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Community and Organizational Response to the Cyclone Affected People in Coastal Bangladesh: A Study on Two Villages in Bagerhat

Hasan, Sk. Razibul

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**Community and Organizational Response to the
Cyclone Affected People in Coastal Bangladesh:
A Study on Two Villages in Bagerhat**

Sk. Razibul Hasan



**Institute of Bangladesh Studies
University of Rajshahi**

Rajshahi
June 2016

Community and Organizational Response to the Cyclone Affected People in Coastal Bangladesh: A Study on Two Villages in Bagerhat

A PhD Dissertation Submitted to
the Institute of Bangladesh Studies (IBS), University of Rajshahi
in Partial Fulfillment of the Requirements for the Degree of
Doctor of Philosophy in Sociology

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**Rajshahi
June 2016**

DECLARATION

I do hereby declare that, except otherwise stated, the dissertation entitled **Community and Organizational Response to the Cyclone Affected People in Coastal Bangladesh: A Study on Two Villages in Bagerhat** submitted to the Institute of Bangladesh Studies, University of Rajshahi for the partial fulfillment of the degree of Doctor of Philosophy in Sociology is exclusively my original work. This work has not been submitted in any form to any other university or institute for any degrees or diplomas.

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CERTIFICATE

I am pleased to certify that the dissertation entitled **Community and Organizational Response to the Cyclone Affected People in Coastal Bangladesh: A Study on Two Villages in Bagerhat** is an original work accomplished by Sk. Razibul Hasan, PhD Fellow, Session 2008-2009 at the Institute of Bangladesh Studies (IBS), University of Rajshahi, Bangladesh. The research has been conducted under my academic guidance and supervision. The researcher himself prepared the dissertation, and this is not a conjoint work. He has certainly made distinct contribution in the field of Sociology, through his original work. As far as I know, the whole dissertation or any part of it has not been submitted to anywhere for any degrees and/or any diplomas.

I have gone through the draft and final dissertation and found it satisfactory for submission. This dissertation is, therefore, recommended and forwarded for submission to the Institute of Bangladesh Studies, University of Rajshahi in partial fulfillment of the requirement for the Degree of Doctor of Philosophy in Sociology.

Rajshahi
June 2016

Dr. M. Zulfiquar Ali Islam
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ABSTRACT

The present doctoral research is designed to portray Community and Organizational Response to the Cyclone Affected People in Coastal Bangladesh and in doing such the research was conducted in villages of Bagerhat District — one of the severe disaster prone areas among the 41 coastal districts of Bangladesh. Almost every year, it has been affected by natural disasters like — cyclone, tidal surge, north-wester, severe salinity etc. Different types and ranges of cyclones ravaged Bagerhat District and victimized its inhabitants in a desolate state of attack recurrently. This study examines the community and organizational responses and initiatives that they employ to the cyclone affected people for their adaptation and survival in different phases of cyclonic disaster in coastal Bangladesh. The cyclonic disaster stimulates the affected people to respond and formulate various adaptive and survival strategies in different ways which are indigenous to their lifestyle and imposed by the organizations.

This research is administrated by survey, in-depth interview, case study and FGD for data collection by using purposive sampling during March 2009 to June 2011.

The coastal communities of Rayenda and Uttar Sauthkhali were highly dependent on the natural resources for earning their livelihoods and most of cyclone victims of the two study villages were poor in

financial, intellectual, and technological capacities. The average level of poverty of the coastal district was higher than the national average by 3 percent. Around half of the extreme poor households lived in the high to very high-risk cyclone inundation areas. This study identified five major vulnerabilities of communities of Rayenda and Uttar Sauthkhali: acute poverty, non-resistant dwelling buildings to cyclone, delta basin, saline water intrusion and changes in coastal morphology. It was forecasted that these vulnerabilities would be acute due to the combined effects of climate changes, sea level rise, subsidence, and change of upstream river drainage, cyclones, and coastal embankments.

From the several generations the respondents have been dwelling on this coastal cyclone affected areas and consequently they experienced and perceived cyclone as hazard to their livelihood. This identification drove them to adopt various techniques, i.e. indigenous hazard assessment, pre-cyclone, during cyclone and post cyclone adaptations, indigenous long term adaptation techniques etc., in their own ways to response community and organizational initiatives for their survival.

It was quite disappointing that the cyclone affected people were not aware about cyclone warnings. For this reason, they deployed various indigenous warning indicators depend on environment, animal behavior, ecology and astronomy etc. in their own fashion. This study explored the community of Rayenda and Uttar Sauthkhali had no planning to mitigate cyclone disaster as well as disaster risks

reduction. As the communities of two very villages were not well conscious about Community Based Disaster Management (CBDM), how it forms, how it works, who are the main actors of CBDM etc., they were very much vulnerable to cyclone disaster.

For cyclone victims survival and adaptation, after cyclone Sidr and Aila the local Government agencies distributed dry foods, saline and drinking water among the cyclone affected people of Rāeẏndā and Uttar Sāuthkhālī. However, the half of the respondents of Uttar Sāuthkhālī opined that they found humanitarian aids after two to three days later. They also opined that NGOs volunteers first distributed dry foods and drinking water among them. However, the cyclone-affected communities of Rayenda opined that the local authorities distributed various aids at the first hour after disaster in both Sidr and Aila. After Sidr disaster, the local authorities conducted a survey for identifying actual affected people who had given various aids for their resilience. But the study found that 42.10 percent of the actual cyclone victims did not found any rehabilitating aids provided by different organizations. Several International and National NGOs directly involved their workers for aid distributing activities. Therefore, the rehabilitating aids that many foreign nations aided for the cyclone affected people of Rayenda and Uttar Sauthkhali was distributed with the collaboration of local Government authorities and some selected National NGOs. The organizational responses after the both cyclones

did not give any aids to the cyclone affected people for increasing their permanent economic capability.

Extensive relief and rehabilitation programme from the part of Government, NGO's and International Organization has been launched after the Sidr and Aial cyclones. But initially the programme suffered from poor transport and communication due to severe damages of roads and telecommunication system. Sufficient amount of relief material came into the locality from various government and non-government organizations. But the cyclone victims of Rāeẏndā and Uttar Sāuthkhālī opined about the deficiency of organizational aids distribution process.

This study disclosed the fact that in Sidr and Aila organizations played a vital role during early, during and after disaster response: nearly two-third of the study villages opined that the organizational response was vital for early warning and after disaster rehabilitation but more than four-fifth of the both villages opined that during disaster time cyclone affected people helped each other to rescue life and property, saved life and helped vulnerable neighbors that means during disaster times community based response was higher than organizational response and rescue system.

The immediate, subsistence and adaptive needs for the survival of the cyclone victims of Rayenda and Uttar Sauthkhali were not fulfilled

moderately rather than partially. It was evident from the findings that one-third cyclone affected people of Rayenda and Uttar Sauthkhali have been fulfilled their immediate, subsistence and adaptive needs and the rests were suffering a meiserable conditions in all stages of disaster. To reduce the damages from cyclone, counter measures are in practice. But the interrelationships of all the problems related to cyclone disaster mitigation are so complex that needs an integrated approach. Finally, the present study wrapped it job with a number of concluding remarks and policy measures for the development of coastal Bangladesh that would be useful for the policy makers and implementers.

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ABBREVIATIONS

ADPC	Asian Disaster Preparedness Centre
AFD	The Armed Forces Division
AMSS	Automatic Message Switching System
BBS	Bangladesh Bureau of Statistics
BDRCS	Bangladesh Red Crescent Society
BMD	Bangladesh Meteorological Department
BWDB	Bangladesh Water Development Board
CBA	Community Based Adaptation
CBDM	Community Based Disaster Management
CBDRM	Community Based Disaster Risk Management
CDNA	Coastal Disaster Need Assessment
CPP	Cyclone Preparedness Program
CPPHQ	Cyclone Preparedness Program Head Quarter
CSDDWS	Committee for Speedy Dissemination of Disaster Related Warning Signals
DDMC	District Disaster Management Committee
DMA	Disaster Management Act
DMB	Disaster Management Bureau
DMTATF	Disaster Management Training and Public Awareness Building Task Force
DRR	Disaster Risk Reduction
EIA	Environmental Impact Assessment

EOC	Emergency Operations Centre
ERS	Emergency Receiving System
EWS	Early Warning System
FFWC	Flood Forecasting and Warning Center
FPOCG	Focal Point Operational Co-ordination Group on Disaster Management
GDSN	Great Danger Signal Number
GMS	Geostationary Meteorological System
GNDP	Guidelines for Natural Disaster Prevention
HFAP	Hoygo Framework Action Plan
IDNDR	International Decade for Natural Disaster Reduction
IIED	Institute for Environment and Development
IMDMCC	In-Ministerial Disaster Management Co-ordination Committee
IPCC	Inter-Governmental Panel on Climate Change
ISDR	International Strategy for Disaster Reduction
ITCZ	Inter-Tropical Convergence Zone
IWI	Indigenous Warning Indicators
JTWC	Joint Typhoon Warning Center
MDMR	Ministry of Disaster Management & Relief
MODF	Ministry of Food and Disaster Management
MWR	Ministry of Water Resources
NCC	National Coordination Committee
NDMAC	National Disaster Management Advisory Committee

NDMC	National Disaster Management Committee
NDMP	National Disaster Management Policy
NGOCC	NGO Co-ordination Committee on Disaster Management
NOAA	National Oceanic and Atmospheric Administration
NPDM	National Plan for Disaster Management
PO	People's Organization
SADIS	Receiving System of Satellite Distribution
SCS	Sattelite Communication System
SOC	Standing Order of Cyclone
SOD	Standing Order of Disaster
SPARRSO	Bangladesh Space Research and Remote Sensing Organization
SRS	Sattelite Data Receiving System
SWC	Storm Warning Center
TUG	Tubewell User Group
WAFS	World Area Forecasting System
WMO	World Meteorological Organization

CHAPTER 1

Introducing the Problem

1.1 Introduction

The number of reported major catastrophes and their impact on social and economic development worldwide has concurrently been increasing. Over the last decade around 7,000 natural disasters, including earthquakes, volcanic eruptions, tropical cyclones, floods and droughts occurred and caused of more than 300,000 people and economic losses estimated an amount US\$ 800 billion as.¹ In the *Āin-I-Ākbarī* of the 16th century, cyclone is mentioned as a disaster in this belt (Indian Subcontinent).² Because of climate change, the frequency and intensity of climate-related events are likely to increase. Disaster as if flood, cyclone etc. are also regular phenomena, especially in the coastal areas and in offshore islands. During the last three decades, almost all of the coastal areas and offshore islands of Bangladesh faced cyclones.

Every year different types and ranges of cyclones occur in the world. It is a continuous and often an unscheduled extreme natural phenomenon. But the human often fail to cope with it, because, they have little or even no control over the recurring natural disasters like cyclone. More than 50 million people are affected by non-routine

¹ Munich Re, *The Small Island Habit*, (UN-DESA: 2004), p6

² Abul Fazal Allami, *The Ain-I Akbari*, Trans. Translated by H. S. Jarret (New Delhi: Crown Publication, 1988), vol. ii, p130

annual attack of tropical cyclone, and of them approximately 22 million people are victimized permanently or temporarily over the world in every year.³ The ability effectively respond to cyclones is becoming more critical because of various factors like generally high growth of population density in the coastal areas and increasing settlements in high-risk areas etc., are contributing to greater vulnerability.

The Bay of Bengal is one of the most cyclone prone areas in the world. In Bangladesh, coastal areas are ecologically sensitive and climatically vulnerable because of the continuous process of erosion and accretion. The coastal areas cover over 6.8 million of households in 147 upazillas (Sub-district) along the coastal belt, which considered as risk prone (BBS, Household Income and Expenditure Survey-2005). In spite of cyclonic risk, there has been growing population pressure on those areas. Due to this natural setting, a total of 23 natural cyclones made landfall in Bangladesh during the 50 year period (1960–2009) and caused huge death tolls and cyclone affected significant numbers of population.

Nevertheless, the coastal morphology of Bangladesh influences the impact of natural hazards on the area. Climate change adds a new dimension to disaster risk and vulnerability. About one-fifth of the

³ UN Inter-Governmental Pannel on Climate Change.
http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html [accessed January 16, 2009]

144 million population lives within 19 coastal districts. Frequently disasters adversely affect the livelihood of coastal regions by damaging their means of earning (destruction of the factory, loss of crop, destruction of shop) and or assets (loss of animals, plowing tools, boats etc). Of the 508 cyclones that have originated in the Bay of Bengal in the last 100 years, 17 percent have hit Bangladesh, amounting to a severe cyclone almost once every three years inflicting heavy losses of life and property. Of these, nearly fifty-three percent have claimed more than five thousand lives. The economic losses of the last three cyclones amount to US\$ 4.6 billion.⁴

Almost every year, small to medium range cyclones are formed in the Bay of Bengal, hit the landmass causing moderate damage. But periodically strong mightiest cyclones associated with high tidal surges engulf the entire coastline and even sometimes approach further north. Thus, not only property loss but also death toll goes beyond any imagination. Given the periodic catastrophes affecting the Bay of Bengal coast, there is a serious need for an effective disaster management plan to minimize the loss of lives and property. Some of the local NGOs in collaboration with government agencies; undertake certain activities but that too have been limited to mostly relief and rehabilitation activities. Cyclone preparedness plan is hardly found among these agencies. People, living in the coast, apply their own

⁴ Abul Barkat et al, *Guidelines to Reduce the Economic Risk of Coastal Livelihood due to Tsunami/Cyclone*. (Dhaka:Ministry of Food and Disaster Management, 2008) p9

weather reading skill and thereby, take necessary precautions. The present study therefore deals with the various actors' related responses towards cyclone disaster of Rayenda and Uttar Sauthkhali. In view of this, the present study has distinct purposes to serve: community participation and responses towards cyclone disasters through their own cultural fashion and organizational response mechanisms (structural and non-structural) towards cyclone disaster.

1.2 Statement of the Problem

The loss of life and property and human suffering caused by tropical cyclones in coastal areas in various parts of the globe are well known. These disasters are, on occasion, particularly severe in the Bay of Bengal region. The northern part of the Bay of Bengal is known for its apprehensive nature to generate dangerous high tides that turns into a major killer when associated with cyclonic storms. In the past, out of 10 recorded cases of very heavy loss of life (ranging from about 40,000 to well over 200,000) in the world due to tropical cyclones, 8 cases were in the Bay of Bengal and the Arabian Sea (5 in Bangladesh and 3 in India).⁵

Natural hazards are usually classified based on where they occur on the Earth. Atmospheric hazards are most often weather-related events, while geologic hazards happen on or within the Earth's surface.

⁵ The Secretariat of The World Meteorological Organization, "Technical Document on Tropical Cyclone Operational Plan for The Bay of Bengal and The Arabian Sea", (Geneva: WMO, 2008) p. 5

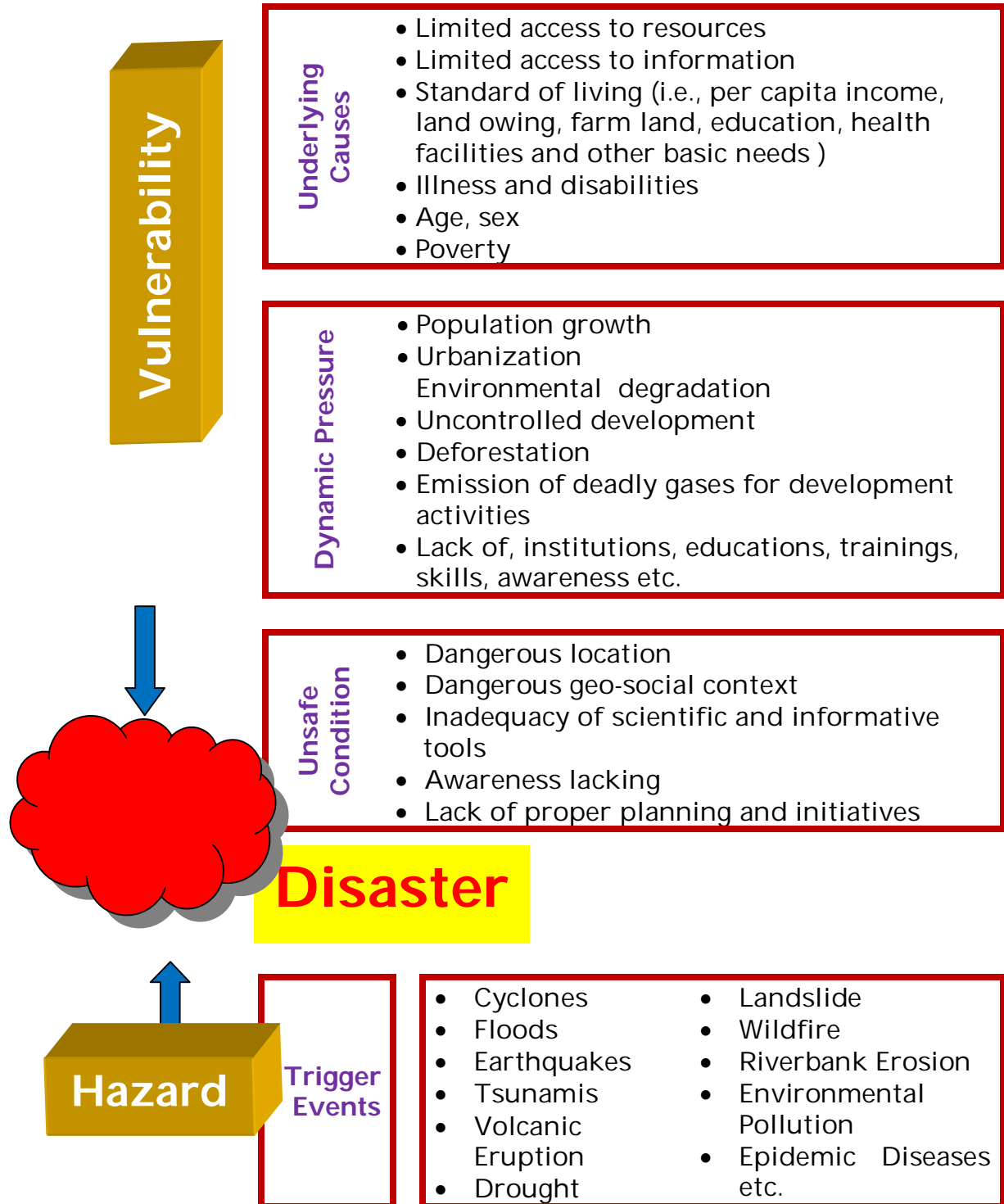
However, it is important to understand that atmospheric hazards can trigger geologic hazards (such as a thunderstorm producing flooding), and geologic hazards can trigger atmospheric hazards (such as a volcanic eruption producing thunderstorms). Any kind of hazard—cyclone, flood, river erosion, and earthquake and so on—turns into disaster when it affects the vulnerable population and causes damage, casualties and disruption.

There are various ways of classifying hazards. One useful typology reflects the extent to which hazards are natural, and it recognizes three groups; natural hazards; such as earthquakes or cyclone, which arise from purely natural processes in the environment and would continue to exist in the absence of people quasi-natural hazards, such as haze or desertification, which arise through the interaction of natural processes and human activities technological (or man-made) hazards, such as the use of toxic chemical pesticides which can seriously pollute food chains and aquatic habitats, or the accidental release of radiation from nuclear installations (like power stations). Any kind of hazard — cyclone, flood, river erosion, and earthquake and so on — turns into disaster when it impacts on the vulnerable population and causes damage, casualties and disruption of social relationship and social structure. And the affected population finally failed to return and/or restore their socioeconomic status before cyclone attack and consequently they are impelled to receive

assistance to meet their cyclone induced needs from the outsiders.

The figure 1 would give a paradigmatic epitome of what a disaster is.

Figure 1: A Paradigmatic Epitome of Disaster



There are 14 coastal districts in our country cover an area of 39,331 skm. with a total population of about 31 million.⁶ So, nearly one forth of the populations living in the coastal areas of Bangladesh live in the high-risk zones. About 2400 cyclones shelters, of them one third were severely damaged by the cyclone SIDR, in the highly risky and risky coastal areas that can accommodate nearly 1.5 million people. A survey conducted in 2004 by the Center for Environmental and Geographic Information (CEGIS) on 1,705 shelters identified some deficiencies in the shelters.⁷ The highly risky areas are subjected to damages caused by the both winds and storm surges that accompany the tropical cyclones. The risky areas are subjected only to wind damages caused by the tropical cyclones, but not to the storm surges that accompanying them.

The Bay of Bengal is a house of developing different types of depression that turn into cyclone. It is reported that 3 to 5 of 80 or so severe tropical cyclones that occur annually in the world form in the Bay of Bengal. During the last century (1900 to 2015), 46 cyclones hit the coastal areas of Bangladesh (Chart 1).⁸ These cyclones struck coastal Bangladesh and devastated the livelihood of coastal people. It is noticeable that, 20 of 41 cyclones ravaged Bagerhat District and victimized its inhabitants in a desolate state of attack. It is found that

⁶ Alam *et al.* "Frequency of Bay of Bengal Cyclonic Storms and Depressions Crossing Different Coastal Zones", *International Journal of Climatology*, (New York: 2003), vol. 23, p1120.

⁷ Management Information and Monitoring Division. <http://www.ddm.gov.bd/site/page/67786590-f690-4696-8ecf-65b7c71923a/> [accessed November 12, 2008].

⁸ Alam *et al.* "Frequency of Bay of Bengal Cyclonic Storms and Depressions Crossing Different Coastal Zones", *International Journal of Climatology*, (New York: 2003), vol. 23, p1121.

nearly two-third (63.41%; N=26 of 41) of total landfall cyclones occurred were tropical cyclones. Since 1970 to 2009, five major cyclones in the year of 1970, 1988, 1991, 2007 and 2009 caused human death tolls of around 448,878 and victimized four times higher than the number of death tolls (Chart 1).

Chart 1
List of Tropical Cyclones in Bangladesh during Last Few Decades

Type of Disaster	Name of Disaster	Year	Number of Casualties
Cyclone	Bhola	12 Nov. 1970	500000
Cyclone	GORKY	29 April 1991	138868
Cyclone		1988	5704
Cyclone	Sidr	15 Nov. 2007	3363
Cyclone		1997	550
Cyclone	AILA	27-29 May 2009	500
Cyclone		2002	300
Cyclone		2007	127
Cyclone		2003	104
Cyclone		2010	56
Cyclone	Roanu	21 May 2016	26
Cyclone	Mahasen	16-17 May 2013	17
Cyclone	Rashmi	26-27 Oct 2008	15
Cyclone	Bijli	19-21 April 2009	
Cyclone	Komen	29 July 2015	

Type of Disaster	Year	Number of Casualties
Tornado	1996	545
Flood	1987	1657
Flood	1988	1517
Flood	1998	918
Flood	1999	15
Flood	2000	36
Drought	1989	800

Source: Wikipedia 2016

It is reported that 0.3 and 1.3 million people in coastal areas lost their lives due to cyclone attack in 1970 and 1991 respectively. More than 8.9 million people in 1,950 unions of 200 upozilas under 30 districts were affected by Cyclone SIDR. Among them 5.63 million cyclone

victims received Governmental assistance after cyclone attack.⁹ It was not at all adequate to adapt to devastated coastal environment and to survive in a befitting manner (Table 1).

