,000
Storm	12-Nov-1970	300,000
Storm	29-Apr-1991	138,866
Storm	Oct-1942	61,000
Storm	11-May-1965	36,000
Flood	Jul-1974	28,700
Storm	28-May-1963	22,000
Storm	24-May-1985	15,000
Storm	Jun-1965	12,047

Source:"EM-DAT: The OFDA/CRED International Disaster Database at www.emdat.be

Table 2: Top 10 Natural Disasters in Bangladesh
(1900-2013)
(By People Affectd)

Disaster	Date	No Total Affected
Flood	Jun-1988	45,000,000
Flood	Jul-1974	38,000,000
Flood	20-Jun-2004	36,000,000
Flood	May-1984	30,000,000
Flood	22-Jul-1987	29,700,000
Drought	Jul-1983	20,000,000
Flood	Jul-1968	15,889,616
Storm	11-May-1965	15,600,000
Storm	29-Apr-1991	15,438,849
Flood	5-Jul-1998	15,000,050

Source:"EM-DAT: The OFDA/CRED International Disaster Database sited at www.emdat.be

Table 3: Top 10 Natural Disasters in Bangladesh
(1900 to 2013)
(By Economic Damage)

Disaster	Date	Damage (000 US$)
Flood	5-Jul-1998	4,300,000
Storm	15-Nov-2007	2,300,000
Flood	20-Jun-2004	2,200,000
Flood	Jun-1988	2,137,000
Storm	29-Apr-1991	1,780,000
Storm	15-May-1995	800,000
Flood	Aug-1987	727,500
Flood	Jul-1974	579,200
Flood	Sep-2000	500,000
Earthquake (seismic activity)	26-Dec-2004	500,000

Source:"EM-DAT: The OFDA/CRED International Disaster Database sited at www.emdat.be

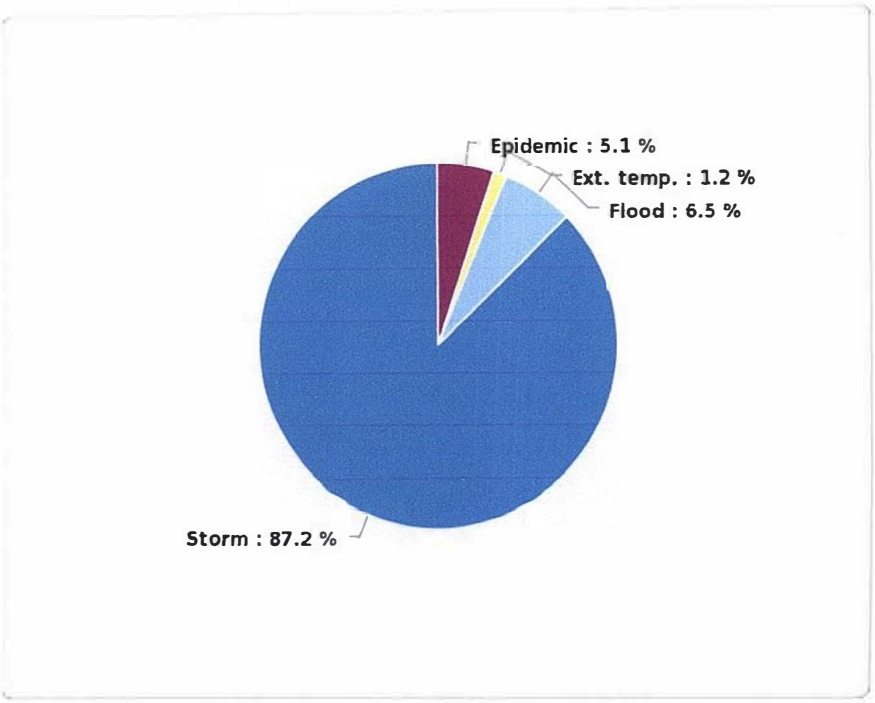
Table 4: Summarized Table of Natural Disasters in Bangladesh from 1900 to 2013

Disaster Category	Disaster	# of Events	Killed	Total Affected	Damage 000 US$)
Drought	Drought	7	1,900,018	25,002,000	-
	ave. per event		271,431	3,571,714	-
Earthquake (seismic activity)	Earthquake (ground shaking)	6	34	19,125	-
	ave. per event		6	3,188	-
	Tsunami	1	2	-	500,000
	ave. per event		2	-	500,000
Epidemic	Unspecified	17	5,068	2,503,118	-
	ave. per event		298	147,242	-
	Bacterial Infectious Diseases	5	3,639	420,479	-
	ave. per event		728	84,096	-
	Parasitic Infectious Diseases	3	1,396	69,904	-
	ave. per event		465	23,301	-
	Viral Infectious Diseases	5	393,085	48,928	-
	ave. per event		78,617	9,786	-
Extreme temperature	Cold wave	18	2,148	313,200	-
	ave. per event		119	17,400	-