Table 1
Nature and Intensity of Cyclones Stricken in Bagerhat District

Year	Nature of Cyclone	Intensity
1909	Cyclone	--
1917	Tropical cyclone (Cyclone)	1
1942	Cyclone	--
1960	Tropical cyclone (Cyclone)	3
1960	Tropical cyclone (Cyclone)	2
1966	Tropical cyclone (Cyclone)	1
1970	Tropical cyclone (Cyclone)	4
1971	Cyclone	--
1971	Cyclone	--
1973	Cyclone	--
1974	Cyclone	--
1975	Cyclone	--
1977	Cyclone	--
1988	Tropical cyclone (Cyclone)	2
1991	Tropical cyclone (Cyclone)	4
1998	Storm	--
2007	Tropical cyclone (Cyclone)	4
2009	Tropical cyclone (Cyclone)	2

Source: Banglapedia 2003; CDMP 2009

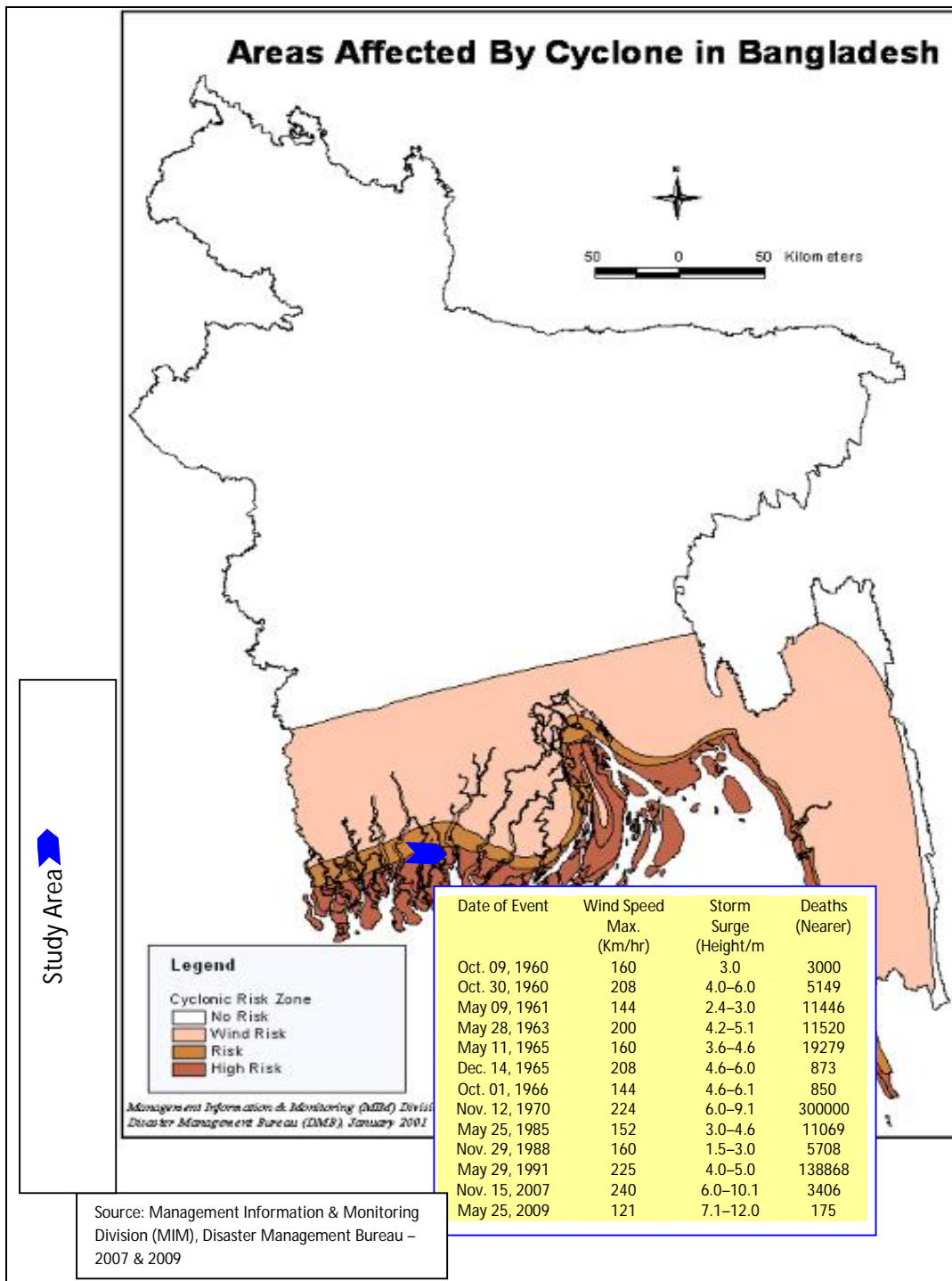
Effective preventive and preparedness strategies such as land-use planning, resource and environmental management, early warning systems integrated with emergency preparedness, could highly reduce risks associated with tropical cyclones and other related hazards in coastal areas. This would require relevant meteorological, oceanographic and hydrological information to support different

⁹ National Disaster Response and Co-ordination Center (NDRCC), <http://www.mofdm.gov.bd/site/view/situationreport> [accessed November 10, 2008]

decision processes. But the Government, NGOs are not mentionable in contrasting to GO, has no oceanographic and hydrological information through the SPARSO.

Map 1

Areas Affected by Cyclones in Bangladesh by Years



An emergency agent, such as a cyclone, flood, earthquake etc. does not automatically adapt to boundaries decided by humans. It can affect various geographical regions and several segments of the society at the same time. Responses to emergencies involve formal organizations that are specialized in such missions (e.g., fire brigades, health care, police, and military personnel) and also other local, regional, and national agencies and organizations that normally operate on a day-to-day basis with emergencies and crises. To a certain degree, administrative borders influence the effectiveness of the responders. Apart from formal organizations, one can identify permanent or temporary clusters of individuals who also are working in the response context. Several of the difficulties encountered have been identified and concern the problem of adaptation of management functions in relation to an event and its dynamics.¹⁰

The structural complexity created by different types of organizations having to operate, sometimes individually and sometimes jointly, to respond to an emergency in an effective way calls for advanced and adaptable management. In a large emergency, a single commander does not oversee the conglomerate of resources. Moreover, in such a complex environment, bureaucratic as well as cultural differences come into play when the rescue services, the police, health care

¹⁰ Christian Uhr, *Multi-organizational Emergency Response Management- A Framework for Further Development*. (Laund: Laund University, 2009) p 6

personnel, and the military all have to operate side-by-side with other official agencies, with NGOs, politicians, single individuals, emergent groups, and the like.

Humanitarian response to mitigate the impact during and after a disaster will always be an important element, however, Disaster Risk Reduction (DRR) during the pre-disaster situation, particularly through the integration of potential threats into a country's planning and policy, at both the national and local levels, is crucial in order to mitigate the impact of disasters and maximize a country's development potential. In Bangladesh, the Inter-Ministerial Disaster Management Coordination Committee (IMDMCC) is in-charge of implementing disaster management policies and decisions assisted by the National Disaster Management Advisory Committee (NDMAC).

For implementing the national disaster management policy, the Comprehensive Disaster Management Programme (CDMP), under the auspices of the Disaster Management Bureau (DMB), is undertaking a number of interventions aimed at strengthening and improving disaster management and risk mitigation capacities at various levels, and in promoting and implementing the national strategic priorities and plans set out by the government.

The year (FY 2009–2010) the government has made the highest budgetary allocation of Tk 129.46 billion for the food and disaster

management ministry to meet the growing need for food, relief and reconstruction works in the disaster-hit areas, mainly in the southern coast, and also to ensure food security of the poverty-stricken people. According to CDMP, in 2007, taka 6 corer have been allocated for disaster response and risk mitigation with the collaboration of the donor agencies for 3 years. The per capita allocation for the coastal inhabitants is 206.90 taka. The amount is too short to mitigate the cyclone affected needs. But it is a fear of concern that no budgetary allocation has been done particularly for the cyclone affected people who are not able to reconstruct their lives. The lower socio-economics status, limited access to resources and sheer poverty cause vulnerabilities to coastal landfall cyclones and this alarming situation makes enormous sufferings and needs for their livelihood.

The cyclone affected people emphatically try to protect their lives and properties from the devastation caused by cyclone attack and finally they found themselves unable to do it properly. The cyclone victims impelled to face adversities in continues their devastated livelihood. During the onslaught of cyclone, the community people and the cyclone victims collaboratively formulate and undertake a number of corrective measures to protect their lives and belongings as none of those are adequate. Unusually they follow their indigenous warning system as the government warning system is found ineffective in many cases. They can prepare their own ways and it is the result of their lifelong traditional experiences on the coastal habitat. They may

have no scientific knowledge in this regard but their experienced based local knowledge is much important to useful for their adaptation and survival in such desolate state of coastal environment induced by severe cyclone attack. In the sheer lack of organizational supports and trainings, the cyclone victims are enforced to do what is needed for meeting cyclone induced adversities and it was operated by their local knowledge and skills and managed by local resources.

So, it is necessary to have a profound insight into the community's strategies which they deploy in different phases of disaster or crisis situation along with the organizational responses to adptation for the cyclone affected people.

1.3 Literature Review

A few numbers of studies on cyclone and responses to cyclone disaster limit their foci on early warning, communication and response, structural measures and coastal zone management, devastation, relief work, and population sufferings in the coastal areas of Bangladesh. These are following: Uy and Shaw 2008; Shoheb and Moniruzzaman 2008; Kazuyoshi Hasegawa 2007; Edwards 2007; Shamsuddoha and Karim 2007; L. Benson, and Bugg 2006; N. Karim, 2005; Mahbuba Nasreen 2004; Alam *et al.* 2003; Barry and Chorley 2003; Haque and Burton 2003; Berry 2003; Islam 1995; Mahbub Hossain 1992; Chowdhury *et al.* 1992.

The following studies depict the nature of cyclone in coastal Bangladesh and responses made by the Organizations and community to the cyclone affected people.

Naoralene Uy and Rajib Shaw (2008)¹¹ in their article entitled “Shaped by Wind and Typhoon: The Indigenous Knowledge of the *Ivatans* in the Batanes Island, Philippines” described the indigenous knowledge of the *Ivatans* in Batanes island for coping with typhoons which heat them averagely 8 times in a year. N. Uy and Shaw (2008) revealed the way of life, the method of doing things, and the beliefs all based on traditional knowledge and customs are the core tenets of *Ivatan* culture. To adapt with the rough climate the *Ivatans* use traditional housing and make boats — their only transportation mechanism — with locale materials and all are shaped with their indigenous knowledge for combating with disaster. The traditional house of the *Ivatans* is built with limestone walls two to four feet thick and layers of reeds and cogon grass as roofing along with small and narrow doors and windows. Only three walls of the house have windows. The faces of the house are opposite to the directions of the strongest wind. As well as they are habituated to make their boat by wood with a rounded bottom that pitches and rolls with the waves and skim the

¹¹ Naoralene Uy and Rajib Shaw, “Shaped by Wind and Typhoon: The Indigenous Knowledge of the *Ivatans* in the Batanes Island, Philippines,” Rajib Shaw, Naoralene and J. Baumwoll (ed), *Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from the Asia-Pacific Region* (New York: ISDR, 2008), pp. 59–63.

rough sea. The *Ivatans* combat with disaster togetherly, while nature batters their islands, the *Ivatans* remain in close touch and help each other, whether it is communally repairing a neighbor's house, keeping villages clean, or harvesting crops. This article identifies indigenous coping strategies to disaster and very much related in some extent to this research study but the context of the article is Batanes Island of Philippines not in coastal cyclone responses of Bangladesh.

A. Z. M. Shoheb and Md. Moniruzzaman (2008)¹² conducted a study to compare the NGOs activities in crisis situation between 1998 and 2007 flood in Kazipur and Rajbari. Shoeb and Moniruzzaman (2008) claimed that NGOs and donour agencies take part to eliminate or reducing suffering through humanitarian ground of feelings in the time of disaster situation. They argued maximum NGOs worked as two-way approach: bottom-up and top-down approach in the time of natural crisis. But the Government activities are always in the top-down approach. In contrasting to the Government role in disaster moment the NGOs response is speedier, less bureaucratic, well organized as well as community based. But the article does not encompass the NGOs role in cyclone disaster management in coastal Bangladesh.

¹²A. Z. M. Shoheb and Md. Moniruzzaman, "NGOs' Role in Flood Disaster Management in Bangladesh: A Case Study," *The Journal of Geo-Environment*, Vol- 7, pp. 1–12, 2008

Kazuyoshi Hasegawa (2007)¹³ described the trends and damages caused by the Sidr, compared its damages with other affected cyclones in Bangladesh, Government success in risk mitigation and responses to disaster. Hasegawa (2007) claims Cyclone SIDR, one of the ten strongest cyclones for past 131 years struck the south-west coastal region in Bangladesh and caused the widespread serious damage. He argued, the remarkable feature is that the fatalities due to Cyclone SIDR sharply decreased compared with the cyclones in 1970 and in 1991. One of the factors is measures of Government for early warning and for increase of cyclone shelters. Also, embankments showed significant roles to minimize the damage, although they could not prevent the storm surge with over 6-9m wave height. However, condition of embankments was seen insufficient in the investigation. It was confirmed that vegetation zone along shorelines or riversides contributes to decrease the water depth of storm surge, and is useful to protect the bank from the erosion. The article does not reveal the community and NGOs responses to cyclone affected people in coastal Bangladesh.

Jonathan Edwards (2007)¹⁴ described the process of formation of cyclones in the different parts of the world including the Bay of Bengal but not post disaster situation which is related to cyclone affected

¹³ Kazuyoshi Hasegawa, "Features of Super Cyclone Sidr to Hit Bangladesh in November, 07 and Measures for Disaster," *Journal of River and Watershed Environment Management* (Japan: Foundation of River & Watershed Environment Management, 2007), pp. 51–58.

¹⁴ Jonathan Edwards, *Tropical Cyclone Formation* (New York: Storm Banner, 2007), pp. 11–13.

people, adaptation to disaster and various responses. It may fulfill the query of Bay of Bengal cyclone formation in this research research.

Shamshuddoha and C. R. Karim (2007)¹⁵ demonstrated major disaster threats which have been caused by climate change by reviewing Bangladesh environmental scenario and major catastrophes that affected Bangladesh severely in different times. It argued cyclone warning system and disaster preparedness are not well enough in contrasting to disaster risk and population density in coastal areas in Bangladesh. It identifies the overall cyclone impacts and damages caused by the low level preparedness but not the GO and NGOs responses to the affected community.

Benson L. and Bugg (2006)¹⁶ demonstrated a child-centered community based framework of DRR where children play leading roles in their communities to minimize the negative impacts of disasters. It included meaningful and ethical child participation in assessing, planning, implementing, monitoring and evaluating DRR based on the United Nations Convention on the Rights of the Child (UNCRC). Whilst children play lead roles with the support of adults in their communities, the responsibility and accountability for preparedness, mitigation and response still lies with adult stakeholders and duty

¹⁵ Md. Shamshuddoha and C. R. Karim, "Climate Change Impacts and Disaster Vulnerabilities in the Coastal Areas of Bangladesh," *Journal of Equity and Justice Working Group of COAST Trust*, 2003, No. 3, pp. 1-7

¹⁶ L. Benson and Bugg, *Child-led Disaster Risk Reduction: A Practical Guide* (Southern Lyte: Save The Children, 2006), pp 6-11

bearers. They explored the community based disaster risk reduction process which includes children as key factor but not the organizational responses to cyclone affected people.

N. Karim (2005)¹⁷ aimed to identify the consequential effects on the overall socioeconomic situation because of cyclonic storms in the coastal areas of Bangladesh. The unprecedented super cyclones of 1991 and 1997, which occurred throughout Bangladesh had triggered fresh initiatives to take mitigation measures to reduce the vulnerability of cyclones and tidal surges. The author argued after the 'super' cyclone of 1991, the government, NGOs and community members took precautionary measures to prevent cyclonic disasters though they had limited instrumental support. They basically demonstrated an overall phenomenon of cyclonic impacts on socioeconomic life of affected people and various responses to disaster but not the indepth insight on cyclone affected people and integrated responses to them.

Mahbuba Nasreen (2004)¹⁸ made an attempt to explore what research has been done to address disasters in Bangladesh and to what extent disasters are highlighted from social perspective. She explored the use

¹⁷ Nehal Karim, "Cyclonic Storms in the Coastal Areas of Bangladesh: Socio-Economic Impact," International Symposium on Disaster Reduction on Coasts Scientific-Sustainable-Holistic-Accessible, 14–16 November, Monash University, 2005, pp. 1–9.

¹⁸ Mahbuba Nasrin, "Disaster Research: Exploring Sociological Approach to Disaster in Bangladesh," *Bangladesh e-Journal of Sociology*, (Dhaka, 2004), Vol. 1. No. 2. p 1-6

of sociological approach in disaster management but not took a single look on the integrated responses to the cyclone affected people.

Alam *et al.* (2003)¹⁹ divided the coastal areas of Bangladesh into 5 zones to observe the variation of cyclone occurrences — occurrences of tropical cyclones by month and week — in different coastal zones. This article tries to identify the zone wise attack of cyclones in coastal Bangladesh and account their damages but not to try to identify the overall responses to cyclone affected people.

Barry and Chorley (2003)²⁰ found the development of Bay of Bengal cyclone, and its nature and scale. The book does not encompass the affected community and various responses to them.

C. Emdad Haque and Ian Burton (2003)²¹ described the experiential aspects, emphasizing current practice of mitigation and its associated measures, costs, risks, and benefits (of all kinds including social, political, ecological) of mitigation, and adjustment and adaptation measures; and policy implications of alternative measures. They identified global adaptation strategies and vulnerability mitigation of disaster that very much related in some extent to this research study but the context of the article is not in coastal Bangladesh.

¹⁹ Alam et al., “Frequency of Bay of Bengal Cyclonic Storms and Depressions Crossing Different Coastal Zones,” *International Journal of Climatology*, (New York: 2003)vol. 23, pp1119-1125.

²⁰ R. G. Barry and R. Chorley, *Atmosphere, Weather and Climate* (New York: Routledge, 2003).

²¹ C. Emdad Haque and Ian Burton, “Adaptation Options Strategies for Hazards and Vulnerability Mitigation: An International Perspective,” *Journal of Mitigation and Adaptation Strategies for Global Change*, (Newyork: Springer, 2003) No. 10, 2003, pp. 335–353.

Linda J. Anderson-Berry (2003)²² argued by analyzing the early survey (1996) data indicated that community residents generally had some knowledge of cyclones but a limited understanding of cyclone processes and they were found to be poorly prepared for cyclones and unlikely to respond to warnings appropriately. But the situation was changed in 2000, Cairns community residents were better informed about cyclones and certainly more experienced by the contribution of disaster education and experience. And they were more aware about their vulnerabilities related to tropical cyclone. They discovered the Cairns residents' cyclone awareness by intensified cyclone awareness education and experience about cyclone over years. The findings of this article is very much related to the organizational and community initiatives to promoting awareness of cyclone affected community in this study though the region is different.

Mahbub Hossain (1992)²³ demonstrated the development strategies and policies after post disaster period. He tried to develop a sustainable policy by government involvement but not the integrated approach to cope with cyclone disaster which includes both organizations and affected community.

²² Linda J. A. Berry, "Community Vulnerability to Tropical Cyclone: Cairns 1996–2000", *Natural Hazards*, (New York: Springer, 2003) vol 23, pp. 209–232.

²³ Mahbub Hossain, "Development policy, Growth Process and Coping with Natural Disaster," H. Hossain, C. P. Dodge and F. H. Abed (ed), *From Crisis to Development—Coping with Disasters in Bangladesh* (Dhaka: University Press Limited, 1992), p. 137.

Chowdhury *et al.* (1992)²⁴ described the collective efforts made by the GO and NGOs as well as individuals in response to cyclone affected people of 'Cyclone Gourky 1991'. They basically demonstrated the health hazards of affected people and responses to them but not the whole responses of GO and NGOs as well as community to cyclone affected people.

Christian Uhr (2009)²⁵ basically intended to correlate multi classes NGOs "traditional" and "contemporary" emergency response mechanisms which is essential to develop command and control, co-ordination and emergence as well reciprocal trust in any emergency management. Uhr did not confine him with a particular disaster rather various disasters in a whole. He did not touch the community (disaster-affected people) activities in disaster emergency as well.

Moreover, the discussions on various responses to cyclone affected people basically cyclone affected people, those literatures are scant and scattered in nature. In this context, the present study intends to make a profound insight into Community and Organizational responses to cyclone affected people in coastal areas of Bangladesh. It is expected that the present study bridges the research gap and this research is different by addressing the needs assessment of the

²⁴ M. Chowdhury et al, Cyclone Aftermath: Research and Direction for The Future," H. Hossain, C. P. Dodge and F. H. Abed (ed) *From Crisis to Development—Coping with Disasters in Bangladesh* (Dhaka: University Press Limited, 1992), p. 101.

²⁵ Christian Uhr, *Multi-organizational Emergency Response Management- A Framework for Further Development*. (Laund: Laund University, 2009).

cyclone affected people, their vulnerabilities, and their coping strategies with community responses as well.

1.4 Operational Definition of Key Concepts

Community: Generally community means all the people who live in a particular area. In this study community describes a totality of human being who are affected and not affected by tropical cyclone and lived in the study area. So, both affected and unaffected people of the study area are considered as community.

Cyclone affected people/victim: In this study cyclone affected people and cyclone victim is used as parallel and same meaning. The term cyclone affected/victims refer to a unit of coastal people who are impelled to stay or leave their original dwelling houses devastated by cyclone attack and to find shelter at neighbors and/or relatives houses and/or cyclone shelter. In this study cyclone victims/affected mean a special community who are victimized by cyclone attack at least once in their life time. They essentially lived in the study locale both temporarily and permanently and were sheltered at NGO, GO cyclone center and/or under the community people shed.

Hazard: It refers to natural events drought, cyclone, earthquake, volcanic eruption, high wind, lightning, flood, riverbank erosion, etc. not yet occurred but can be occurred or not. The present study considers mainly the environmental hazard of cyclone,

which recurrently threatens the lives and properties of the coastal community in Bangladesh. It deserves all traits and/or potentialities of a disaster but not yet occurred.

Cyclonic Disaster: In the present study, the coastal people usually are victimized by landfall cyclone attack annually and they are used to experience such damages and losses more than once in a year. In such catastrophic situation, they fail to recover and rehabilitate their desolate livelihood by their own capacities and skills and consequently the need support from outsiders. This situation is regarded as cyclonic disaster in the present study.

Disaster Risk Reduction: The concept of 'disaster risk reduction' comprises of a numbers of plans and activities: early warnings, preparedness, evacuation, communication and response, infrastructural measures and coastal zone management. In this research, disaster risk reduction activities also include vulnerabilities reduction, hazard mapping, awareness raising, orientation and training of apprehensive population in native ways.

Organization: In this research, organization refers to both the government and non- government organizations which are self-governing, private, not-for-profit, or non-profit organizations that exist to improve the quality of life and livelihood of cyclone victims/affected coastal people.

Response: This is the period that immediately follows the occurrence of the coastal people disaster. The coastal people respond to the disaster of cyclone in their own ways. The needs and sufferings of cyclone victims are enormous. Those are immediate, subsistence and rehabilitation. This study consider, all endeavors undertaking by GOs and NGOs to meet those needs and responses.

1.5 Research Questions

Based on the consideration mentioned above, the following research questions can be formulated:

- i. Do the low-level socioeconomic status and lack of awareness cause vulnerabilities of the coastal people to cyclone?
- ii. Does what they received from the organizational sources (GO and NGOs) meet the expectation of responses to cyclone induced enormous needs?
- iii. How is the cyclone victims impelled to formulate and undertake indigenous adaptation and survival strategies caused by the sheer lack of organizational supports?

1.6 Objectives of the Study

The main objective of the study is to identify the community and organizational responses and initiatives that they employ to the enormous needs of cyclone victims in different phases of cyclonic disaster in coastal Bangladesh (Chart 2). To attain this broad objective,

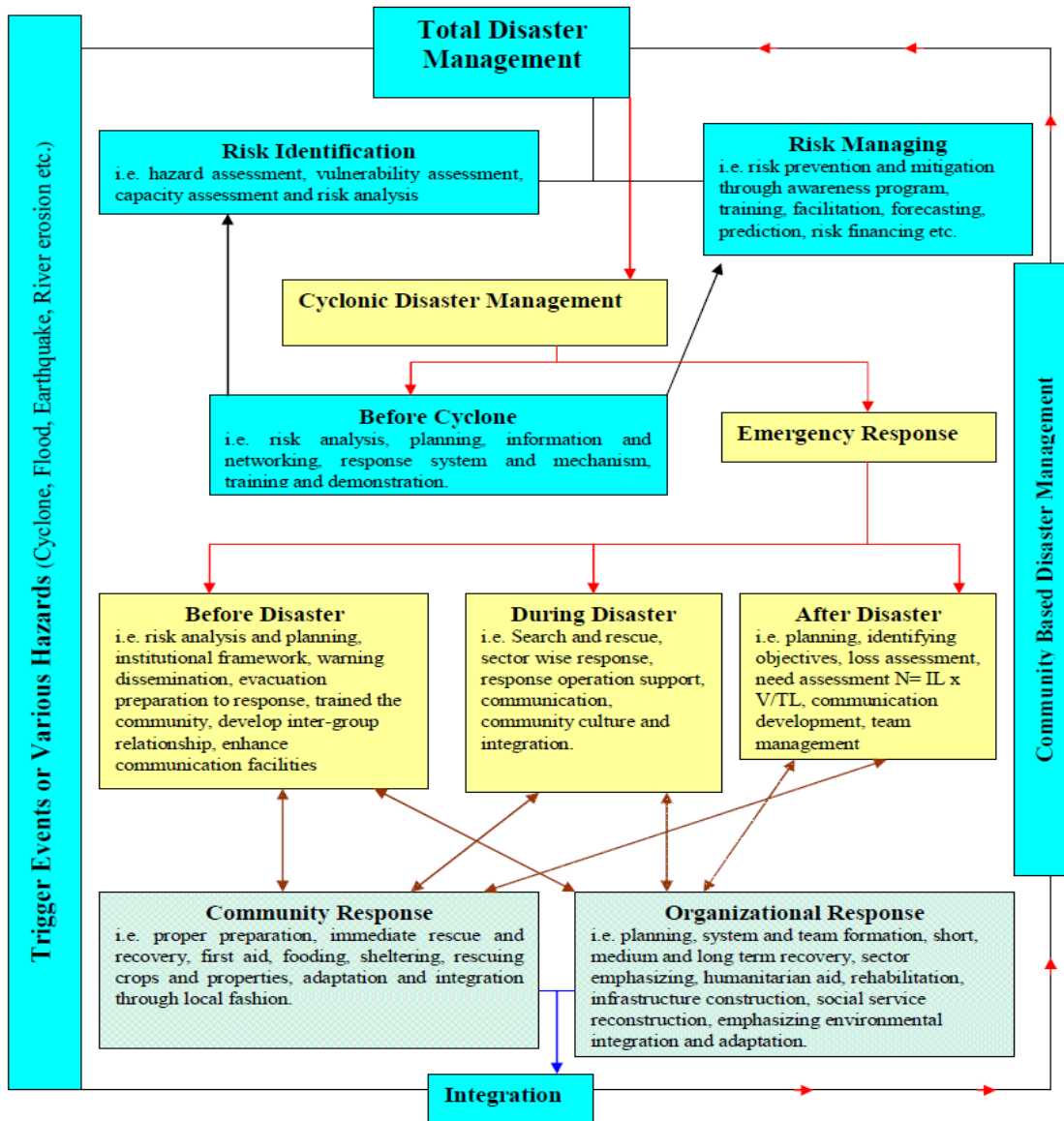
a number of objectives of the present research are specified in following ways:

- i. To know the extent of the cyclone victims vulnerabilities to cyclone hazard in their coastal habitat;
- ii. To analyze the community and organizational cyclone warning system;
- iii. To analyze the plans and strategies of organizations and communities to reduce cyclone disaster risk;
- iv. To explore how the affected community adapt to the cyclone devastated habitat in their indigenous fashion; and
- v. To analyze the community and organizational response to the cyclone victims' enormous needs of the subsistence and rehabilitation.

Chart 2
Operational Matrix of Research Objectives

Main Objective			Output	
To identify the community and organizational responses and initiatives that they employ to the enormous needs of cyclone victims in different phases of cyclonic disaster in coastal Bangladesh.			Disaster responses of organization and cyclone affected people coping strategies in coastal Bangladesh	
Specific Objectives	Verifiable Indicators	Data Sources	Data Type	Output
To know the extent of the cyclone victims vulnerabilities to cyclone hazard in their coastal habitat	Cyclone affected people education level, access to resources, access to power, Housing pattern, environmental degradation	Field survey, FGD, Indepth interview and Case study	Quantitative& Qualitative	Understanding the causes of vulnerabilities of cyclone affected people
To analyze the community and organizational cyclone warning system	Scientific instrument and knowledge, cyclone awareness, Communication facilities	Field survey, FGD, Indepth interview and Case study	Quantitative& Qualitative	Understanding community and organizational warning system
To analyze the plans and strategies of organizations and communities to reduce cyclone disaster risk	GO & NGOs disaster management plans, Hazard mapping, Early preparedness, Coastal community's strategies and method	Field survey, FGD, Indepth interview and Case study	Quantitative& Qualitative	Understanding the existing disaster management plan of community GO, and NGOs
To explore how the affected community adapt to the cyclone devastated habitat in their indigenous fashion	Cyclone affected people, Education, communication, wealth, Locale resources, Prejudice and dogmas, inherited coping knowledge	Field survey, FGD, Indepth interview, informal discussion and Case study	Quantitative& Qualitative	Profound knowledge about GO, NGOs' responses to cyclone affected people
To analyze the community and organizational response to the cyclone victims' enormous needs of the subsistence and rehabilitation	Ensure shelter in pre, on slot and post disaster situation, awareness, Food staff, Rehabilitation, Various reliefs: clothing, medicine, money, water, rice or wheat, VGF and VGD etc. Needs of the cyclone affected people pre, during and after cyclones and responses in favor of that needs done by the organization and community	Field survey, FGD, Indepth interview, informal discussion and Case study	Quantitative& Qualitative	Profound knowledge about community and organizational responses to cyclone affected people. Understanding response efficiency according to cyclone affected people immediate, subsistence and adaptive needs

Chart 3
Conceptual Framework
Conceptual Framework Matrix of Community and Organizational Response to the Cyclone Affected People in Coastal Bangladesh



1.7 Methodology

1.7.1 Types of Research: This research is a descriptive, and exploratory in nature. Both quantitative and qualitative approaches are utilized in gathering and analyzing empirical data on community and organizational responses to the cyclone victims of Rayenda and Uttar Sauthkhali villages of Bagerhat District.

1.7.2 Study Area Selection: In this study two medium sized villages of Bagerhat district are purposively selected. There are some reasons behind this selection. Bagerhat, one of the most cyclonic disaster prone areas of Bangladesh, faced 18 so severe hurricanes since 1960 to 2009 and two selected villages: Rayenda and Uttar Sauthkhali were badly massacred by category 2/4 cyclones on 1970, 1988, 1991, 2007 and 2009. Therefore, the findings of the present study attest the immense sufferings and enormous needs of cyclone victims and the pattern of community and organizational responses to their sufferings and needs.

1.7.3 Sample Size and Sampling: Both the qualitative and quantitative data are collected from the two disaster prone villages of Bagerhat District. Having resource and time constraint for in-depth study, purposive sampling method is used for this research. A total of 255 respondents are considered as the study samples and 255 respondents are ensured as scheduled questionnaire survey, 5 for FGD, 7 respondents for case study and 5 for informal interview (Chart 4).

Chart 4
Sample Distribution and Sampling Techniques

Data Collection Methods and Techniques	Number of Sample	Sampling Techniques	Types of Sample
Scheduled Questionnaire of Social Survey	255	Purposively	Households
FGDs	5	Purposively	Cyclone victims
Case Studies	7	Purposively	Cyclone victims (Severely affected)
Informal Interviews with Stakeholders	5	Purposively	Key Informants

1.7.4 Unit of Analysis: The present research considered all cyclone affected households as its unit of analysis.

1.7.5 Methods of Data Collection: Both the qualitative and quantitative methods and their techniques are utilized for collecting empirical data on community and organizational responses to the cyclone victims of Rayenda and Uttar Sauthkhali villages of Bagerhat District.

The social survey method and its two techniques questionnaire and interviews are used to collect household level data of the cyclone victims/affected. It is covered all the unit of analysis (255). A number of case studies are conducted to cover notable issues and/or significant aspects of cyclone affected. This case studies provide empirical in-depth of the units investigated here. To have more accurate social realities of cyclone victims, a total of 5 FGDs are conducted as selected aspects and problems of the respondents. A

focus group was usually composed of 7 to 10 respondents. Some informal discussions were conducted to gather in-depth insight, and validity and reliability of the data from relevant stakeholders, e.g; GO or NGO personnel, community leaders, community people etc.

1.7.6 Type and Sources of Data: The present study is chiefly based on empirically collected primary data. However, secondary data are also used to support primary data in relevant cases (Chart 5).

**Chart 5
Type and Sources of Data**

Types of Data	Sources of Data	Techniques of Collection
Primary Data	Cyclone affected Household (255)	Scheduled Questionnaire Survey
	Selected cyclone victims (5)	FGDs
	Selected cyclone victims (7)	Case Studies
	GO and NGO Personnel, Community People (5)	Informal Interviews
Secondary Data	Govt. and NGOs Documents, Books, Journals, Research Reports, Articles, Survey Reports and other available and relevant documents	Document Analysis

1.7.7 Techniques of Data Analysis: Collected data in this research are processed and analyzed with the help of computer. Descriptive and inferential techniques such as frequency distribution, cross tabulation, variance, correlation, regression, and graphical presentation style are used for analyzing quantitative data in this research.

Qualitative data collected through case studies, FGDs, and informal interviews are analyzed through simple reasoning process by

categorization and classification with linguistic, conceptual and descriptive manner.

1.8 Justification of Research

In the review of collected literature, it has been observed the early studies have been conducted in different aspects of cyclonic disaster not in the field of community and organizational responses to cyclone victims. So, there is a knowledge gap in this regard. Every year in monsoon season, the coastal area of Bangladesh is found to be at risk of cyclone attacks. It slows down the overall economic development. Cyclone is the great threat and disaster as well as for the coastal community's economic development and their human rights situations. As a result, the cyclone risk reduction become a great and difficult tasks for the GOs and/or NGOs.

Knowing how the cyclone victims people cope with cyclonic disaster and how they get responses from their own community and, GO and NGO are important. It can add a new dimension to cyclonic disaster research and can create an opportunity for proper intervention; especially community oriented cyclonic disaster reduction as well as cyclone risk reduction because this research takes an attempt to explore warning system, communication and response, structural measures and coastal zone management. This study can help policy makers, planners to think more effectively and efficiently so that they can develop more effective programs for strengthening cyclone risk

reduction strategies and save lives and properties in coastal Bangladesh. The present study can be justified by following ways:

- it provides to be new and/or a new window of knowledge for students and/or researchers;
- its findings to be a baseline for future research;
- its findings to be utilized by the policy makers and planners for future development for the cyclone victims disaster mitigation;
- its findings reflect opinions and views of cyclone victims for their rehabilitation;
- its findings to be useful for the students, researchers, policy makers, development program planners, social workers and the cyclone victims as well.

1.9 Scope of Research

The focus of the study is restricted to the community and organizational responses and their strategies for the cyclone victims in reducing cyclonic disaster risks and losses in coastal Bangladesh. This study examined the existing cyclone risk reduction policies of GOs and NGOs along with community involvement in reducing cyclonic disaster risks and loss. It also identifies the awareness level of affected community and how they respond to cyclone affected people and to cope with disaster devastated coastal habitat.

1.10 Limitations

There are 14 coastal districts cover an area of 39km. with a total population of 31 million. Only two coastal villages of Bagerhat District

are selected in this study to examine the nature and pattern of response made by the GOs and NGOs, and cyclone victims to enormous needs and sufferings of cyclone victims. There are various aspects and issues of the cyclone victims are not addressed by the present study.

1.11 Time Reference

All cyclones struck to the Bagerhat District between 1990 to 2009 are analyzed in this research.

1.12 Time Budget

1. July 2008–June 2009: A coursework and collection of materials, analysis, interpretation and presentation of seminar.

2. July 2009–June 2010: Collection of data, analysis of reasonable data, writing dissertation (partially) and finalizing the proposal for PhD Conversion and presentation of the Conversion Seminar.

3. July 2010–October 2011: Collection and analysis of data, writing PhD dissertation, presentation of seminar, completion and submission of the thesis.

1.13 Thesis Outline

The present doctoral dissertation comprises eight distinct chapters. The first chapter introduces the research problem of community and organizational response to the cyclone affected people in Coastal Bangladesh. It justifies the selection of the present topic for doctoral research, rationalizes the methodology for investigation in the light of its objectives. The second chapter details the geo-social settings and socio-physical effects of landfall cyclones in the study area. The third

chapter provides cyclone affected peoples' vulnerabilities to cyclone hazards, and their awareness and access to information, shelter, and responses. The fourth chapter explores the community and organizational cyclone warning in the face of cyclonic hazards and consequent disasters. The fifth chapter explores the community adaptation and organizational strategies in cyclonic disaster. The sixth chapter pinpoints the community and organizational responses to the enormous needs of the cyclone victims in catastrophic cyclonic disasters. The seventh chapter compares the actual responses received by the cyclone victims with their enormous needs caused by the cyclonic disasters. The concluding chapter summarizes findings, draws concluding remarks and indicated a number of policy measures for the development of coastal Bangladesh that would be useful for the policy makers and implementers.

It is expected that this research will clarify a profound understanding about how community and organization response to cyclone affected people to coping with cyclone disaster. It is also expected that the study will find out a correlation among cyclone affected people needs and various responses to them. This study is based on field survey. It may undergo changes with the progress of the study as well as the incorporation of better suggestions, opinions of scholars and concerned individuals.

CHAPTER 2

GEO-SOCIAL SETTINGS AND SOCIO-PHYSICAL EFFECTS OF LANDFALL CYCLONES IN THE STUDY AREA

The present chapter is designed to portray the geographical location and ecological settings of the study villages. It firstly provides information about location and topography of study locale; secondly socioeconomic conditions of the inhabitants of study locale; thirdly geo-natural context of landfall cyclones in study local; and lastly cyclones and its socio-physical effects.

The coastal areas include mangrove, coastal island, marine, estuary, coral, tidal flats and sandy beach have its unique geo-physical characteristics that construct its own socio-ecological settings and socio-political consequences. Bangladesh has 710 km long coastline which is low-lying with 62 percent of the land have an elevation of up to 3 meters and 86 percent up to 5 meters. A study of IPCC in 2003 reveals that today, approximately 3 billion people — about half of the world's population — live within 200 thousand kilometers of a coastline. In regards of Bangladesh perspective up to 50 percent of population lives in coastal areas.²⁶

²⁶ Brown *et al*, *Global Environment Outlook 3*. (London: UNEP, 2003), p 188

In terms of administrative consideration, Bangladesh has 19 districts out of 64 are situated in coastal belt which represents an area of 47,211 sq km, 35 percent of country's geographical areas where 6.85 million of households are living. Bagerhat is one of the most hazardous coastal districts in Bangladesh with an area of 3959.11 sq km, which means 8.39 percent of coastal areas, is bounded by Gopalganj and Narail districts on the north, Bay of Bengal on the south, Gopalganj, Pirojpur and Barguna districts on the east and Khulana district on the west. It contains 1.5 million of population out of 1.2 million are living in coastal belt.²⁷

Out of nine upazilas of Bagerhat, Sarankhola is one of the most vulnerable to environmental hazards i.e., cyclone, tidal surge, and flood since its innumerable past. It is typical flood plain delta, which bounded by three rivers Baleshwar in the east, Chandpai in the west and Haringhata Khal in the north, and the mighty Bay of Bengal in the south. For this ecological setting when any kinds of depressions are made in Bay of Bengal in April to November cause heavy rainfall, tidal surge and heavy wind blowing.

2.1 Location and Topography of Study Locale

Sarankhola thana was established in 1908 and was turned into an upazila in 1982. It consists of 5 union parishads, 12 mouzas and 45

²⁷ Bangladesh Bureau of Statistics, *Bangladesh Economic Review 2008*. (Dhaka: Ministry of Finance, 2008)

villages. Sarankhola with an area of 756.61 sq km, bounded by Morrelganj upazila on the north, the Bay of Bengal on the south, Mathbaria and Patharghata upazilas on the east, Mongla upazila on the west, geographical coordinates are 22° 18' 0" North, 89° 47' 0" East (Map 2). Arable land is 11616 hectares, fallow land 829 hectares; single crop 53.02 percent, double crop 26.67 percent and treble crop land 20.31 percent.²⁸

It contains 0.11 millions of population with male 51.28 percent, female 48.72 percent; Muslim 91.11 percent, Hindu 8.84 percent, others 0.05 percent. The average literacy rate is 35.4 percent with male 39 percent, female 31.9 percent. Most of the people are living on agriculture, forestry, fishing and fishing related labor: agriculture 32.94 percent, forestry 8.65 percent, fishing 4.27 percent, agricultural laborer 11.96 percent, wage laborer 7.32 percent, commerce 14.14 percent, service 5.78 percent, others 14.94 percent. Above 60 percent of the total population is living in poverty line.

Among the peasants, 35.03 percent is landless, 7.23 percent is marginal, 22.10 percent is small, 29.67 percent is intermediate, and 5.97 percent is rich and cultivable land per head 0.09 hectare.²⁹ & ³⁰

²⁸ Bangladesh Bureau of Statistics, *Bangladesh Household Income and Expenditure Survey 2005*. (Dhaka: Ministry of Finance, 2005)

²⁹ Abul Barkat *et al.* *Guidelines to Reduce the Economic Risk of Coastal Livelihood due to Tsunami/Cyclone*. (Dhaka: Ministry of Food and Disaster Management, 2008) p10

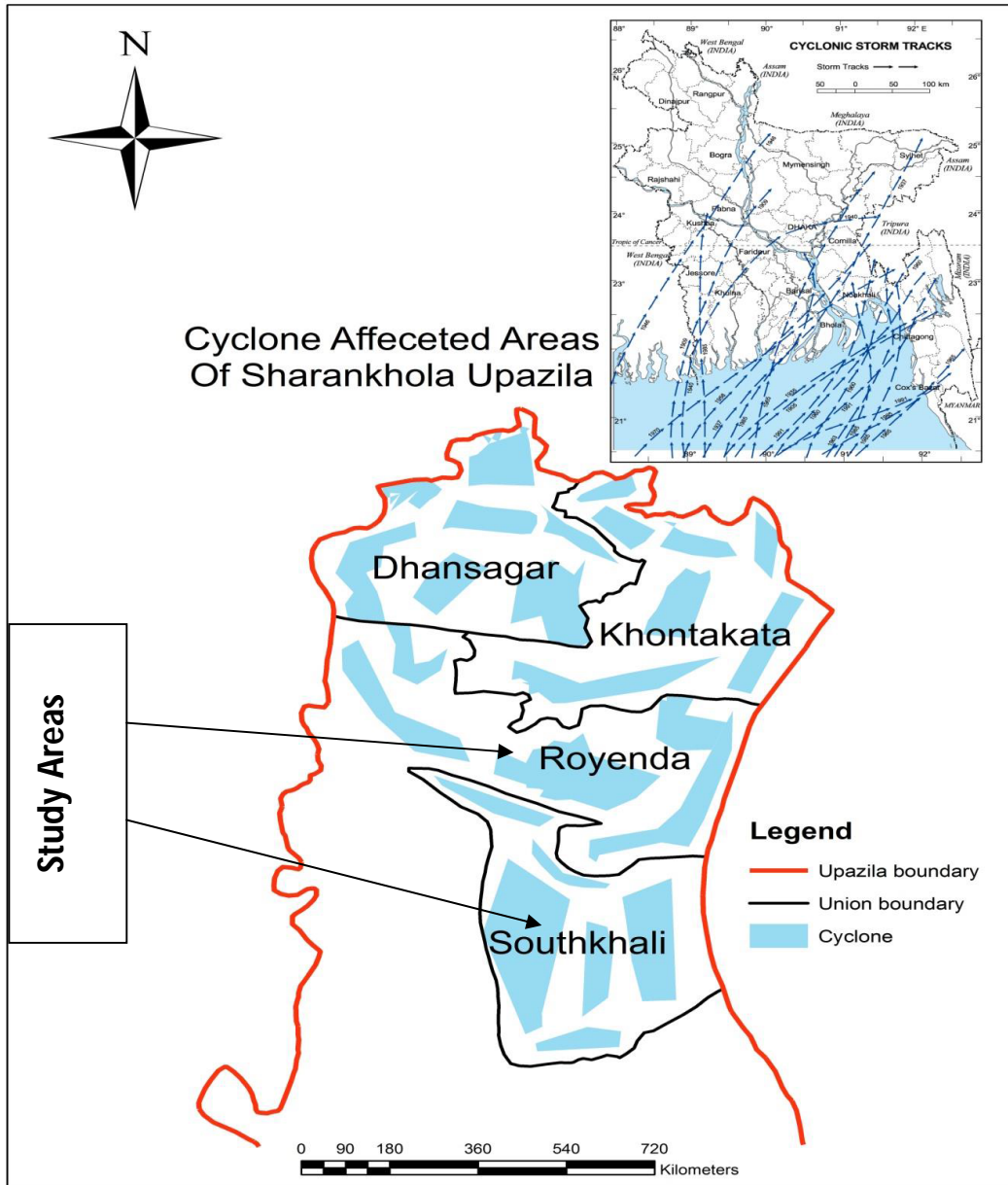
³⁰ Bangladesh Bureau of Statistics, *Bangladesh Economic Review 2009 (Partial)*. (Dhaka: Ministry of Finance, 2009)

Map 2
Map of Sarankhola Upazila



The village Rayenda is bounded by Taphalbari village on the south, Khontakata village on the north, Baleswar River on the east and Sharonkhola and Chandpai River on the west (Map 3). The village contains 626 households and around 2370 population. Most of the villagers are farmers and fishermen. As it is surrounded by two rivers and situated in coastal belt it is vulnerable to natural disasters.

Map 3
Cyclone Affected Areas of Sarankhola Upazila



The village Uttar Southkhali is bounded by Bakultala village on the north, Bagi and Chalitabunia village on the south, Baleshwar River and Sundorban on the east and Taphalbari on the west (Map 3). Most of the villagers are involved in fishing by boat and day laborers related to fishing. They are living on Baleshwar River and sundorban though they had paid innumerable humanitarian cost by the tidal surge of the

mighty Baleshwar in the time of cyclones. The village contains 530 households and around 2223 population.

These two villages were badly affected by Sidr and Aila though destruction types and levels were different by natural settings, intensity of cyclones, socio-cultural habitat and socio-economic condition of the localities.