	Extreme winter conditions	2	230	101,000	-
	ave. per event		115	50,500	-
	Heat wave	2	62	-	-
	ave. per event		31	-	-
Flood	Unspecified	31	44,847	177,076,392	4,024,100
	ave. per event		1,447	5,712,142	129,810
	Flash flood	11	261	7,634,577	729,000
	ave. per event		24	694,053	66,273
	General flood	41	7,074	132,446,412	7,285,300
	ave. per event		173	3,230,400	177,690
	Storm surge/coastal flood	2	51	473,335	-
	ave. per event		26	236,668	-
Mass Movement Wet	Landslide	3	96	55,280	-
	ave. per event		32	18,427	-
Storm	Unspecified	49	5,706	2,356,857	850,000
	ave. per event		116	48,099	17,347
	Local storm	31	1,976	1,409,079	16,401
	ave. per event		64	45,454	529
	Tropical cyclone	86	626,859	74,852,031	4,765,979
	ave. per event		7,289	870,373	55,418

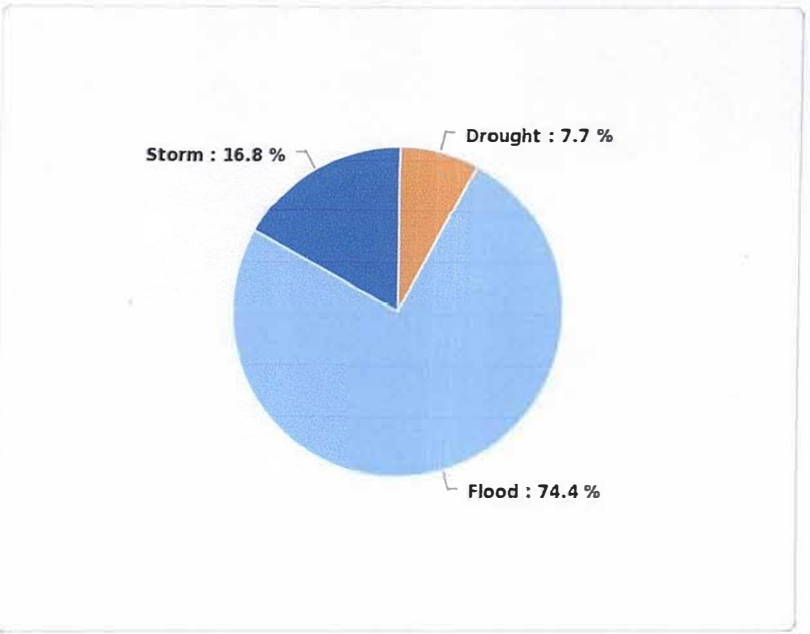
Source:"EM-DAT: The OFDA/CRED International Disaster Database, sited at www.emdat.be

Figure 1 : Percentage of Reported People Killed by Disaster Type



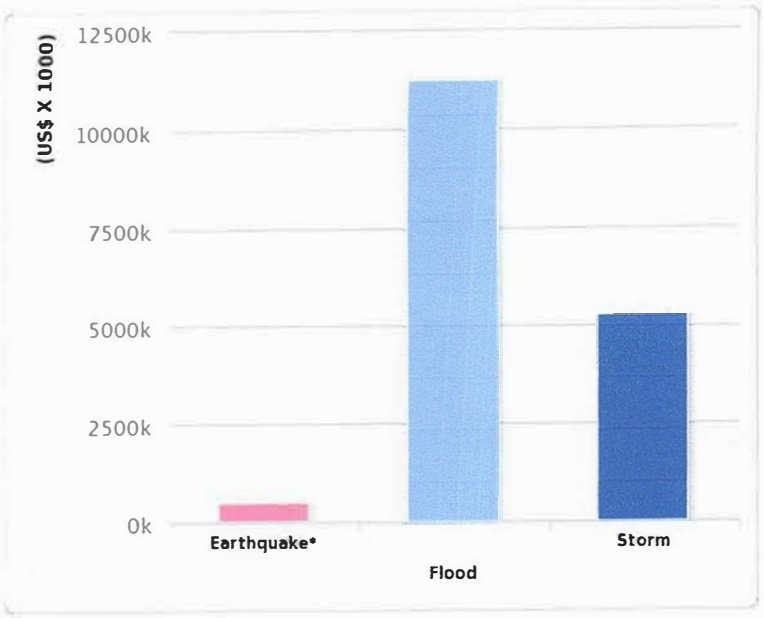
Source: Source of data: "EM-DAT: The OFDA/CRED International Disaster Database, Data version: v11.08 Sited at http://www.preventionweb.net/english/countries/statistics/?cid=14

Figure 2: Percentage of Reported People Affected by Disaster Type



Source: Source of data: "EM-DAT: The OFDA/CRED International Disaster Database, Data version: v11.08, Sited at http://www.preventionweb.net/english/countries/statistics/?cid=14

Table 5: Estimated Economic Damages Reported by Disaster Type (US$ X 1,000)



Source: Source of data: "EM-DAT: The OFDA/CRED International Disaster Database, Data version: v11.08 Sited at http://www.preventionweb.net/english/countries/statistics/?cid=14

Table 6: Natural Disasters from 1980 – 2010

(Overview)

No of events:	234
No of people killed:	191,836
Average killed per year:	6,188
No of people affected:	323,480,264
Average affected per year:	10,434,847
Economic Damage (US$ X 1,000):	17,072,500
Economic Damage per year (US$ X 1,000):	550,726

Source: Source of data: "EM-DAT: The OFDA/CRED International Disaster Database, Data version: v11.08 Sited at http://www.preventionweb.net/english/countries/statistics/?cid=14