2.2. Socioeconomic Profile of Respondent Household

Socio-economic conditions and characteristics have great influence on disaster vulnerabilities and destruction caused by cyclones. Because any type of disasters are best seen as social crisis. In Bangladesh socio-economic factors and disaster are interrelated which highlights social phenomenon, and individual and collective behavior to cope with disasters. It is worth noticing out those coastal habitants have different socio-economic characteristics as they living in extremely dynamic estuary environment facing threats such as: cyclone, storm surge, land erosion, salinity intrusion, and deteriorating coastal ecosystems. This ecological setting determines their livelihood, culture and every aspect of human occasions.

2.2.1 Gender of the Respondent Household Heads

The Bangladesh society prescribes the senior and active male family member to be the head of individual household. In spite of such cultural prescription and expectation, the study villages show no

realities that wholly attest this fact. The social realities of both the study villages are changed caused by the cyclonic attack. The respondent cyclone affected people reported that nearly 2 percent (1.96%, n=5 of 255) respondent household were headed by female head (Table 2).

Table 2
Gender-wise Distribution of the Respondent Household Heads

Gender	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Male	118	98.33	132	97.78	250	98.04
Female	2	01.67	3	2.22	5	1.96
Total	120	100	135	100	255	100

It was evident from the cyclone victims that 98.33 percent cyclone affected household in Rayenda were male and only 1.67 percent were female headed. In Uttar Sauthkhali, respectively 97.78 percent and 2.22 percent cyclone victims' households were male and female headed. Both the two localities 80 percent female were turned into family head by the dead of their husband in Sidr and 20 percent turned into head by their husbands' serious injury caused by the cyclone Sidr.

2.2.2 Age Group of the Respondent Household Heads

The fact was empirically found that 36.67 percent respondents in Rayenda were in the age group 45–55 and 34.17 percent in the age group 35-45 (Table 3). That means above two-third (70.84%, N=120)

cyclone affected people in Rayenda were in the range of middle age and 10.83 percent cyclone affected people were aged.

Table 3
Age Group of the Respondent

Age Group	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
15-25	6	5.00	12	8.89	18	7.05
25-35	16	13.33	14	10.37	30	11.76
35-45	41	34.17	51	37.78	92	36.07
45-55	44	36.67	52	38.52	96	37.64
55+	13	10.83	6	4.44	19	7.45
Total	120	100	135	100	255	100

In Uttar Sauthkhali, most of the cyclone affected people, 38.52 percent belong to the age group 35-45 and 37.78 percent belong to the age group 45-55. Along with Rayenda, Uttar Sauthkhali's picture was same above two-third (76.30%, n=135) cyclone affected people belong the middle age group. So, it was evident from the findings that above two-third (73.71%, n=255) cyclone victims were belong to middle age group. So, most of the cyclone affected people were middle aged (Table 3).

2.2.3 Marital Status of the Respondent Household Heads

It was evident from the findings that 87.45 percent cyclone victims in Uttar Sauthkhali and Rayenda were married and 9.02 percent were unmarried. It was observed that above two-third (88.33%, n=120) and above two-third (86.67%, n=135) of total cyclone victims of Rayenda and Uttar Sauthkhali were married respectively (Table 4).

Table 4
Marital Status of the Respondent

Marital Status	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Married	106	88.33	117	86.67	223	87.45
Unmarried	10	8.33	13	9.63	23	9.01
Widow	2	1.67	3	2.22	5	1.96
Widower	2	1.67	2	1.48	4	1.56
Total	120	100	135	100	255	100

The fact was lying between the two categories widow and widower. It was empirically found that 1.57 percent cyclone affected people were turned into widow by the doleful death of their husbands and 1.96 percent meal cyclone affected people were turned into widower by the pathetic death of their wives on the super cyclone Sidr.

2.2.4 Education Status of the Respondent Household Heads

Education is both dependent and independent variable. Collected data from the field exposed that in Rayenda, above half of the total (55%, n=120) cyclone affected people were illiterate, 32.50 percent were completed primary education, 10 percent were not completed their SSC but acquired their education up to class ten (Table 5). In Uttar Sauthkhali, nearly two-third (60.74%, n=135) victims were illiterate only whereas 29.63 percent were primary passed, 2.96 percent were SSC passed and 0.74 percent was graduate. It was observed that education status proportion of cyclone victims were high in Uttar Sauthkhali rather than Rayenda.

Table 5
Education of the Respondent

Education Status		Study Villages					
		Rayenda		Uttar Sauthkhali		Total	
		n	%	n	%	n	%
Illiterate		66	55.00	82	60.74	148	58.04
Primary (Class I-V)		39	32.50	40	29.63	79	30.98
Secondary	Class VI-X	10.00	10.00	5.93	5.93	7.84	7.84
	SSC Passed	2.50	2.50	2.96	2.96	2.75	2.74
Graduate		0	0	1	0.74	1	0.39
Total		120	100	135	100	255	100

Both the two villages' maximum that means 58.04 percent cyclone affected people was illiterate whereas 3.13 percent were SSC and more than SSC. So educational status of the cyclone affected of the two villages were very low which demonstrates their low level of awareness.

2.2.5 Occupation of the Respondent Household Heads

It was empirically found that one-third (38.33%, n=120) cyclone affected people in Rayenda were earning their livelihood by fishing though nearly two-third (61.48%, n=135) cyclone affected people in Uttar Sauthkhali were fishermen. Out of 255 respondents, 22.75 percent were day laborer which 32.50 percent labor were living in Rayenda and 14.08 percent in Uttar Sauthkhali, 17.25 percent cyclone affected people were peasant and out of them 20.01 and 14.81 percent were living in Rayenda and Uttar Sauthkhali, only 0.78 percent were

housewives and 8.63 percent were living by various occupations like business, teaching, government service and so on (Table 6).

Table 6
Occupation of the Respondents

Occupation	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Fisherman	46	38.33	83	61.48	129	50.58
Labor	39	32.50	19	14.08	58	22.74
Peasant	24	20.01	20	14.81	44	17.25
Housewife	1	0.83	1	0.74	2	0.78
Others	10	8.33	12	8.89	22	8.63
Total	120	100	135	100	255	100

So, half of the total (50.58%, n=255) cyclone affected people were living by fishing and fishing related activities (Table 6). For this matter of reality, sent percent of them were affected by cyclone rigorously because of their living in the side of river embankment. As most of the cyclone affected people in Uttar Sauthkhali were fishermen and they were living on the embankment for that reason the rate of absolute cyclone affected were higher in Uttar Sauthkhali rather than Rayenda.

2.2.6 Income of the Respondent Household Heads

Income is such type of variable which not only determine the standard of living but also the competency of facing disastrous situation which have been occurred after any natural hazards. A well being family may fulfill the instant needs after a disaster. Data represented the income of the cyclone affected people and their capability of resilience against the disaster. It was observed that both the two villages' 18.43 percent

cyclone affected people' income was very low among the range of tk. 2500–3500, of them 14.09 percent were living in Uttar Sauthkhali though the total 39.22 percent cyclone affected people whose income was high among the values of 5500–6500 and 6500+ of them 20.39 percent were living in Uttar Sauthkhali (Table 7).

Table 7
Income of the Respondents

Monthly Income in Taka	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
2500–3500	9	7.5	38	28.15	47	18.43
3500–4500	34	28.33	12	8.89	46	18.03
4500–5500	29	24.17	33	24.44	62	24.31
5500–6500	37	30.83	46	34.07	83	32.54
6500+	11	9.17	6	4.44	17	6.66
Total	120	100	135	100	255	100

This data showed acute disparity among the rich and poor in Uttar Sauthkhali village though this high income in Uttar Sauthkhali was depends on household size and income earners.

2.2.7 Savings of the Respondent Household Heads

Savings is such type of variable which determines the solvency of a household. It also represents the response efficiency of a family in the time of instant humanitarian needs after a cyclone. It was evident from the findings that in both of the villages only 10.98 percent cyclone affected people were habituated of savings. It was observed that 8.24 percent cyclone affected people have their savings among the values of Tk. 200-500 and only 1.18 percent cyclone affected people had

above Tk. 800 savings. Though in prior data showed the income of the cyclone affected people in Uttar Sauthkhali was higher than the cyclone affected people of Rayenda but, only 1.49 percent cyclone affected people in Uttar Sauthkhali were involved in savings whereas 21.67 percent in Rayenda (Table 8). Therefore, it was concluded that economic status of Rayenda was well enough in contrast to Uttar Sauthkhali.

Table 8
Savings of the Respondents

Monthly Income in Taka	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
200–500	19	15.83	2	1.48	21	8.23
500–800	4	3.33	0	0	4	1.56
800+	3	2.50	0	0	3	1.17
No savings	94	78.33	133	98.52	227	89.01
Total	120	100	135	100	255	100

Data were empirically found that there were positive correlations among education, income, occupation and savings of the cyclone affected communities of Rayenda and Uttar Sauthkhali. It was observed that these four variables were reciprocally dependent to each other and showed strong significant correlation. Nevertheless, two variables — education and Savings — were positively correlated with each variable separately (Table 9).

Table 9
Correlations among Education, Occupation, Income and Savings of Cyclone Affected Communities

Correlations

		Education	Occupation	Income	Savings
Education	Pearson Correlation	1.000	.406**	.262**	.212**
	Sig. (2-tailed)	.	.000	.000	.001
	N	255	255	255	255
Occupation	Pearson Correlation	.406**	1.000	-.066	.223**
	Sig. (2-tailed)	.000	.	.297	.000
	N	255	255	255	255
Income	Pearson Correlation	.262**	-.066	1.000	.371**
	Sig. (2-tailed)	.000	.297	.	.000
	N	255	255	255	255
Savings	Pearson Correlation	.212**	.223**	.371**	1.000
	Sig. (2-tailed)	.001	.000	.000	.
	N	255	255	255	255

** . Correlation is significant at the 0.01 level (2-tailed).

2.2.8 Land Amount of the Respondent Household Heads

In an agrarian society like Bangladesh proprietorship of land is another important variable for societal status. The cyclone victims reported that 19.17 percent in Rayenda and 52.60 percent in Uttar Sauthkhali were landless. In Rayenda, 13.33 percent cyclone affected people had 1-2 katha, 18.33 percent had 2-3 katha, 19.17 percent had 3-4 katha and 15.83 percent had above 5 katha of land whereas respectively 12.59 percent, 10.37 percent, 8.89 percent and 5.93 percent cyclone affected people in Uttar Sauthkhali were totally landless and used to live in government khas land and river embankment (Table 10).

Table 10
Land Amount of the Respondents

Land in <i>Katha</i>	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Landless	23	19.17	71	52.59	94	36.86
1-2	16	13.33	17	12.59	33	12.94
2-3	22	18.33	14	10.37	36	14.11
3-4	23	19.17	12	8.89	35	13.72
4-5	17	14.17	13	9.63	30	11.76
5+	19	15.83	8	5.92	27	10.58
Total	120	100	135	100	255	100

It was observed that those who were totally landless were severely affected by the super cyclone Sidr and the Aila because of their living in the embankment of Baleshwar river and char of Baleshwar.

2.2.9 Housing Condition of the Respondent Household

It was empirically found that the housing conditions of cyclone affected people, which were gauged, by wall materials and roof materials. It was reported from the cyclone victims that 64.71 percent cyclone affected people were living in *cutcha* house, which were made by *golpata*, jute stick, tin and wood, and 31.76 percent cyclone affected people were living in hut which were made by palm leaf, hatch, plastic paper etc. Only 3.53 percent cyclone affected people were living in semi-building. It was observed that 24.31 percent cyclone affected people who live in Uttar Sauthkhali were living in bad housing condition and in Rayenda the rate were 7.45 percent (Table

11). For this poor housing condition, every house of the cyclone affected people was ravaged by the cyclones badly. Because, *cutcha* and hut houses are more vulnerable for any kind of destructive cyclone.

Table 11
Housing Pattern of the Respondents

Pattern	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Semi-building	7	5.83	2	1.48	9	3.52
<i>Cutcha</i>	94	78.33	71	52.59	165	64.7
Hut	19	15.84	62	45.93	81	31.76
Total	120	100	135	100	255	100

2.2.10 Household Size of the Respondent

Household size of cyclone affected people that are measured by the total members of a family who use same kitchen to live. It was empirically found that nearly two-third (59.22%, n=255) cyclone affected people household had 4 to 6 members, which showed the high density and 12.16 percent cyclone affected household had 7 to 8 members. It was observed that 14.81 percent household in Uttar Sauthkhali consisted 7 members whereas 1.67 percent in Rayenda, 3.7 percent household in Uttar Sauthkhali consisted 10 and 10+ members whereas Rayenda had none. This data revealed 85 percent household consist 3 to 5 members in Rayenda but 40.44 percent in Uttar Sauthkhali, 47.40 percent household consist 6 to 9 members in Uttar

Sauthkhali and 15 percent in Rayenda (Table 12). So, household size was greater in Uttar Sauthkhali than Rayenda.

Table 12
Household Size of the Respondents

Household Size	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
2	0	0	6	4.44	6	2.35
3	36	30.00	18	13.33	54	21.17
4	29	24.16	19	14.07	48	18.82
5	37	30.83	23	17.04	60	23.52
6	15	12.50	28	20.74	43	16.86
7	2	1.67	20	14.81	22	8.62
8	0	0	9	6.67	9	3.52
9	1	.83	7	5.18	8	3.13
10	0	0	3	2.22	3	1.17
10+	0	0	2	1.48	2	0.78
Total	120	100	135	100	255	100

It has been showed that land ownership, housing pattern and household size of Rayenda and Uttar Sauthkhali was positively correlated. That means those who uses *Khas* land for housing, their pattern of housing is poor as well as their household size consists with around six members. Moreover, who uses own land for housing their pattern of houses is good enough in contrasting to landless cyclone affected people (Table 13).

Table 13
Correlations among Land Ownership, Residence Pattern and
Households Size of Cyclone Affected Communitis

Correlations

		Land Amount	Pattern of Residence	number of Family Members
Land Amount	Pearson Correlation	1.000	.134*	.269**
	Sig. (2-tailed)	.	.032	.000
	N	255	255	255
Pattern of Residence	Pearson Correlation	.134*	1.000	.293**
	Sig. (2-tailed)	.032	.	.000
	N	255	255	255
number of Family Members	Pearson Correlation	.269**	.293**	1.000
	Sig. (2-tailed)	.000	.000	.
	N	255	255	255

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

2.2.11 Sources of Drinking Water of the Respondent Household

Data revealed sources of drinking water of the cyclone affected people of the study locale. It was evident from the respondents that above two-third (71.67%, n=120) and above half of the total (57.04%, n=135) cyclone victims of Rayenda and Uttar Sauthkhali used tube-well water before cyclone Sidr and Aila. But after cyclones, due to tidal surge many tube-wells were damaged. For that reason, after cyclones, it was observed that 42.35 percent cyclone affected people used tube-well water for their daily drinking. Only 1.97 percent cyclone affected people' source of drinking water was pond and others. It was observed that because of salinity in every sources of drinking water 54.51 percent cyclone affected people use PKSF filtering water for their daily drinking (table 14). It was observed that maximum cyclone victims of Rayenda used tube-well water for their daily drinking, while 25.18%

cyclone victims of Uttar Sauthkhali used tube-well water. It was not the reason, the community of Uttar Sauthkhali had not tube-well facilities but the tube-well water was saline, so that the maximum respondents of Uttar Sauthkhali used filter water from PKSf.

Table 14
Sources of Drinking Water of the Respondents

Sources before Cyclone	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Tube-well	86	71.67	77	57.04	163	63.92
Ponds	2	1.67	8	5.93	10	3.92
PKSF Filter	30	25.00	49	36.30	79	30.98
Others	2	1.67	1	0.74	3	1.18
Total	120	100	135	100	255	100
Sources after Cyclone	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Tube-well	74	61.67	34	25.18	108	42.35
Ponds	2	1.67	3	2.22	5	1.97
PKSF Filter	42	35.00	97	71.86	139	54.50
Others	2	1.66	1	.74	3	1.18
Total	120	100	135	100	255	100

2.2.12 Sanitation Facilities of the Respondent Household

It was observed that 52.16 percent cyclone affected people used open toilet for their sanitation, 23.14 percent used hanging toilet and 24.71 percent used sanitary latrine. It was observed that using sanitary latrine in Rayenda were higher than Uttar Sauthkhali. Otherwise using hanging toilet in Uttar Sauthkhali was higher than Rayenda. Though it

was observed in the time of field survey moderate number of cyclone affected people those who were using open toilet at this moment were using sanitary latrine before super cyclone Sidr. At present, they were using this type of latrine for depreciating their toilets by cyclone (Table 15).

Table 15
Sanitation Facilities of the Respondents

Sanitation	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Hanging toilet	21	17.50	38	28.15	59	23.13
Open toilet	62	51.67	71	52.59	133	52.15
Sanitary	37	30.83	26	19.26	63	24.7
Total	120	100	135	100	255	100

2.2.13 Medium of Informative Tools of the Respondent Household

Data represented the scenario of owing entertainments/informative tools of cyclone affected people before and after of cyclone Sidr and Aila. It was evident from the findings that 25.88 percent cyclone affected people used radio for their entertainment/information before cyclone Sidr though these rates were 97.65 percent after cyclone Sidr. However, in terms of television only 0.39 percent cyclone affected people had television after cyclone Sidr and Aila. Data exposed that 4.31 percent cyclone affected people used both entertainment/informative tools before cyclone Aila (Table 16).

Table 16
Medium of Informative Tools of the Respondents

Medium	Rayenda				Uttar Sauthkhali			
	Before Cyclone		After Cyclone		Before Cyclone		After Cyclone	
Cyclone	Sidr %, N=120	Aila %, N=120	Sidr %, N=120	Aila %, N=120	Sidr %, N=135	Aila %, N=135	Sidr %, N=135	Aila %, N=135
Radio	23, 19.16%	117, 97.50%	117, 97.50%	104, 86.67%	43, 31.85%	132, 97.78%	132, 97.78%	121, 89.63%
Television	0	0	1, .83%	1, .83%	0	0	0	0
Both	8, 6.67%	0	2, 1.67%	2, 1.67%	0	3, 2.22%	3, 2.22%	2, 1.48%
No	89, 74.17%	3, 2.50%	0	13, 10.83%	92, 68.15%	0	0	12, 8.89%
Total	120	120	120	120	135	135	135	135

It was empirically found that respectively 70.98 percent and 5.88 percent cyclone affected people had no information tools before cyclone Sidr and Aila. This data explore an acute vulnerability of cyclone-affected people. Experts think it is one of the causes for the great death toll by the super cyclone Sidr. Nevertheless, after cyclone Sidr it was observed every cyclone affected people used informative tools. Before cyclone Aila only 1.18 percent cyclone affected people had no information tools though after Aila 9.8 percent cyclone affected people lost their information tools which was caused by cyclone (Table 16).

2.2.14 Membership of Organizations of the Respondent Household

Head

Membership of an organization represents the competency of connectivity with different kind people, information nevertheless it also improve resilience power against any kind of hazard. So, inhabitant membership of organization is important in disaster study. It was observed that above three-fourth (77.25%, N=255) of total cyclone affected people were not engaged with any type of organization. It was evident from the findings, 17.25 percent cyclone affected people had membership of organization and of them 5.49 percent had membership of welfare organization. In contrast to Uttar Sauthkhali, the cyclone victims of Rayenda were more active to engage organizations (Table 17).

Table 17
Membership of Organizations

Membership	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Micro credit	28	23.33	16	11.85	44	17.25
Welfare	3	2.50	11	8.15	14	5.49
NO	89	74.17	108	80.00	197	77.25
Total	120	100	135	100	255	100

2.2.15 Annual Food Security of the Respondent Household

Food security is another variable of socio-economic wellbeing and stability. It also indicates the economic competency and social status of a household.

Data showed annual food security of the cyclone affected people before and after the cyclone. It was observed that 12.16 percent household had surplus food before cyclone and these situations were changed in 7.45 percent after cyclone. Before cyclone, food deficit rate was 21.17 percent, which was increased in 59.21 percent after cyclone Sidr and Aila. At present food balance situation was decreased 66.67 percent to 33.33 percent after cyclone Sidr and Aila (Table 18). So it can be said that current food security of the cyclone affected people is low than the prior times.

Table 18
Annual Food Security of the Respondents

State of food	Rayenda				Uttar Sauthkhali				Before Cyclone Total		After Cyclone Total	
	Before cyclone		After cyclone		Before cyclone		After cyclone		n	%	n	%
	n	%	n	%	n	%	n	%				
Deficit	24	20.00	67	55.83	30	22.22	84	62.22	54	21.17	151	59.21
Balance	82	68.33	42	35.00	88	65.19	43	31.85	170	66.67	85	33.33
Surplus	14	11.67	11	9.17	17	12.59	8	5.92	31	12.16	19	7.45
Total	120	100	120	100	135	100	135	100	255	100	255	100

In contrast to Rayenda the food deficit and surplus rate of Uttar Sauthkhali was low. But before and after food balance rate of Uttar Sauthkhali was high in contrast to Rayenda (Table 18). From this above discussion, we have a moderate insight of the background scenario of socio-economic variable of the cyclone-affected people in coastal Bangladesh. With this discussion we can easily estimate cyclone

affected people' socio-economic condition in terms of resilience to cope with disaster.

2.3 Geographical Context and Nature of Landfall Cyclones

Cyclone, resulting from monsoon tropical depression from the Bay of Bengal and Indian sea, is a natural phenomenon of Bangladesh. As the coastal areas of Bangladesh are located at the vortex of the funnel shape of Bay of Bengal and at the out-fall of the Ganges, the Brahmaputra, and the Meghna Rivers the impact of cyclone is severe in every time when it occurs because of this geographical location, flat topography and funnel shaped coast.

Stephen A. Nelson (2007) argued hazardous process of all types can have primary, secondary, and tertiary effects.³¹ It is clarified as Nelson that:

Primary Effects occur as a result of the process itself. For example water damage due to a tidal surge, and collapse of houses due to a cyclone, earthquake, landslide, cyclone, or tornado.

Secondary Effects occur only because a primary effect has caused them. For example, damaged infrastructures and other facilities due to cyclone and tidal surge, fires ignited by earthquakes or volcanic eruptions; disruption of electrical power and water services as a result

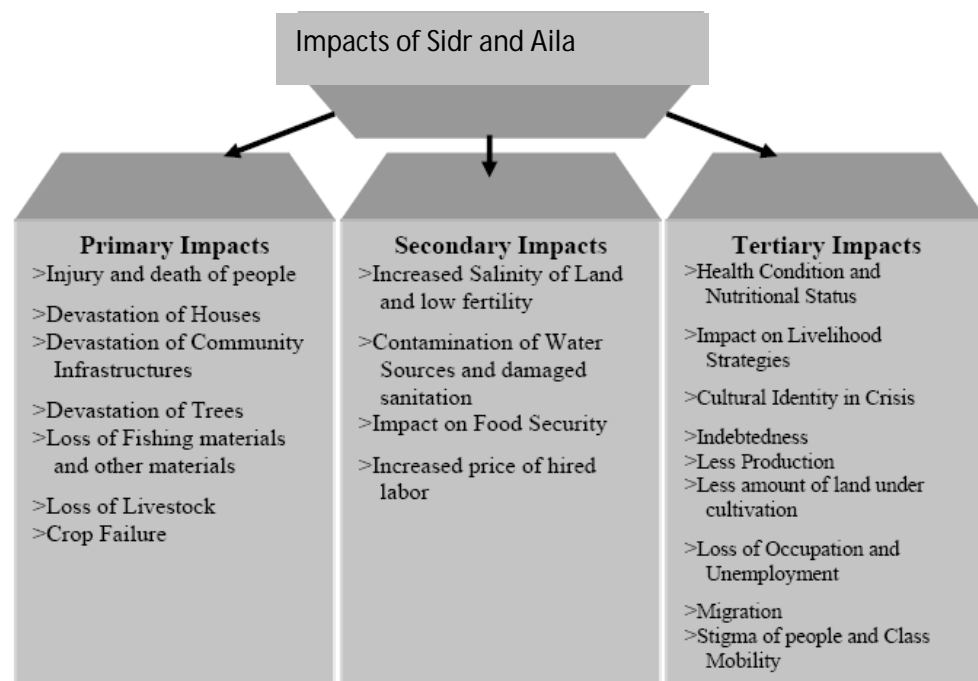
³¹ Stephen A. Nelson, "Natural Disaster & Assessing Hazards Risk", *The Journal of Tulane University*. (Tulane: Tulane University, 2007) p3

of an earthquake or flood, and flooding caused by a landslide moving into a lake or river.

Tertiary Effects are long-term effects that are set off as a result of a primary event. These include things like loss of houses caused by a cyclone, permanent changes in the occupation etc. The figure 6 clarifies the cyclone effects clearly.

Figure 6:

Impacts of Cyclone



Source: Adopted by Nelson, Stephen A. 2007 and Field Survey

Generally cyclone creates massive havoc in coastal areas of Bangladesh, recorded data show 12.14 million people affected by the three major cyclones which struck Bangladesh from 1991 to 2009. It also killed approximately 4.5 millions of people and damaged 27.4 millions of houses. People not only lost their houses but also food,

clothing, utensils and other belongings, which were swept away by tidal waves. In that situation drinking water also became scarce as ponds and canals were submerged under saline water while hand tube-wells became inoperative. Consequently, diarrhoea and jaundice broke out on a large scale throughout the coastal areas affected by the tidal surge and most of the victims of the disease were infants and children.

2.3.1 Nature and Causes of Cyclones in Bangladesh

According to Greg O'Hare (2008), "Tropical cyclone is the general term for low-pressure atmospheric circulations in the tropics. These have anticlockwise rotating winds in the northern hemisphere and clockwise rotating winds in the southern hemisphere."³² All tropical cyclones have low atmospheric pressure at ground level, and a vortex of converging winds and rising air. They all have extensive rain-bearing layered clouds and towering vertically extensive cumulonimbus rain-bearing clouds. Yet despite these common features, tropical cyclones in Indian Ocean and the Bay of Bengal vary greatly in size, frequency and intensity, and have varying effects on the land they cross.

Every tropical cyclone has following nature and characteristics:

- i) Position or location;
- ii) Eye;
- iii) Center;
- iv) Center fix;

³² Greg O'Hare, "Cyclone in the Indian Ocean: Facts and Figure", *The Geographical Journal*. (London: Royal Geographical Society:2008) p 2

- v) Central pressure;
- vi) Pressure depth;
- vii) Direction of movement;
- viii) Speed of movement;
- ix) Mean wind speed or sustained wind speed;
- x) Maximum wind speed;
- xi) Gust;
- xii) Storm surge; and
- xiii) Storm tide.

Data represented the nature of Bay of Bengal cyclone like its speed, height, duration, width, frequency and rainfall. All those factors are rooted in the cyclones that occurred in the Bay of Bengal and landfall on Bangladesh and its adjacent neighboring countries as Greg O'Hare stated in 2001(Table 19).³³

Table 19
Nature of Bay of Bengal Cyclones

Type of tropical cyclonic system	Speed (m/sec)	Height (km)	Duration (days)	Width (km)	Frequency	Rainfall (cm)
Depression	8-17	4-8	2-5	250-500	common	10-20
Storm	17-32	8-10	3-10	300-600	occasional	20-50
Cyclone	>32	8-12	5-7	400-1000	rare	50-150

Source: Adopted by G. O'Hare (2001)

Causes of cyclones which hit Bangladesh in several times are rooted with the combination of geographical and social conditions. The

³³ Greg O'Hare, "Hurricane 07b in the Godavari Delta, Andhra Pradesh, India: vulnerability, mitigation and the spatial impact", *The Geographical Journal*. (New York: Springer, 2001) No167, pp23-38

roughly triangular shape of the Bay of Bengal has its apex along its northern shoreline which includes the full coast of Bangladesh. This shape funnels the storm surge pushed by the severe tropical storms (known as cyclones or cyclonic storms in the region) onto the Bangladesh coast. The shape is accentuated by the shallow waters which allow the build-up of high storm surges. The devastation caused by these surges can be especially destructive, and deadly, when they occur at astronomical high tide. Bangladesh is a very low country, particularly in its southern coastal regions where the elevation of the land does not exceed 10-15 meters (33-50 ft) above sea level in height. Much of it sits on the delta of the Ganges-Brahmaputra-Meghna Rivers and is very susceptible to flooding.

Tropical cyclones affecting Indian Subcontinents originate over surrounding oceans, especially in the Bay of Bengal. They require at least five conditions to form and develop: low pressure at the surface; abundant moist air capable of convective or upward movement in the atmosphere; ocean surface temperatures over 26–27 degrees Celsius; small wind shear—the rate at which wind strength and direction change with height in the atmosphere—(especially for the taller more intense systems); and the power of the Earth's rotation to spin the system into a rotating vortex.

Tropical cyclones in Indian Subcontinents derive their main energy from intense evaporation over warm water—not, as in mid-latitude cyclones, from contrasting temperatures between cold and warmer air

masses. Water vapor, evaporated from the sea, is drawn into the developing cyclone. As the rising air within the cyclone cools, the evaporated moisture becomes cloud, forming billions of tiny water droplets. Converting the water vapor to water droplets releases a great amount of (latent) heat, providing energy that helps invigorate and maintain the cyclone's development.

2.3.2 Nature of three Deadly Cyclones Landfall in Bangladesh

Cyclone in 1991: On the list of the world's deadliest tropical storms, the 1991 cyclone ranks ninth. The storm struck on the night of 29 April 1991 in the Chittagong district of southeastern Bangladesh. The storm's birth was first noticed a week earlier when an area of cloud developed into a tropical depression. Over the next two days, its size increased to cover nearly the entire Bay of Bengal, and its wind speed increased so that it became Tropical Storm. As the tropical storm moved northwestward, it strengthened into a full cyclonic storm on the 27th. Intensifying to a very severe cyclonic storm on the 28th, it took a turn to the northeast, a heading that would take it to southeastern Bangladesh.

Over the next two days, Cyclone Gorky rapidly grew to the equivalent of a Category 5 cyclone with sustained winds of over 255 km/h (160 mph), its estimated minimum pressure falling to 898 mb. When it struck the coast south of Chittagong late on the 29th, its winds had diminished slightly to around 250 km/h (155 mph), a strong Category

4 storm. Cyclone Gorky pushed a wall of water 6 meter (20 ft) high inland over a wide swath of shoreline.

The official death estimate set the figure at 138,000 with the highest mortality among children and the elderly (greatest among under-10-year-olds (26 percent) and women older than 40 years (31 percent)). Most of the deaths in the Bagerhat district were due to heavy storm (Table 20).

Cyclone in 2007: Cyclone Sidr is also noteworthy for its peak winds of 260 km/h (160 mph) on 15 November 2007, making it the second strongest tropical storm to hit Bangladesh since reliable record keeping began in 1877, exceeded only by the 1991 storm. Such winds rate the storm as Category 5 on the Saffir-Simpson Scale, or a Super Cyclonic Storm using the locale storm designation.

Sidr began as an area of cloud organized southeast of the Andaman Islands on 9 November. It officially became Tropical Cyclone 06B on 11 November, and early the next day, the India Meteorological Department upgraded the storm to Cyclonic Storm Sidr. The storm headed slowly northwestward, gaining strength as it intensified and reached very severe cyclonic storm status on the 13th. By the morning of 15 November, the Joint Typhoon Warning Center best track estimated that the storm winds had reached 260 km/h (160 mph) with minimum central pressure at 944 mb.

Cyclone Sidr made landfall along the northern Bay of Bengal coast near the border between the Indian State of Tamil Nadu and Bangladesh, a region known as the Sunderbans, late on 15 November with sustained winds at 240 km/h, a Category 4 storm, and measured storm surge of 3 meters (9.8 ft) at Chennai in Tamil Nadu and over 5 meters (16 ft) in the Patuakhali, Barguna and Jhalokati Districts of Bangladesh. Calculations suggest the highest surge may have reached 6.1 to 7.6 meters (20-25 ft) along the Sunderbans coast to the right of the storm's eye.

The official death estimate set the figure at 3406 with the highest mortality among women and children. It affected 2064026 households and injured 55282 people in 30 districts. Most of the deaths in coastal line in Bangladesh were due to tidal surge and heavy wind (Table 20).

Cyclone in 2009: Tropical Storm Aila struck southern Bangladesh on May 25, 2009 caused 175 people death and left hundreds of thousands more homeless. Aila began as an area of cloud as an area of cloud developed in the Bay of Bengal on the mid May 2009. It turned into a tropical cyclone soon and grew its intensity in category 1 storm. The cyclone headed slowly the south and crossed 24 parganas of India over khulna and Bagerhat. Its minimum wind speed was 121 km./hour and tidal surge height was maximum 12 meters higher than Sidr.

It affected 2.3 millions of people due to high tidal surge and water logging in Khulna, Shatkhira and Bagerhat districts. Most of the deaths

in coastal shores were due to tidal surge and water born diseases (Table 20).

Table 20
Nature of Three Deadly Landfall Cyclones in Bangladesh

Cyclone	Category	Wind Speed	Tidal Surge	Deaths	Affected Households
Gorky	4	225	4 meters	138868	840000
Sidr	4	240	6 meters	3406	2064026
Aila	2	121	7.1 meters	175	2300000

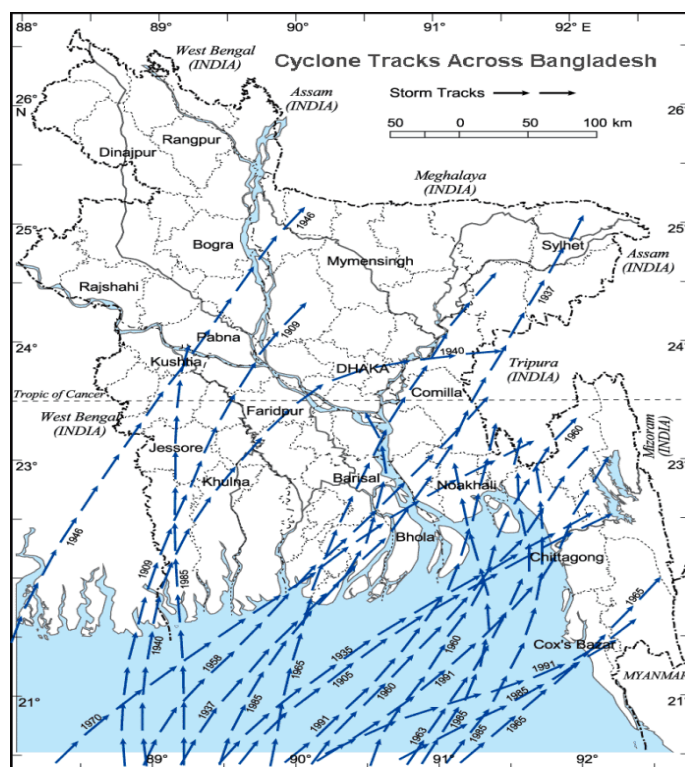
2.4 Cyclones and its Socio-physical Effects in Study Locale

Every hazard which turns into disaster has long term or short term socio-physical effects. With the combination of Bangladesh's geographical and socio-economic context every cyclone which turned into cyclone had long term effect on this locality. The Bay of Bengal is an ideal field to originate and develop powerful cyclones and storms. Because of the funnel shaped coast, Bangladesh repeatedly becomes the landing ground of cyclones that formed in the Bay of Bengal. Cyclones, originate in the Bay of Bengal, causing the maximum damage when they come into Bangladesh and West Bengal of India, also move towards the eastern coast of Indian locality like Andhra Pradesh, Tamil Nadu, 24 Parganas etc., towards Myanmar and occasionally into Sri Lanka. This is because of the low flat terrain, high density of population and poorly built houses.

Data revealed cyclones paths and location of landfall which tracking over Bangladesh during the twentieth century. It is observed that in

the last century, the deadliest storm in the region was the Great Bhola Cyclone of November 1970 for which the estimated death toll ranged from 300,000 to 550,000. Cyclone Gorky struck the Chittagong region a few years later on 29 April 1991 and claimed 138,868 lives. Other high death tolls (>10,000) during the 1900s occurred in 1960, 5000 to 10,000 deaths; 1961, 11,446 deaths; 1963, 11,520 deaths; 1965, 19,279 deaths; 1985, 11,069 deaths (Map 4).

Map 4: Cyclones Tracking over Bangladesh during the Twentieth Century



Added to the geographical factors is the fact that Bangladesh is a poor, mostly agricultural nation whose residents generally live in homes made from locale materials unable to withstand the onslaught of cyclone-force winds and storm surge. The fertile soil of the delta

makes it a prime location for subsistence farms but a deadly location when severe cyclones hit.

Since 2000, the deadliest storm to hit Bangladesh was very severe cyclonic storm Sidr. The official death toll has been given at 3,406 deaths. However, Save the Children estimated shortly after the storm that the number of deaths could be between 5,000 and 10,000, while the Red Crescent Society reported the number could reach 10,000. After few months later this locality had been struck another super cyclone Aila in 2009. A recorded death toll given by official was 175 which were lower than any other cyclones which landfall in Bangladesh due to its lower intensity. But socio-economic and humanitarian effects were more and still remaining in southern region i.e. Khulna, Shatkhira, Tala, Bhabadha etc.

2.4.1 Number of Cyclones of the Respondent Household Head

Data represented the numbers of facing cyclones by the cyclone-affected people in study locale. It was observed above three-fourth (78.82%, n=255) cyclone affected people faced three severe cyclones in their life time, which vary 82.50 (n=120) percent to 75.55 (n=135) percent in Rayenda and Uttar Sauthkhali. Only 9.41 percent cyclone affected people faced five cyclones in their life time indeed (Table 21).

Table 21
Number of facing cyclones by the Respondents

Cyclones	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
3	99	82.50	102	75.55	201	78.82
4	13	10.83	17	12.59	30	1.17
5≥	8	6.67	16	11.85	24	9.41
Total	120	100	135	100	255	100

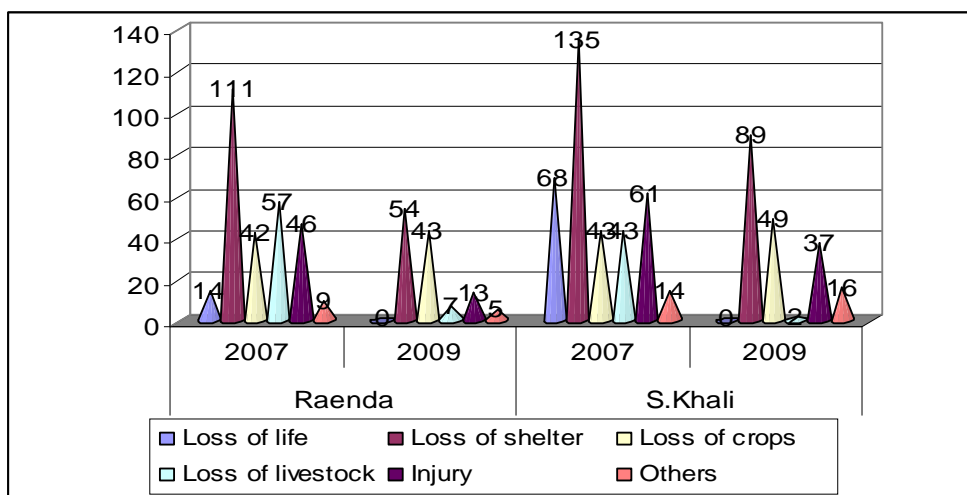
It is no doubt cyclone is the great natural enemy of the coastal people of Bangladesh. Cyclone, which struck, in this locality had ultimate impact on coastal habitat lives, properties and natural environment. As the income of coastal zone is relatively poor compared to the rest of the country, so every cyclone integrates with this poorer economy turns into great disaster and loss lives and properties profusely in coastal zone.

2.4.2 Cyclone Victims Loss by the Cyclones

Data represented the scenario of cyclone victims people various losses caused by the two great cyclones: Sidr and Aila. It was observed that 32.15 percent cyclone affected people lost their household members by the super cyclone Sidr though there were no deaths in the cyclone Aila. In Sidr, 96.47 percent cyclone affected people lost their shelter while this rate were cent percent in Uttar Sauthkhali, 41.96 percent cyclone affected people were injured, 33.33 percent cyclone affected people lost their crops while 45.59 percent crops lost was observed in Aila which was higher than Sidr because of logging saline water. It also

observed that 39.22 percent cyclone affected people lost their livestock by the cyclone Sidr while these rates were 3.53 percent in the cyclone Aila (Figure 2).

Figure 2: Cyclone Affected People Loss by the Cyclones



Note: 2007= Sidr and 2009= Aila

Another severe impact of disaster on human was injury, which was caused to cope with this natural calamity. It was observed in chart 1, 41.96 percent cyclone affected people were injured by the cyclone Sidr while this rate was 19.61 percent in Aila. This chart also represented the others lost beyond those, which were 9.02 percent and 8.24 percent in Sidr and Aila respectively (Figure 2).

2.4.3 Household Wise Lost Lives by the Cyclones

In the prior chart, we see the general scenario of lost lives of human. It was evident from the cyclone victims that 65.46 percent, 20 percent, 7.27 percent, and 7.27 percent households lost one, two, three, and four of their family members by the cyclone Sidr respectively (n=55 of

255). This means 21.57 percent household lost their family members by the cyclone Sidr while death tolls by households in Uttar Sauthkhali were higher in contrast to Rayenda (Table 22).

Table 22
Household Wise Number of Lost Lives by the Cyclones

Cyclones	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
1	10 (10x1=10)	71.42	26 (26x1=26)	63.41	36	65.46
2	4 (4x2=8)	28.57	7 (7x2=14)	17.07	11	20.00
3	0	0	4 (4x3=12)	9.76	4	7.27
4	0	0	4(4x4=16)	6.76	4	7.27
Total	14	100	41	100	55	100

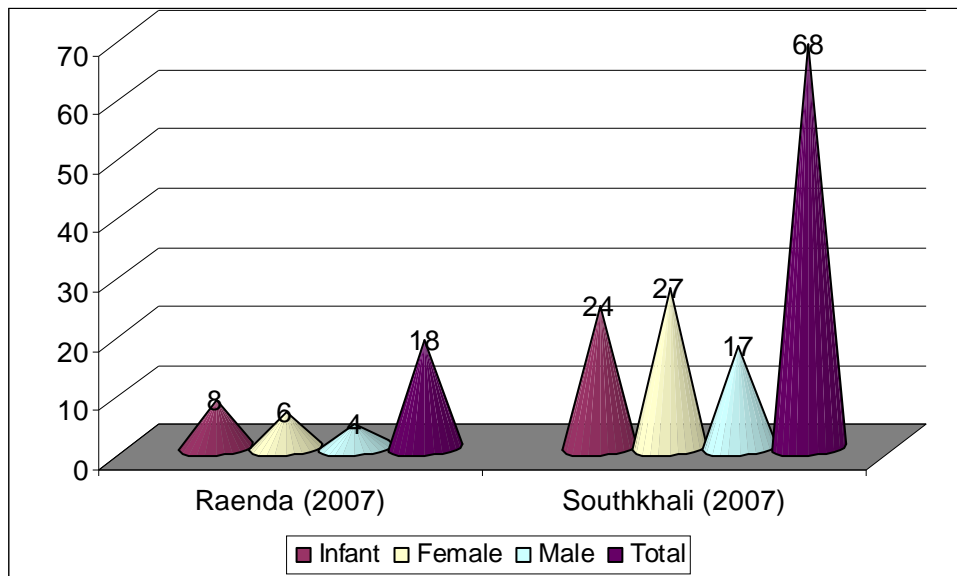


These two affected people lost 4 members of their families in Sidr

2.4.3.1 State of lost lives of the Households by the cyclone

It was empirically found that nearly one third (26.67%, n=255) households lost 68 of their family members in super cyclone Sidr. In these total deaths 37.21 percent were infants, 38.37 percent were female and the rest were male. This means infant and female death tolls were high in contrast to male because of their age and gender based vulnerabilities. Nevertheless, death tolls in Uttar Sauthkhali were approximately five times higher than the death tolls of Rayenda (Figure 3).

Figure 3: State of Lost Lives by the Cyclone



Some spatial and social phenomena of Uttar Sauthkhali are responsible for these high death tolls. Those are as follows:

- a) Geographical location of Uttar Sauthkhali is bounded by two enormous rivers: Baleshwar and Haringhata;

- b) Cyclone affected people are living on the embankment and *Char* of Baleshwar;
- c) Heavy tidal surge;
- d) Cyclone affected people lacking of awareness;
- e) Lacking and long distance of cyclone shelter;
- f) Disbelieve in early warning etc.



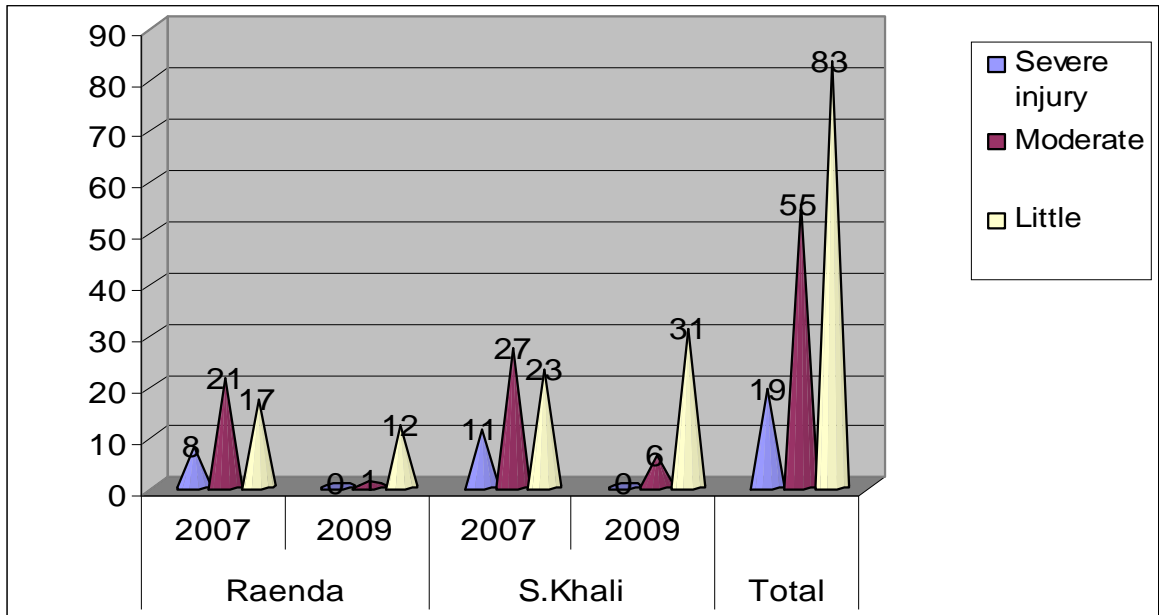
Case 1
 Rumisa Begum, age 32, wife of Makbul Majhi, inhabitant of Uttar Sauthkhali, lost their two sons in Sidr. She told my husband did not rely on institutional warning and told us to stay in home. But at the evening when our house was blown away, we rushed with our three sons to find cyclone resistant place. In the meanwhile, when we were rushing on the embankments a big wave came and took away our two sons.

This lady of Uttar Sauthkhali lost two children in Sidr

2.4.4 State of Injured of the Household Caused by the Cyclones

It was reported by the cyclone victims that above one third (38.33%, n=120) and nearly half (45.19%, n=135) of the cyclone affected people were injured by Sidr in Rayenda and Uttar Sauthkhali respectively. Whereas 10.83 percent (n=120) and 26.67 percent (n=135) cyclone victims were injured by Aila in Rayenda and Uttar Sauthkhali respectively (Figure 4).

Figure 4: State of Injured Caused by the Cyclones



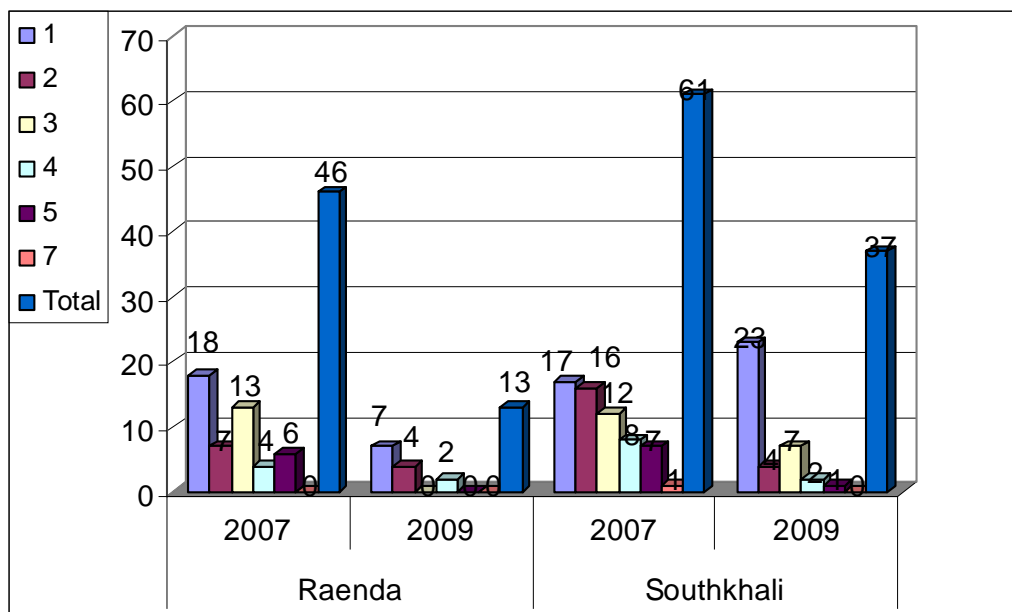
Note: 2007= Sidr and 2009=Aila

Data represented the state of injured by the cyclones Sidr and Aila by severity, modesty and simplicity. It was observed, 12.10 percent were injured severely in Sidr while severe injured was nil in Aila, 30.57 percent were moderately injured in Sidr while 4.46 percent in Aila and the rest were little injured both the Sidr and Aila. Therefore, various types of injury were higher in the super cyclone Sidr. However, severe injured means those who are totally disabled and seriously shocked, moderate injured means seriously injured but not disabled and little injured means temporarily injured that has been overcome.

2.4.4.1 Number of Injured by Household Caused by Cyclones

The prior chart shows categorical state of the injured in the super cyclone Sidr and Aila by age and sex. It was empirically found that one to seven members of a household were injured by cyclones Sidr and Aila. It was reported by the cyclone victims that 41.40 percent, 19.75 percent, 20.38 percent, 10.19 percent and 7.64 percent households got one, two, three, four and five of their family members injured in the super cyclone Sidr and Aila. It was observed that injuries in Uttar Sauthkhali were higher than the injuries in Rayenda because of their poor structured settlement, and unwillingness to go safe places and long distance of cyclone shelter (Figure 5).

Figure 5: Number of Injured by Household



Note: 2007= Sidr and 2009 = Aila

2.4.5 State of Shelter Loss by the Cyclones

It was observed that respectively nearly total (92.50%, n=120) and total (100%, n=135) of the cyclone victims in Rayenda and Uttar Sauthkhali

lost their shelter in Sidr and about half (45%, n=120) and about two-third (65.92%, n=135) of the cyclone victims in Rayenda and Uttar Sauthkhali lost their shelter in Aila (Table 23).

Table 23
State of shelter Lost of the Respondents by the cyclones

State of Shelter	Rayenda				Uttar Sauthkhali				Total		Total	
	Sidr		Aila		Sidr		Aila		Sidr		Aila	
	n	%	n	%	n	%	n	%	n	%	n	%
Totally damaged	62	51.67	21	38.89	129	95.55	63	70.79	191	74.90	84	58.74
Moderate	42	35.00	6	11.11	6	4.45	9	10.11	48	18.82	15	10.49
Little	7	5.83	27	50.00	0	0	17	19.10	7	2.74	44	30.77
Total	120	100	54	100	135	100	89	100	255	100	143	100

2.4.6 State of Crops Lost by the Cyclones

It was evident by the respondents that respectively 74.90 percent, 18.82 percent and 2.75 percent shelters were fully, moderately and slightly damaged by Sidr. But in Aila respectively 32.94 percent, 5.89 percent and 17.25 percent houses were fully, moderately and slightly. Therefore, we can say by this table destructiveness of the super cyclone Sidr was higher than the cyclone Aila and the rate of shelter lost of Uttar Sauthkhali was higher than the shelter lost of Rayenda in Sidr and Aila respectively.

Data represented the state of crops lost by the cyclones by totally damaged, moderate and little damaged. It was evident by the cyclone victims that nearly two-third (62.35%, n=85), 22.35 percent and 15.29

percent crops were totally, moderately and little damaged by the super cyclone Sidr though 17.25 percent cyclone affected people are farmer (table 5). But this rate was 48.70 percent, 17.39 percent and 33.91 percent respectively in the cyclone Aila (Table 24). So, it can be said that crops lost were approximately two times higher in Aila than the super cyclone Sidr. In contrast to Uttar Sauthkhali, the farmers of Rayenda suffered severely in time of Aila and Sidr Disaster. A cause behind these high crops losses in 2009 was logging saline water in crops fields.

Table 24
State of Crops Lost by the Cyclones

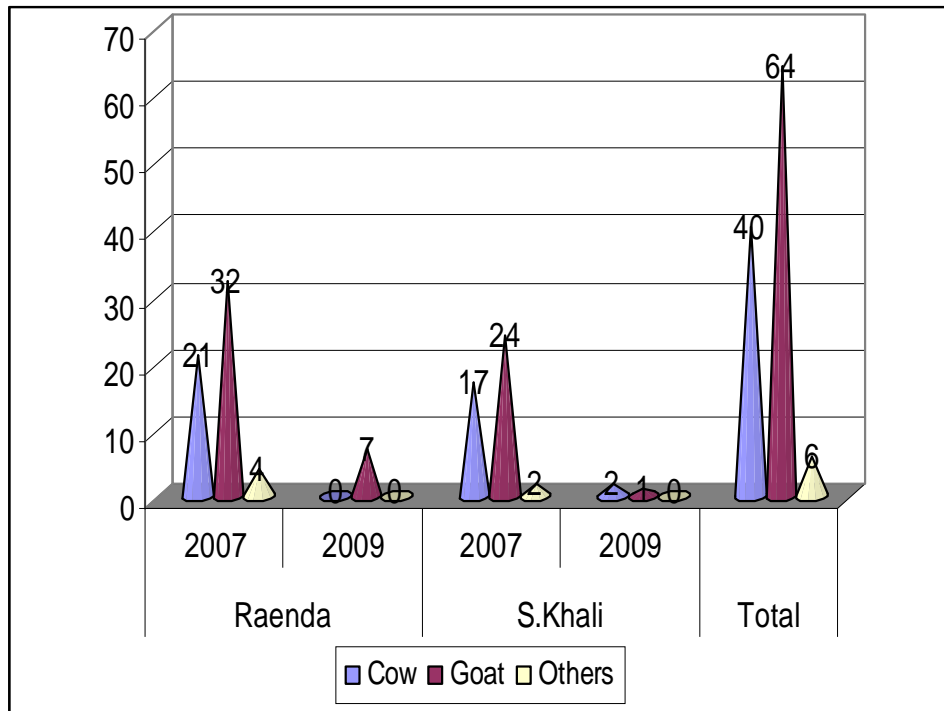
State of Crops	Rayenda				Uttar Sauthkhali				Total		Total	
	Sidr		Aila		Sidr		Aila		Sidr		Aila	
	n	%	n	%	n	%	n	%	n	%	n	%
Totally damaged	27	64.28	23	36.51	26	60.46	33	63.46	53	62.35	56	48.69
Moderate	12	28.57	9	14.29	7	16.28	11	21.15	19	22.36	20	17.39
Little	3	7.15	31	49.20	10	23.26	8	15.38	13	15.29	39	33.92
Total	42	100	63	100	43	100	52	100	85	100	115	100

2.4.7 State of Livestock Lost by the Cyclones

Livestock is one of worthy GDP suppliers in Bangladesh economy. Approximately, it is made 2.08 percent GDP contribution in our national economy in the year of 2008. Every disaster takes a massive numbers of livestock now and then because of their vulnerabilities and defenselessness. It was observed that 14.90 percent cyclone affected households lost their cows in the super cyclone Sidr while the rate was 0.78 percent in Aila and out of this 0.78 percent cows did not dead in

Rayenda in Aila. It was evident from the respondents that goats were dead by 21.96 percent households in Sidr though the rate was 3.14 percent in Aila, and 2.35 percent households' lost beyond these two (Figure 6).

Figure 6: Households Wise Losses of Livestock by Cyclone



2.4.7.1 Number of Lost Livestock by Household

It was reported from the respondents that 14.90 percent households lost 87 cows in Sidr and 0.78 percent households lost only 2 cows. Total 99 goats were dead by 21.96 percent households while 2.35 percent households lost 8 animals beyond those.

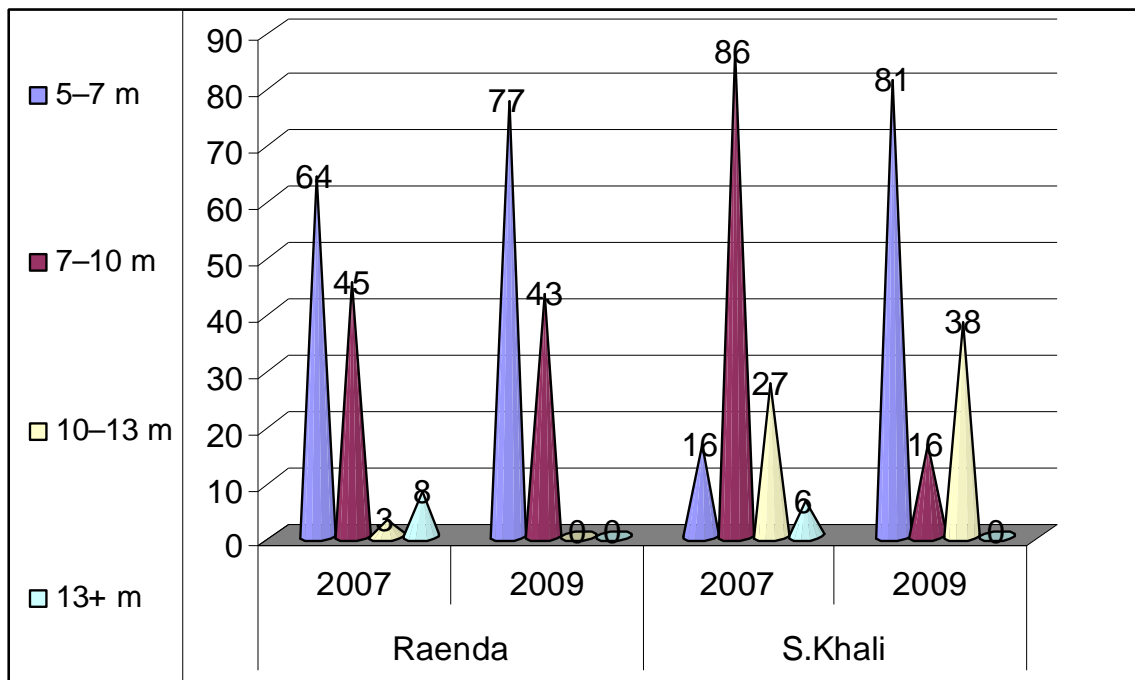
**Table 25
NUMBER OF LOST LIVESTOCK BY CYCLONE**

No	Rayenda						Uttar Sauthkhali					
	2007			2009			2007			2009		
	Cow	Goat	Other	Cow	Goat	Other	Cow	Goat	Other	Cow	Goat	Other
1	12	13	2	0	2	0	7	5	0	2	0	0
2	3x2=6	7x2 =14	0	0	3x2=6	0	3x2=6	16x2= 32	0	0	1	0
3	2x3=6	7x3 =21	2x3=6	0	2x3=6	0	0	3x3=9	2x3=6	0	0	0
4	1x4=4	5	0	0	0	0	4x4=16	0	0	0	0	0
5	3x5=15	0	0	0	0	0	3x5=15	0	0	0	0	0
Total	43	53	8	0	14		44	46	6	2	1	0

2.4.8 Tidal Surge Caused by Cyclones

It has been evident from the respondents that about half of total (51.37%, n=255) and about one-fourth (23.18%, n=255) cyclone affected people opined tidal surge was 7–10 meters high in the super cyclone Sidr and Aila respectively while about one-third (31.37%, n=255) and above half of total (61.96%, n=255) opined 5 to 10 meters in Sidr and Aila respectively. On the other hand, 11.76 percent and 14.90 percent cyclone affected people opined that the tidal surge was 10 to 13 meters high in the super cyclone Sidr and Aila respectively. Because of the combination of tidal surge and severe intensity of wind, death tolls are high in Sidr rather than Aila (Figure 7).

Figure 7: Limits of Tidal Surge of the Cyclones



Note: 2007= Sidr and 2009= Aila

2.4.9 Two Sectors of Household where Losses were Innumerable

Though losses of cyclone affected people were too innumerable to fulfill, it was observed that cyclone affected people were opined the two sectors of their losses where they lost in more. It was observed that maximum cyclone affected people opined about the loss of their family members (17.68%, n=255) and loss of shelter (80.06%, n=255) as their great losses in the cyclone Sidr (Table 26).

Table 26

Two Sectors of the Cyclone Affected People where Losses were More

Sectors	Rayenda				Uttar Sauthkhali				Total		Total	
	Sidr		Aila		Sidr		Aila		Sidr		Aila	
	n	%	n	%	n	%	n	%	n	%	n	%
Loss of lives	10	7.63	0	0	45	25	0	0	55	17.68	0	0
Loss of shelter	114	87.02	84	81.55	135	75	89	78.07	249	80.06	173	79.72
Injury	0	0	13	12.62	0	0	9	0	0	0	22	10.14
Others	7	5.34	6	5.82	0	0	16	0	7	2.25	22	10.14
Total	131	100	103	100	180	100	114	100	311	100	217	100

*Multiple answers computed

About Aila, above half of the total (79.72%, n=217 of 255) cyclone affected people opined their great loss was lost of shelter. So, it can be said that every losses are great in terms of misery but lost of lives, shelter, and crops and loss of human organs are the massive lost.

FGD 1

A FGD that was combined by 9 cyclone victims (Male), 5 from Rayenda and 4 from Uttar Sauthkhali had satated their losses in SIDR. As the victims of Uttar Sauthkhali were lived in the coast of Bawleshar river, they had faced more losses including lives due to strong wind with tidal surge. They told after Sidr, despite RCC building every dwelling houses of Uttar Sauthkhali were destroyed. The inhabitants of Rayenda, was living the Upazila Sadar of Sarankhola, argued when intensity of Sidr was beyond their limit of resilient the mazimum inhabitaants near to Rayenda rushed to the Upazila Sadar and saved themselves. For that reason, death toll was of Rayenda was little in contrast to Uttar Sauthkhali.

2.5 Conclusion

By this above discussion, it can be said that with the combination of geo-physical settings and socio-economic conditions every cyclone has a massive havoc in this coastal locality. But Sidr and Aila are different in terms of their intensity, characteristics and nature. Socio-environmental disasters are higher in Sidr and Aila and coastal localities of Bangladesh still sufferings by their massive destructions.

If government takes coastal community friendly environment development program to develop coastal population and their lives. As natural hazards are not protectable, so appropriate land use policy and resource extracting policy should be developed for the coastal habitat by predominating their coastal culture, then this effect will be little on this habitat.

CHAPTER 3

VULNERABILITIES OF THE CYCLONE AFFECTED PEOPLE TO CYCLONE HAZARDS

The Chapter 3 is aptly focus on the risks of cyclone hazards faced by the cyclone apprehended coastal people and vulnerabilities of them to cyclone hazards multiplied the risks in the precarious habitat. It intends to explore firstly, risks and vulnerabilities of cyclone affected people associated with their housing pattern and condition; secondly, awareness of risks and vulnerabilities of the respondents of study locale; thirdly, vulnerabilities associated with lack of information, and scarcity and inadequacy of shelter arrangements; lastly, vulnerabilities associated with incapacibilities of the respondents to secure resources and information.

The risk of cyclonic disaster is integral part of daily life of the inhabitants of coastal Bangladesh because of its geo-spatial context. Disaster risk depends on geo-spatial context along with people's socio-economic factors, social wisdom and society's values. Risk denotes the probability of harmful consequences, or expected losses (deaths, injuries, losses of properties, livelihood, disruption of economic activities) resulting from interaction between natural calamities and man made disaster. Vulnerability occurs when disaster risk effects with the geo-social factors of the inhabitants as well as availability of natural disasters. According to UNSIDR, 2007, vulnerability means

"The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards" (K. O'Brien *et al.* 2008:14).³⁴

So, vulnerability denotes the expected risk that depends on hazards.

These risk and vulnerability can be formed in equations:

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability}$$

$$\text{So, Vulnerability} = \text{Risk} / \text{Hazard}$$

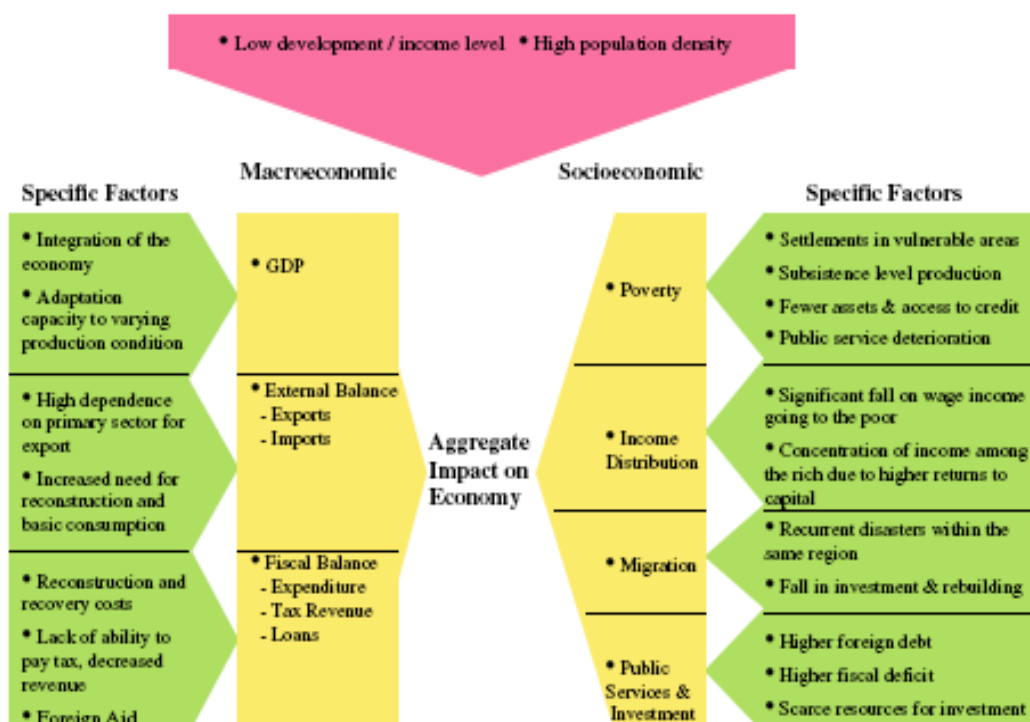
There are many approaches and segments of vulnerability and risk factors analysis, such as physical approach, hazard centered approach, impact oriented paradigm and social approach. This study is rigorously concentrated with social approach. A social vulnerability approach focuses on vulnerability as the result of interplay among many contextual factors and cultural conditions related to economy that generate unequal exposure to risk and create differential capacities to respond to both shocks and long term changes.

The magnitude of these effects is linked to the share of land, population, and economic activity affected by the natural disaster, as well as to the initial conditions and resilience of the population and the economy. Understanding the macroeconomic effects both within and across countries is key to the proper assessments of

³⁴ Karen O'Brain *et al.*, *Disaster Risk Reduction, Climate Change Adaptation and Human Security*. (Oslo: University of Oslo, 2008), p14

vulnerabilities and policies to reduce them. Figure 8 summarizes the factors affecting economic and social vulnerability from a macro perspective.³⁵

Figure 8
Factors Affecting Economic and Social Vulnerability



Source: Mari´a Eugenia Ibarrara´n *et al.* (2007:7)

It is reported that 35 percent of the total land experiences cyclone in and every year in Bangladesh. The vulnerability to cyclone is determined by the impacts on livelihood components, such as: geo-social, economic and human resources. Most of the time the impacts of cyclone are cumulative and the frequency of damages are magnified with the help of this vulnerability factors. This study reveals that 1.5 million people of the study district face several ranges of cyclones in

³⁵ Mari´a Eugenia Ibarrara´n *et al.* "Climate change and natural disaster: macroeconomic performance and distributional impacts", *Environ Dev Sustain.* (New York: Springer, 2007) p 7

every year. Geographical location of Uttar Sauthkhali and Rayenda reveals that those are surrounded by rivers near the mighty Bay of Bengal. Nevertheless, its socio-economic situations, education significances, social wisdom and fashion relating to cyclone awareness as well as preparedness are very poor contrasting its natural risks.

3.1. Vulnerabilities of Cyclone Non-resistant Dwelling House

The study villages, Rayenda and Uttar Sauthkhali, are located in the Shore of Baleshwar River. Rayenda is located near the upazilla sadar of Sharonkhola. On the other hand Uttar Sauthkhali is located in a frontier region of Sharonkhola Upazilla. Though Rayenda is the central business district (CBD's) of Sharonkhola Upazilla but its inhabitants' residential pattern is molded by rural fashion and culture like Uttar Sauthkhali. The study population have experienced frequent disaster due to cyclone and consequently lost their houses, properties, and other resources.

It was empirically found that housing pattern of two villages was in traditional fashion. Structure of the houses was made of mud, straw, wood, bamboo, bricks and CI (corrugated iron) sheet. Data showed the fact that two-third (78.33%, n=120) of cyclone affected people of Rayenda and half of the total (52.59%, n=135) cyclone victims of Uttar Sauthkhali abode in non-concrete settlement. This housing pattern was constructed by mud in the floor, bamboo, wood and *golpata* (one kind of leaf like coconut leaf) CI sheet on the roof. This type of housing has

consisted of a main door, one to two bedrooms, mostly a porch, mostly two to three windows, separate shanty kitchen along with an open courtyard. The coastal people usually use their porch as cattle shed (*goyal ghar*) though it causes hygienic hazards (Table 27).

Table 27
Residential Pattern of Cyclone Affected People

Pattern of Residence	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Semi-concrete	7	5.83	2	1.48	9	3.53
Non-concrete	94	78.33	71	52.59	165	64.71
Hut	19	15.84	62	45.93	81	31.76
Total	120	100	135	100	255	100

Data (Table 27) showed that 15.83 percent and 45.93 percent households of Rayenda and Uttar Sauthkhali respectively abode hut housing. Such type houses consist, mostly, of mud in the floor, straw in the roof (sometimes mixed with straw and palm leaves), circumference of bamboo made fibers. This type of housing has no window though it has an entrance which made by bamboo fiber or straw and bamboo fiber jointly. Most of this housing has no porch, if some has that was used as kitchen and dining. Those who are the inhabitants of this housing maximum of them were landless or disaster made refugee. The cyclone affected people of 5.83 percent in Rayenda and 1.48 percent in Uttar Sauthkhali have resided in semi-

building housing in nature. This type of housing had small brick made portion and another portion of this housing was made by wood or mud. Sometimes its' wall was made by bricks and roof was made by tin or tails.

It was evident from the cyclone victims that the residential patterns of the cyclone affected people had significantly correlated with occupation, income and land ownership. That means the greater proportion of all these groups' lives in cutcha and hut dwelling. However, the high income groups, maximum land owners and richly occupied people live in semi-building (Table 28).

Table 28
Correlation among Occupation, Income, Land Amount and Residential Pattern of the Cyclone Affected People

		Occupation	Income	Land Amount	Pattern of Residence
Occupation	Pearson Correlation	1.000	-.066	.302**	.163**
	Sig. (2-tailed)	.	.297	.000	.009
	N	255	255	255	255
Income	Pearson Correlation	-.066	1.000	.470**	.089*
	Sig. (2-tailed)	.297	.	.000	.158
	N	255	255	255	255
Land Amount	Pearson Correlation	.302**	.470**	1.000	.134*
	Sig. (2-tailed)	.000	.000	.	.032
	N	255	255	255	255
Pattern of Residence	Pearson Correlation	.163**	.089*	.134*	1.000
	Sig. (2-tailed)	.009	.158	.032	.
	N	255	255	255	255

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

3.2 Awareness Level of Cyclone Victims

Disaster awareness has a critical relationship to people vulnerabilities, which generates risk to various natural disasters. Awareness to disaster particularly cyclonic disaster comprises very diverse, often mutually reciprocal, factors that have to be taken into account to determine the awareness level of the coastal people. There are various factors which determine the awareness level to cyclonic disaster. These are education; training related to disasters; belief in fate and easy access to information. The impacts of poverty should be put in center to realize the cyclonic disaster awareness. That means due to poverty the coastal people have limited access to education, communication and other mechanism to take pre-initiatives to reduce disaster risk.

Due to poor education and insufficient knowledge of the cause-effect matrix, people are less able to respond appropriately in a changing environment. Fatalism is widespread as a consequence of the belief that natural disasters are willed by God and are therefore inevitable. Nevertheless, lacking of sufficient informative tools is a critical obstacle for awareness. The population of two study villages, Rayenda and Uttar Sauthkhali, are not beyond from the prior facts.

Recently Bangladesh Meteorological Department has been changed its warning system, but it was empirically found that only 10.6 percent of cyclone affected people of study locale knew current warning and signal system while 8.6 percent and 5.5 percent knew about current

warning and current signal system respectively. But it was very much remarkable that above two-third (75.3%, n=255) cyclone affected people do not properly concern about standing warnings and signals system of Bangladesh and this rate was higher in Uttar Sauthkhali than Rayenda (Table 29).

Table 29
Awareness of Recent Warnings and Signals

Awareness Level	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Current Warnings Known	4	3.33	10	7.41	14	5.5
Current Signals Known	6	5.00	16	11.85	22	8.6
Both Known	21	17.50	6	4.44	27	10.6
Unknown	89	74.17	103	76.30	192	75.3
Total	120	100	135	100	255	100

3.2.1 Cyclone Victims Understanding Pattern of Signals

It was empirically found that 9 percent cyclone affected people or their family members understood signals superficially, without having a clear conception about the implications of signals. Only 12.9 percent cyclone affected people had better understanding about all signals and about this criteria, the cyclone affected people of Rayendawere very much ahead in contrast to Uttar Sauthkhali. It was very much remarkable that nearly two-third (69.80%, n=255) cyclone affected people do not understood any kinds of signals due to their lack of general and disaster education. This study also revealed that those who had better concern about signals, they were trained about disaster education and CPP volunteers in few cases (Table 30).

Table 30
Indigenous and Institutional Understanding Pattern of Signals

Signals	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
All Signals	21	17.5	12	8.89	33	12.9
Some Signals	4	3.33	17	12.59	21	8.2
Superficial	16	13.33	7	5.19	23	9.0
Unable	79	65.83	99	73.33	178	69.8
Total	120	100	135	100	255	100

3.2.2 Listening and/or Watching Pattern of Weather Forecast/ Warning

This study revealed the warning listening tendency of the cyclone affected people, which have been disseminated by Bangladesh Meteorological Department. It was evident from the cyclone victims that only 16.9 percent cyclone affected people used to listen or watching warning bulletin regularly broadcasted through Radio and television. It was empirically found that regular listening tendency of weather forecast warning in Rayenda was lower than that in Uttar Sauthkhali. Because most of the cyclone victims of Uttar Sauthkhali were fishermen who was living beside the Baleshwar and they were used to listen warning bulletin prior to fishing in Bay of Bengal. It was observed that respectively 17.6 percent and 32.2 percent cyclone affected people listen warning bulletin rarely and often (Table 31).

Table 31
Listening and/or Watching Pattern of Weather Forecast Warning

Listening and/or Watching Weather Forecast Warning	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Rarely	27	22.50	18	13.33	45	17.6
Often	35	29.17	47	34.81	82	32.2
Occasionally	40	33.33	45	33.33	85	33.3
Regularly	18	15.00	25	18.52	43	16.9
Total	120		135		255	100

It was very much remarkable that one-third (33.3%, n=255) cyclone affected people used to listening warning bulletin occasionally when any kind of depression was located in the Bay of Bengal and its adjoining areas.

3.2.3 Main Concern of Listening Weather Forecast

It was evident from the cyclone victims; cyclone, Rainfall and temperature are the main concern for listening weather warning by the respondents. It was empirically found that people living in the coastal areas are very much interested to know about rainfall (13.3%), temperature (7.5%) but respectively half of the total (55%, n=120) and above one-third (37.78%, n=135) cyclone affected people of Rayenda and Uttar Shauthkhali opined that cyclone was their main concern to listening weather forecast. Only one-third (33.3%, n=255) cyclone

victims opined that both cyclone and temperature were their main concern to listening weather bulletin (Table 32).

Table 32
Main Concern of Listening Weather Forecast

Main Concern	Rayenda		Uttar Southkhali		Total	
	n	%	n	%	n	%
Cyclone	66	55.00	51	37.78	117	45.9
Rainfall	18	15.00	16	11.85	34	13.3
Temperature	3	2.50	16	11.85	19	7.5
Cyclone & Temperature	33	27.50	52	38.52	85	33.3
Total	120	100	135	100	255	100

3.3 Vulnerabilities Related to Information and Shelter Centers

Disaster related information like early warning; disaster forecasting and information to general preparedness' to cope with disaster play a vital role for decreasing vulnerabilities and risks related to cyclonic disaster. The early warning system played a great role to save lives and properties during cyclone. In general, Bangladesh Meteorological Department issues forewarning for any impending cyclone and storm surge; newspapers, television channels and radio stations broadcast the warning; and the local government administration and the local Cyclone Preparedness Program (CPP). Although the overall quality of forecasting cyclones and storm surges has improved over the years but more precision in forecasting, especially in the landfall location and location-specific inundation depth, is required.

Along with the information shelter or cyclone center is needed to decrease risks and to save lives and properties. In coastal areas of Bangladesh category 1 cyclone shelter: well designed cyclone shelter which made only for shelter in disaster, is very limited. In coastal areas maximum schools and others government office is used to cyclone center. This is called school cum cyclone center. Although, cyclone shelters in the coastal region of Bangladesh play a vital role in protecting human lives and livestock during cyclones but it is needed to adapt the coastal habitants about its proper utilization. During the Sidr (2007), 15 percent of the affected population took refuge in cyclone shelters; and it has been estimated that cyclone shelters saved thousands of lives.³⁶

According to access to shelter and information, the inhabitants of Rayenda and Uttar Sauthkhali have less than moderate access due to their limited knowledge and resources.

3.3.1 Early Warning Heard by the Cyclone Affected People

It was empirically found that 24.17 percent and 38.52 percent of cyclone affected people, one-third (31.8%, n=255) of total households, in Rayenda and Uttar Sauthkhali did not aware about the early warning

³⁶ Dasgupta et al. "Vulnerability of Bangladesh to Cyclones in Changing climate: Potential Damages and Adaptation Cost." Policy Research Working Paper. (The World Bank: Environment and Emergency Team, April 2010), p19

which has been disseminated by meteorological department and local authority before super cyclone Sidr. Whereas in cyclone Aila 14.17 percent and 21.48 percent cyclone affected people, 18 percent of total households, in Rayenda and Uttar Sauthkhali did not hear about the early warning (Table 33).

Table 33
Early Warning Heard by the Cyclone Affected People

Warning Heard		Rayenda		Uttar Sauthkhali		Total	
		n	%	n	%	n	%
Sidr	No	29	24.17	52	38.52	81	31.8
	Yes	91	75.83	83	61.48	174	68.2
Total		120	100	135	100	255	100
Aila	No	17	14.17	29	21.48	46	18
	Yes	103	85.83	106	78.52	209	82
Total		120	100	135	100	255	100

Access to early information about cyclone warning was 13.8 percent higher in Aila in contrast to super cyclone Sidr. There were various causes lying behind the rising rate of access to early information in time of cyclone Aila. Some significant causes were as below:

- i. Increasing (very little) awareness level of cyclone affected people after super cyclone Sidr;
- ii. Availability of various informative materials basically Radio devices;
- iii. Increasing warning dissemination of local authority;
- iv. Increasing community activities related to disaster; and

- v. Increasing voluntary activities about community participation in warning dissemination.

Though community activities and participatory warning dissemination of cyclone affected people is increasing after super cyclone Sidr, the access rate to information is still struggling to cent percent.

3.3.2 Distance of Cyclone Shelter from the Victims' Homesteads

It was evident from the cyclone victims that 18.1 percent households were below half and half kilometers distance to cyclone center whereas 6.7 percent household were very near to cyclone center. Respectively 12.5 percent, 31 percent and 38.4 percent households were situated in above half Km., 1 Km. and above 1 Kilometers to cyclone center. That means above two-thirds (69.4%, n=255) households were situated in long distance to cyclone center. So, respectively above two-third (72.058%, n=120) and above two-third (79.26%, n=135) cyclone affected people of Rayendaand Uttar Sauthkhali were inhabited in long distances to cyclone center (Table 34). For this reason losses rate of the inhabitants of Uttar Sauthkhali are more severe in contrast to the loss of the inhabitants of Rayenda. So, distance between homestead and cyclone center is the major factor that demonstrates cyclone affected people access to shelter in time of disaster.

Table 34
Distance of Cyclone Shelter from the Victims' Homesteads

Distance (km)		Rayenda		Uttar Sauthkhali		Total	
		n	%	n	%	n	%
Very Near	<0.5	11	9.17	6	4.44	17	6.7
Near	0.5	22	18.33	7	5.19	29	11.4
Distant	0.5 - <1.0	17	14.17	15	11.11	32	12.5
More Distant	1.0	43	35.83	36	26.67	79	31.0
Long Distant	>1.0	27	22.50	71	52.59	98	38.4
Total		120	100	135	100	255	100

Data showed the distance to cyclone center and various types of losses of cyclone-affected people were significantly correlated. According to the loss of shelter, crops and livestock are greater proportion of losses that occurring in super cyclone Sidr rather than Aila and those were significantly correlated. According to death toll which was only occurred in super cyclone Sidr, the greater proportion was happening in Uttar Sauthkhali because of the distances to cyclone center from homestead. Nevertheless, the death of infants, women and aged people were high in Uttar Sauthkhali in contrast to Rayenda (Table 35).

Table 35

Correlation between Distance of Cyclone Shelter and Various Types of Losses

Correlations^a

		Distance of Cyclone Shelter from Home	Number of Death	Loss of Shelter in Sidr	Loss of Shelter in Aila	Loss of Crops in Sidr	Loss of Crops in Aila	Loss of livestock in Sidr	Loss of livestock in Aila
Distance of Cyclone Shelter from Home	Pearson Correlation	1.000	-.414**	-.111	.184**	.152*	.089	-.090	.180**
	Sig. (2-tailed)	.	.000	.076	.003	.015	.157	.153	.004
Number of Death	Pearson Correlation	-.414**	1.000	.053	-.078	-.124*	-.162**	-.022	-.038
	Sig. (2-tailed)	.000	.	.400	.212	.048	.010	.722	.541
Loss of Shelter in Sidr	Pearson Correlation	-.111	.053	1.000	.065	-.135*	-.122	-.064	-.079
	Sig. (2-tailed)	.076	.400	.	.300	.031	.052	.309	.211
Loss of Shelter in Aila	Pearson Correlation	.184**	-.078	.065	1.000	-.239**	-.113	.003	.022
	Sig. (2-tailed)	.003	.212	.300	.	.000	.073	.963	.726
Loss of Crops in Sidr	Pearson Correlation	.152*	-.124*	-.135*	-.239**	1.000	.733**	.131*	.090
	Sig. (2-tailed)	.015	.048	.031	.000	.	.000	.037	.151
Loss of Crops in Aila	Pearson Correlation	.089	-.162**	-.122	-.113	.733**	1.000	.049	.033
	Sig. (2-tailed)	.157	.010	.052	.073	.000	.	.437	.596
Loss of livestock in Sidr	Pearson Correlation	-.090	-.022	-.064	.003	.131*	.049	1.000	.064
	Sig. (2-tailed)	.153	.722	.309	.963	.037	.437	.	.309
Loss of livestock in Aila	Pearson Correlation	.180**	-.038	-.079	.022	.090	.033	.064	1.000
	Sig. (2-tailed)	.004	.541	.211	.726	.151	.596	.309	.

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

a. Listwise N=255

So, it can be said that access to information and shelter are very insufficient in both of the study villages. For this reason the inhabitants of the two villages are very much vulnerable to disaster and they live with environmental hazardous risk.

3.4 Access to Resources and Responses

Access to various types of resources and responses according cyclone affected people awareness needs are significant in the process of their adaptation to environment. According to awareness needs resources can be classified in various types:

- i. Institutional resources: Institutional warning dissemination, sufficient warning dissemination and trained to cope with disaster;
- ii. Local resources: sufficient shelter and easy access to shelter; warning dissemination through local people;
- iii. Individual resources: various types of warning receiving tools–Radio, Television, Mobile etc.–and ability to adapt with local resources; and
- iv. Adaptation manner to warning: individual beliefs, fatalisms etc.

Those are the factors relating to access to resources and responses to disaster awareness which determine population resilience stream to disaster.

3.4.1 Access to the Various Types of Medium of Warning in Sidr and Aila

It was reported by the cyclone victims that 31.76 percent and 18.04 percent cyclone affected households had no access to institutional warning in Sidr and Aila respectively. Before cyclone Sidr and Aila respectively nearly one-third (31.67%, n=255) and 6.7 percent cyclone affected households had no medium of informative tools by which they can access to disaster response. Nevertheless 5.7 percent and 2.4 percent cyclone affected household knew about institutional warning by their neighbors in Sidr and Aila respectively. It was observed that local warning dissemination was very poor in rate: 9.8 percent in Sidr and 10.5 percent in Aila, the growth rate in local warning is 0.7 percent in Aila in contrast to Sidr (Table 36). Though the Go and NGOs argued about the development of institutional warning dissemination, the field data did not support the fact. So, it is to be said that according to individual warning receiving tools and sufficiency of institutional warning dissemination the situation of the two study villages is very vulnerable and environmental risks oriented.

Table 36
Access to the Various Types of Medium of Warning in Sidr and Aila

Distance (km)		Rayenda N=120		Uttar Sauthkhali N=135		Total N=255		
		n	%	n	%	n	%	
Sidr	TV	26	21.667	34	25.19	60	23.53	
	Radio	Own	44	36.67	43	31.85	87	34.12
		Others	25	20.83	31	22.96	56	21.96
	Micing	29	24.17	30	22.22	59	23.14	
	Neighbors	44	36.67	38	28.15	82	32.16	
	Others	3	02.50	2	1.48	5	1.96	
	No Access	29	24.17	52	38.52	81	31.77	
Aila	TV	60	50.00	55	40.74	115	45.10	
	Radio	Own	81	67.50	72	53.33	153	60.00
		Others	7	5.83	15	11.11	22	8.63
	Micing	27	22.50	24	17.78	51	20.00	
	Neighbors	18	15.00	31	22.96	49	19.22	
	Others	4	3.33	3	2.22	7	2.75	
	No Access	17	14.17	29	21.48	46	18.04	

Note: Multiple responses computed.

3.4.2 Cyclone Affected People Responses of Reliance to Warning for Sidr and Aila

It was reported by the cyclone victims that, in Sidr, more than two-third (69.23%, n=91) and nearly two-third (65.06%, n=83) of total respondents did not rely on early warning in Uttar Sauthkhali and Rayenda respectively. Whereas, 3.35 percent and 1.44 percent cyclone victims in Rayenda and Uttar Sauthkhali did not rely on the early warning in Aila. It was evident from the cyclone victims that respectively 32.75 percent and 95.21 percent believed in early warning in Sidr and Aila (Table 37). After the massive destruction of Sidr the coastal people of Baleshwar used to rely on any types of disaster warning. So, Aila was not the exception. Due to disbelief in early warning, people in coastal area of Baleshwar faced severe damaged in super cyclone Sidr.

Table 37
Cyclone Affected People Responses of Reliance to Warning for Sidr and Aila

Response of Reliance to Warning			Rayenda		Uttar Sauthkhali		Total N=255	
			n	%	n	%	n	%
Sidr	Access	No	63	52.50	54	40.00	117	45.88
		Yes	28	23.33	29	21.48	57	22.35
	No Access		29	24.17	52	38.52	81	31.77
	Total		120	100	135	100	135	100
Aila	Access	No	7	5.83	3	2.22	10	3.92
		Yes	96	80.00	103	76.30	199	78.04
	No Access		17	14.17	29	21.48	46	18.04
	Total		120	100	135	100	135	100

FGD: 2

A FGD that was combined by 8 cyclone affected people, 6 men and 2 women, aged 35 to 65+ in Uttar Sauthkhali demonstrated the fact of their disbelieving in early warning in Sidr. They told that before 2 months of Sidr landfall Bangladesh Meteorological Department warned the coastal people about Tsunami and advised to take shelter in safe places. Abide by that warning the cyclone affected people in Baleshwar took shelter in safe places over night. But in midnight the Bangladesh Meteorological Department withdraw the Tsunami warning. So, in Sidr when warning disseminated through TV, Radio, Mega Phoning and Micing they think it would be the fake one like Tsunami warning. Due to this reason, they did not go to safe places or cyclone shelter. For this reason, they had to pay much through severe losses in lives and properties.

3.4.3 Using Medium of Transportation to go to Cyclone Center

The southern districts of Bangladesh along the Bay of Bengal are prone to cyclones, which develop over warm tropical oceans and have sustained winds of 64 knots (74 miles/hour) or more. In addition to strong winds, water can rise as high as seven meters and flood waves can travel up to 30 miles inland. In order to protect people from severe storms and tidal surges, more than 2,100 cyclone shelters have been built in the coastal districts. Construction of cyclone shelters is one of six key mitigating measures along with embankments,

afforestation, early warning systems, awareness building and communications.³⁷

A typical shelter is a concrete building, shaped like two sides of a triangle, facing into the wind. To enter, people climb the staircase at the back, as it is slightly more sheltered from the wind. Railings are placed on both sides of the staircase to help people climb when winds are very strong. Cyclone shelters can have one or two floors. Windows have metal shutters as glass can break into pieces and cause injuries. There are water supply and toilets downstairs or close to the building. Some 700 to 1,000 people can take refuge in a typical shelter, which may cost around 60 million taka to build. Larger shelters can accommodate up to 2000 people and may have a different design. This type of shelter has new criteria, is not available in prior typical shelter, and separates room for men and women where children usually stay with women.³⁸

Earlier shelters were built as single purpose structures but new ones are multipurpose. They can also be used as local government offices, schools or health centers. Newer shelters may have a 'killa' (raised platform for livestock) nearby. In Rayenda, there is no shelter which has modern facilities and construction. Nevertheless, Rayenda has no special or uni-purpose shelter. In Rayenda out of 11 multipurpose

³⁷ *Bangladesh Climate Change Strategy and Action Plan 2008*, (Dhaka: Ministry of Environments and Forests, 2008) p 28

³⁸ *Bangladesh Climate Change Strategy and Action Plan 2008*, (Dhaka: Ministry of Environments and Forests, 2008) p 31

cyclone shelters 9 are very little, 8 are poorly constructed, and no one has separate room and toilet for women. Recently, after cyclone Aila, LGED and Facilitations Department reconstructed 4 poorly constructed and Sidr damaged shelter. According to local Cyclone Preparedness Program (CPP), this cyclone shelter can accommodate nearby 500 to 600 persons in disaster moment. So, in contrast to population the proportion is 0.25:3.10.

In Uttar Sauthkhali, there are 12 cyclone shelters. Out of 12, 1 cyclone shelter named Bogi Cyclone Shelter funded by CARE and facilitated by LGED is a typical cyclone shelter that is constructed in 2009 and ready to be used in 2010. In super cyclone Sidr 7 multipurpose shelter were severely damaged that was reconstructed in 2009 by Facilitation Department and LGED. According to CPP this cyclone shelter in Uttar Sauthkhali can accommodate 900 to 1000 persons in disaster moment. According to DPIO of Sharankhola Upazilla the Bogi Uni-purpose cyclone shelter can accommodate 150 men and 120 women in separate areas. So, in contrast to population the proportion between shelter and population is .37:2.67. So, according to sufficient shelter in proportion to population of the two study villages is poorly insufficient.

It was reported by the cyclone victims that in disaster moment or early disaster situation in Sidr 29.61 percent cyclone-affected people stayed in cyclone shelter which increasing in 61.57 percent in Aila. To rush in

shelter 90 percent and 75.17 percent people used their foot in Rayendaand Uttar Sauthkhali respectively. Only 4 percent and 9.55 percent in Rayendaand Uttar Sauthkhali used van to rush to cyclone shelter, whereas 9.55 percent in Rayendaused bicycle to rush to shelter. Only 6 percent and 5.73 percent used boat to rush to shelter in Rayendaand Uttar Sauthkhali (Table 38). So, according to instant access to shelter, the two study villages are struggling with severe vulnerability and risks.

Table 38
Using medium of transportation to go to cyclone center

Medium of Transport	Rayenda		Uttar Sauthkhali		N		Percent of N	
	Sidr	Aila	Sidr	Aila	Sidr	Aila	Sidr	Aila
By foot	19	57	26	61	45	118	90	75.17
Van	2	10	-	5	2	15	4	9.55
Boat	-	2	3	7	3	9	6	5.73
Bicycle	-	4	-	11	-	15	-	9.55
Total	21	73	29	84	50	157	100	100

3.4.4 Access to Community Responses about Early Warning in Sidr and Aila

It was evident from the cyclone victims about community response in Sidr and Aila, that 28.63 percent and 38.04, two-third (66.7%, n=255) of total households, in Rayendaand Uttar Sauthkhali did not take any steps to warn the community members about early warning whereas, 33.3 percent affected people warned by their community members in Sidr. But, in Aila, 23.92 percent and 40.39 percent, nearly two-third (64.3 %, n=255) of total households, in Rayendaand Uttar Sauthkhali

did not take any steps to warn the community members about early warning respectively. Only 33.3 percent and 35.7 percent affected people took help about early warning from their community members in Sidr and Aila respectively (table 39).

Table 39
Access to Community Responses about Early Warning in Sidr and Aila

Taking Help in Sidr	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Do Not Take Any Help	73	60.83	97	71.85	170	125.93
Take Help	47	39.17	38	28.15	85	62.96
Total	120		135		255	100
Taking Help in Aila	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Do Not Take Any Help	61	50.83	103	76.30	164	121.48
Take Help	59	49.17	32	23.70	91	67.41
Total	120		135		255	100

3.4.5 Cyclone Affected People Training on Disaster Management

Training in disaster management can make people capable to cope with disaster. It was reported from the cyclone victims that 3.9 percent—5 percent in Rayenda and 2.96 percent in Uttar Shauthkhali—had training on disaster management organized by various organizations and 96.1 percent have no training on disaster management (table 40). But they did use their training into disaster moment due to completion of training after cyclone Sidr and Aila. So, according to institutional capability the affected people of the two study villages were vulnerable in Sidr and Aila.

Table 40
Cyclone Affected People Training on Disaster Management

Taking Help in Sidr	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
No	6	5.00	4	2.96	10	3.9
Yes	114	95.00	131	97.04	245	96.1
Total	120		135		255	100

Case 2

Nurullah Farazi, age 36, a fisherman of Uttar Sauthkhali argued before Sidr no one (GOs and NGOs) came to us for giving training on disaster and we were unknown about *Jharer Training* (Disaster Training). Before training we used our indigenous coping mechanisms to mitigate cyclone disaster. But after Aila, we were conscious about what had to do in different phases of disaster.

So, according to institutional resources, local resources, individual resources and adaptive manner of the cyclone affected people, the cyclone affected people of the two study villages are not capable to cope with disaster but severely vulnerable to environmental hazards.

3.5 Conclusion

It is essential that Bangladesh prepares now to adapt to climate change and safeguard the future well-being of her people. Over the last 35 years, the Government of Bangladesh, with the support of development partners, has invested over \$10 billion to make the country less vulnerable to natural disasters. These investments include flood management schemes, coastal polders, cyclone and flood shelters, and the raising of roads and highways above flood level. In addition, the Government of Bangladesh has developed state-of-the-art warning systems for cyclones and storm surges, and is expanding community-based disaster preparedness. Climate resilient varieties of rice and other crops have also been developed.

By this above discussion it can be said that the people in coastal areas are very much vulnerable condition in every disaster vulnerability matrix and living with risks of environmental hazards along with their local fashion adaptive capacity, and indigenous knowledge to cope with disasters. The challenge Bangladesh now faces is to scale up these investments to create a suitable environment for the economic and social development of the country and to secure the well-being of our people, especially the poorest and most vulnerable groups, including women and children.

CHAPTER 4

COMMUNITY AND ORGANIZATIONAL CYCLONE WARNING SYSTEM

The Chapter 4 is aptly focusing on the institutional warning systems and mechanisms, and local people cyclone forecasting indicators. It intends to explore the facts, firstly various warning procedures and existing institutional facilities to provide reliable early warning; secondly warning procedures and dissemination's system of the study locale; thirdly inhabitants indigenous knowledge to identify a cyclone; lastly challenges (individual and institutional) faced by the inhabitants of the study locale.

Disaster risk reduction involves activities aiming at reducing such losses by addressing hazards related risks and people's vulnerability. Early warning of disaster is a major element of disaster preparedness and risk reduction. It saves life and reduces economic and material losses from disasters. To be effective, community based early warning systems need the active involvement of the community people, a strong public education on and awareness of risks, an effective communication system ensuring a constant state of preparedness.

The United Nations Millennium Declaration takes early warning as a key issue for global economic progress. For this reason UN Secretary General Kofi Annan recommended “the establishment of a worldwide early warning system for all natural hazards, building on existing national and regional capacity”³⁹ to complement broader disaster preparedness and mitigation activities. Nevertheless, to assist in the system’s establishment, UN Secretary General Kofi Annan requested the ISDR secretariat to coordinate a survey of existing capacities and gaps in early warning systems, in cooperation with all United Nations system entities concerned. ISDR defines early warning as “the provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response”.

To analysis early warning ISDR performed a survey worldwide which was presented in Early Warning Conference (EWC III) in Bonn, Germany, March, 2006.⁴⁰

³⁹ *Global Survey of Early Warning System*, (New York:United Nations, 2006), p II

⁴⁰ *Global Survey of Early Warning System*, (New York:United Nations, 2006), p 8

The survey declared five main recommendations about early warning as follows:

1. Develop a globally comprehensive early warning system,

rooted in existing early warning systems and capacities:

A global early warning system will require long-term sustained action by diverse players, strong political commitment to engender public action and to make early warning a core task of national policy and disaster risk reduction strategy, strong international support and coordination, with clear roles and responsibilities and wide participation of NGO, private sector and regional organizations.

2. Build national people centered early warning systems:

Country-based early warning systems are needed for the protection of citizens and also provide the building blocks of the global early warning system. The recommendation includes calls for a national multi-party roundtable on early warning, a national plan based on a survey of capabilities, a warning dissemination strategy, and community-based approaches, public education and mock exercises.

3. Fill the main gaps in global early warning capacities:

The recommendation highlights gaps and opportunities that deserve immediate concerted action, including for tropical cyclones,

floods and tsunamis for the most ill-protected populations, agreements and networking for drought, food security and wildland fire, a global survey and mobile monitoring facility for volcanoes and a major early warning project in each least-developed country.

4. Strengthen the scientific and data foundations for early

warning: The scientific and technical recommendation seeks action on a long-term global data plan, upgraded telecommunications, an agreement on basin-wide data exchange for floods, a pan-African project to fill major data gaps, improved hazard and vulnerability mapping, an early warning science and technology agenda and an internet portal for natural hazards, risks and warnings.

5. Develop the institutional foundations for a global early

warning system: This recommendation addresses the needs for underpinning mechanisms of international and regional governance, coordination and support, starting with a call for the UN system to affirm the goal of a global early warning system and including requests for various UN and international agencies in technical, humanitarian and development fields to undertake specific governance and support roles.

So, according to these recommendations it is to be said that community and organizational early warning system should be developed in every country, with vice-versa dependencies between community and organizations, to cope with disasters and to make a resilience community. Nevertheless, it is needed to establish people centered warning system, a particular system whose warnings are timely and understandable to those at risk, which take into account the demographic, gender, cultural and livelihood characteristics of the target audiences, periodically review, and maintain information systems and establish institutional capacities to ensure that early warning systems are well integrated into governmental policy and decision-making processes and emergency management systems at both the national and the local levels.

4.1 Conceptualizing Early Warning

4.1.1 Community Based Early Warning System: Community based early warning system basically claims a system that is people centered which empowers individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner so as to reduce the possibility of personal injury, loss of life, damage to property and the environment and loss of livelihoods. Communities, particularly those most vulnerable, are central to people-centered early warning systems. Their input to system design and their ability to respond ultimately determines the extent of risk associated with natural hazards. They

should be aware of the hazards and the related effects to which they are exposed and be able to take specific actions to minimize the threat of loss or damage.

To develop an effective community based early warning systems ISDR identified four inter-related factors:⁴¹

- 1. Risk Knowledge:** The vulnerable communities should be aware of the hazards related risks and have a clear cognition about environmental risks by institutionally or local fashion (IK). Risk analyses require a systematic collection and examine the data along with dynamics and variability of hazards resulting from various disasters. By this risks assessments it is easy to develop a risk maps for a community which helps to motivate people, people needs of early warning system and guide to develop response preparations and disaster presentations activities.
- 2. Warning and Monitoring Service:** Warning service is the core factor of early warning system. To forecast reliable and valid warning, warning system should be based on sound scientific modern equipments that may create sound predictions. Nevertheless, to generate accurate warning continuous monitoring of warning parameters and precursors is needed.

⁴¹ UN/ISDR, “Develop Early Warning System- A Check List”, Third International Conference on Early Warning. *ISDR Platform for the Promotion of Early Warning*, (Bonn: UN/ISDR, 2006) p1-3

3. Dissemination and Communication: To make people resilience it is ensure to provide clear, reliable and useful information. By using national and local level multiple communication channels and tools, and one authoritative voice that are pre-identified are necessary to aware community about disaster.

4. Response Capability: The disaster vulnerable communities should be responded positively to warning. The community must have the knowledge to react for safe behavior as well as cope with disaster related risks. It is the duty to disaster related authorities to inform the mechanism how community response with the disaster time and the mechanism should be practiced and tested properly.

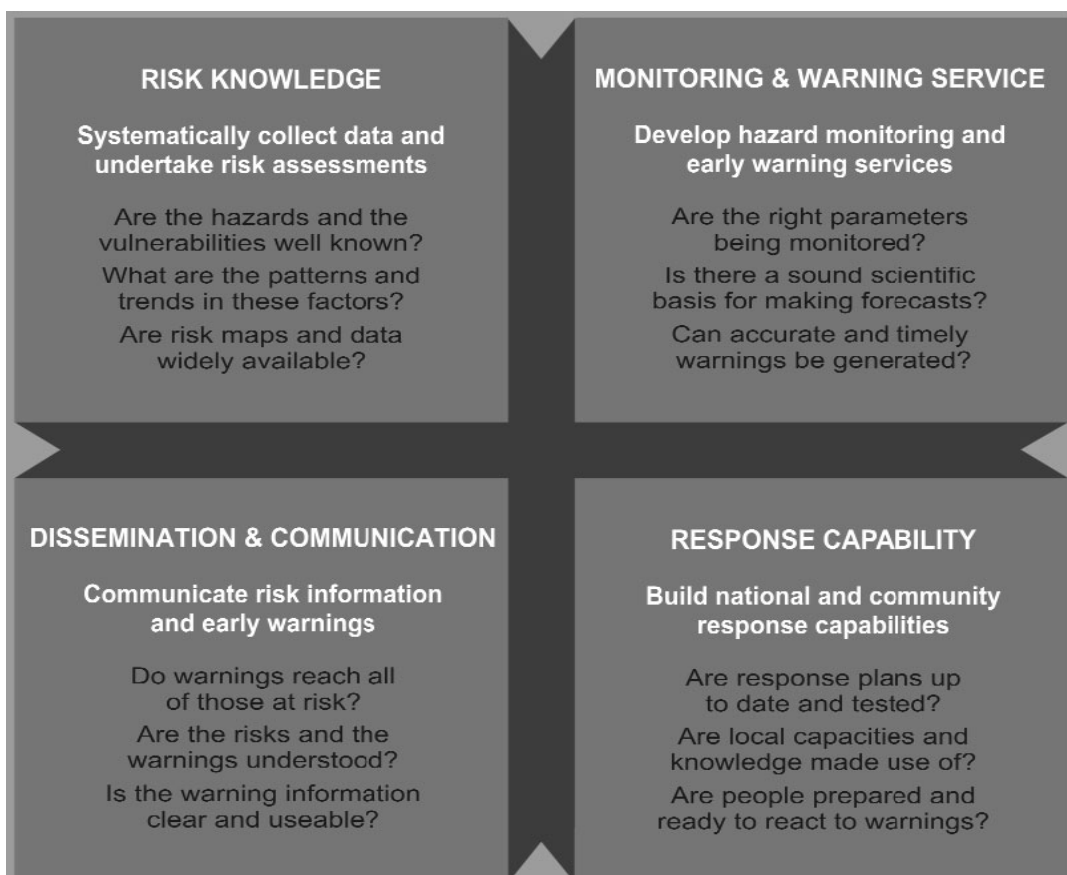
So, greater inter-linkage among the above factors should be required to develop a safe, reliable and trusted early warning system. By this system people able to aware various hazards and their relation to disaster to which they are exposed and be able to take specific actions to mitigate the losses of lives and properties, and be resilient.

Figure 9 discloses a brief concept about community based warning system as well as the way of community preparedness to disaster. Basically it shows how a vulnerable disaster community takes part in early warning and puts them in center to take different policies and

ensure greater participation to execute the policies so that they become resilient. It is a system that is of the community, for the community and by the community. So, in modern disaster mitigation activities community based or disaster vulnerable people centered early warning system is highly recommended by internationally and nationally.

Figure 9

Community Based Early Warning System



Source: ISDR Platform for the Promotion of Early Warning; (2006: 2)

4.1.2 Organizational Early Warning System: In modern disaster preparedness notion organization is not far behind the community rather organization is included in community. There is, however, no generally accepted definition of an organization since its meaning may

vary in terms of the different sociological approaches applied to the subject. In broader sense Stephen Hunt (2007:10) cited "A broad definition of an organization could be said to be that of any purposeful arrangement of social activity that implies active control over human relations ordered for particular ends."⁴² In this sense, organizations involve patterns of relationships beyond primary group associations that are largely spontaneous, unplanned, and informal, and that are typified by kinship relations, peer groups, and localized community networks. Moreover, while organizations may be deliberately constructed or reconstructed for specific ends, the problem of definition founders on the specification of "organizational goals," since groups and individuals within organizations may hold a variety of different and competing goals and the level of compliance and cooperation displayed by subordinates may vary, thus leading to the distinction between "formal" and "informal" organizations.

In disaster preparedness notion organization, institutions that have specific objectives and goals, is a bundle of different goals oriented groups which holds a formal entity and group associations. In this study national and local level government organizations, regional institutions and organizations, international, national and local NGOs' and private sectors are included in sense of organization. If different

⁴² Stephen Hunt, "Organization of Sociology" In George Ritzer (ed.), *Blackwell Encyclopedia of Sociology*, (London: Blackwell Publishing, 2007), p 1111, http://www.blackwellreference.com/public/book.html?id=g9781405124331_9781405124331[accessed 16 november 2009]

organizational roles and responsibilities in early warning system can discuss in-depth, it will clarify the total organizational early warning system. To establish an effective early warning system a greater coordination must be developed among different types of institutions and organizations where each has particular goals to achieve a strong early warning system.

To develop a sound early warning system led by organization, ISDR identified some roles and responsibilities of organization based on ISDR Platform for the Promotion of Early Warning and Hugo Framework which are given bellow.⁴³

- 1) National Government Organization:** National governments are responsible for policies and frameworks that facilitate early warning and usually also for the technical systems for preparing and issuing timely warnings. They have responsibility to ensure that warnings and related responses address all of the population, particularly the most vulnerable. They also provide support to local governments and communities to develop their operational capabilities and to translate early warning knowledge into local risk reduction practices.

⁴³ UN/ISDR, “Develop Early Warning System- A Check List”, Third International Conference on Early Warning. *ISDR Platform for the Promotion of Early Warning*, (Bonn: UN/ISDR, 2006) p 12-13

2) Local Government Organization: Local governments usually have direct responsibilities for citizen safety and considerable knowledge of the hazards to which their communities are exposed. They must be actively involved in the design and maintenance of early warning systems and understand advisory information received to be able to advise, instruct or engage the local population in a manner that increases their safety and reduces the possible loss of resources on which the community depends

3) Regional Institutions and Organizations: Regional institutions and organizations provide specialized knowledge and advice in support of national efforts to develop or sustain operational capabilities of countries that share a common geographical environment. Regional organizations are crucial to linking international capabilities to the particular needs of individual countries and in facilitating effective early warning practices among adjacent countries.

4) International and National NGO's: International bodies (INGO's) provide support for national early warning activities and foster the exchange of data and knowledge between individual countries. Support may include the provision of advisory information, technical cooperation and policy and

organizational support necessary to ensure the development and operational capabilities of national authorities or agencies responsible for early warning practice. Non-governmental organizations (NGOs) specially local NGOs' including volunteers involving organizations play a critical role in raising awareness among individuals and organizations involved in early warning and in the implementation of early warning systems, particularly at the community level. In addition, they play an important advocacy role to help ensure that early warning stays on the agenda of government policy makers.

5) The Private Sectors: The private sector has a diverse role to play in early warning, including developing early warning capabilities in their own organizations. The media plays an important role in improving the disaster consciousness of the general population and by disseminating early warnings. In addition, the private sector has a large untapped potential to help provide skilled services in the form of technical manpower, know-how or donations (in-kind and cash) of goods or services, especially for the communication, dissemination and response elements of early warning.

6) The Science Community: The science community has a central and critical role in providing specialized scientific and technical input to assist governments and communities in developing effective early warning systems. Their expertise is fundamental to analyzing natural hazard risks facing communities, supporting the design of scientific and systematic monitoring and warning services, supporting data exchange, translating scientific or technical information to comprehensible messages and to the dissemination of understandable warnings to those at risk.

The responsibility for organizing appropriate responses to warnings usually lays with national disaster management organizations. In developing countries, significant roles are played by emergency response agencies, emergency committees and organizations, NGOs and UN agencies. Integral parts of this task are the preparation of hazard and vulnerability maps and disaster preparedness strategies. Often there are specific political responsibilities for ensuring that warnings are issued and acted upon and that evacuation plans are effective.

4.2 Cyclone Detection and Warning Procedure in Bangladesh

As the Bay of Bengal, situated in the northeastern corner of the Indian Ocean and is bounded between 5°-22¢ North Latitude and 80°- 95¢ East

Longitude, is the breeding place of catastrophic cyclone. The Bay of Bengal cyclones mostly originate at latitudes greater than 5°N (near the *Andamans*). It is presumed that the Inter-Tropical convergence Zone (ITCZ), which is situated near the equator, and where winds from the two hemispheres meet, plays a part in the formation of the tropical cyclones.⁴⁴ Bangladesh being a poor country, cannot manage to have a large organization with equipment exclusively to meet the requirements of pre, during and post disaster activities.

Disaster management principally concerns to disaster mitigation and preparedness. Mitigation and preparedness encompasses some vital factors and early warning system (EWS) is one of them. Effective early warning systems need four components:

- (1) Detection and monitoring the hazards;
- (2) Analysis of risks and forecasting the hazards;
- (3) Dissemination of timely warnings - which should carry the authority of government; and
- (4) Activation of emergency plans to prepare and respond.

⁴⁴ Chowdhury, M. Yusuf Chowdhury, Abbas Bhuyia, K. Islam, Z. Hossain, O. Rhaman, R. Glass and M. Bennish. "Cyclone Aftermath: Research and Directions for the Future." in Hossain, Dodge and F. H. Abed edited *From Crisis to Development—Coping With Disasters in Bangladesh*. (Dhaka: University Press Limited, 1992), p108

These need to be coordinated across many agencies at national to community levels for the system to work.

(1) Cyclone Detection and monitoring the hazards: Basically cyclone detection is the task of Bangladesh Storm Warning Center (SWC) and for maintaining this task properly; they record any kind of intrusion in the Bay of Bengal.⁴⁵ Nevertheless, for delivering accurate forecasting and up-to-date warning message to the people, SWC observed cyclone from its formulation stage to landfall. As well as the Bangladesh Meteorological Department (BMD) is responsible for providing tropical cyclone warnings to Bangladesh and its coastal areas and for a designated portion of the high seas in the Bay of Bengal. Warnings and forecasts are issued under the authority of the Director, Bangladesh Meteorological Department. The tropical storm warnings are provided from the Storm Warning Centre, Dhaka. This Centre is also responsible for issuing the weather warnings like—Nor'westers (severe local storms) warning, etc.

The tropical cyclones are tracked with the help of conventional observations, radar, satellite observations and model derived products. Presently the Bangladesh Meteorological Department (BMD) takes every responsibility to prepare all weather

⁴⁵ E. C. Hoque and Burton, "Adaptation Options Strategies for Hazards and Vulnerability Mitigation: An International Perspective." *Journal of Mitigation and Adaptation Strategies for Global Change*. (New York: Springer, 2003)No. 10, p 4

forecasts and disaster warnings. These vital tasks are completed with the coordination of Storm Warning Center (SWC) by guidance of BMD through five interconnected subdivisions: a) observations, b) communication, c) display and manipulations, d) analysis, and e) prognosis (preparation of forecast).⁴⁶

After observing any kind of disturbance in the Bay of Bengal the BMD then communicates all of its conventional mechanisms try to monitor multi hazardous risks. The BMD gathers data from various sources which are spreads nationally and internationally. There are 35 surface observatories in the country which collect hourly data and send them to the Center in Dhaka; these data include wind speed, direction, humidity, air temperature and other meteorological variables at different elevations. The BMD also has three radar stations, at Dhaka, Khepupara and Cox's Bazar, transmitting hourly and halfhourly data. The Center receives U.S. NOAA (National Oceanic and Atmospheric Administration) satellite imagery via an earth station in Chittagong, and data from NOAA satellites 10 and 11 and the Japanese satellite GMS4 via the Bangladesh Space Research and Remote Sensing Organization (SPARRSO). The World Meteorological Organization network also provides data to the BMD.⁴⁷

⁴⁶ World Meteorological Organization, *Review of the Tropical Cyclone Operational Plan*. (Thailand: WMO/ESCAP Panel on Tropical Cyclones, 2010), p 8-9

⁴⁷ C. E. Haque, "Atmospheric Hazards Preparedness in Bangladesh: A Study of Warning, Adjustments and Recovery from the April 1991 Cyclone", *Natural Hazards*, (Springer: 1997)vol.16, p185

It is observed that the major hazards that affect Bangladesh, ranked by historical figures of casualties and economic losses attributed to the respective hazards, and identifies the national agency mandated to issue warnings and the hazard Type. For Type I hazards, the identified agency, Bangladesh Meteorological Department, has the exclusive mandate for development of warnings for the hazard. In the case of Type II hazards, the identified agencies, Bangladesh Meteorological Department and Department of Agriculture Extension, have a joint mandate for the development of the warnings. Where hazards are classified as Type III, the identified agencies, Bangladesh Meteorological Department and Bangladesh Water Development Board, provide information to other agencies that have the mandate for the development of the warning (table 41).⁴⁸

⁴⁸ A. Habib et al, “The Bangladesh Cyclone Preparedness Program. A Vital Component of the Nation’s Multi-Hazard Early Warning System”, in Maryam Golnarghi (ed) *Institutional Partnerships in Multi-Hazard Early Warning System: A Completion of Seven National Good Practices and Guiding Principles*, (Geneva: WMO, 2012), p39

Table 41
Major Hazards that Affect Bangladesh and the National Agency
Mandated to Issue Warnings

Hazard Rank	Hazard	National Agency for Mandate	Hazard Type	Remarks
1	Cyclones	BMD	I	
2	Storm surge	BMD	I	
3	Thunderstorm (Nor'wester), Lightning	BMD	I	
4	Tornado	BMD	I	
5	Hailstorm	BMD	I	
6	River flooding	FFWC (BWDB), BMD	III	
7	Flash flood	FFWC (BWDB), BMD	III	
8	Coastal flooding (due to storm surge/tsunami)	BMD	I	
9	Drought	BMD, DAE	II	
10	Heat Wave	BMD	I	
11	Cold Wave	BMD	I	
12	Dense Fog	BMD	I	
13	Landslide/Mudslide (due to heavy rain)	BMD	I	
14	Earthquake	BMD		BMD monitors earthquakes and issues reports to government and public
15	Tsunami	BMD	III	Tsunami Watch Information (TWI) Bulletins are received from PTWC and JMA
16	Turbulence/Icing	BMD	I	
17	Strong winds	BMD	I	
18	Wind driven surge	BMD	I	
19	Air pollution	DoE	II	
20	Waterborne hazards	DPHE	II	
21	River Erosion	BWDB	I	

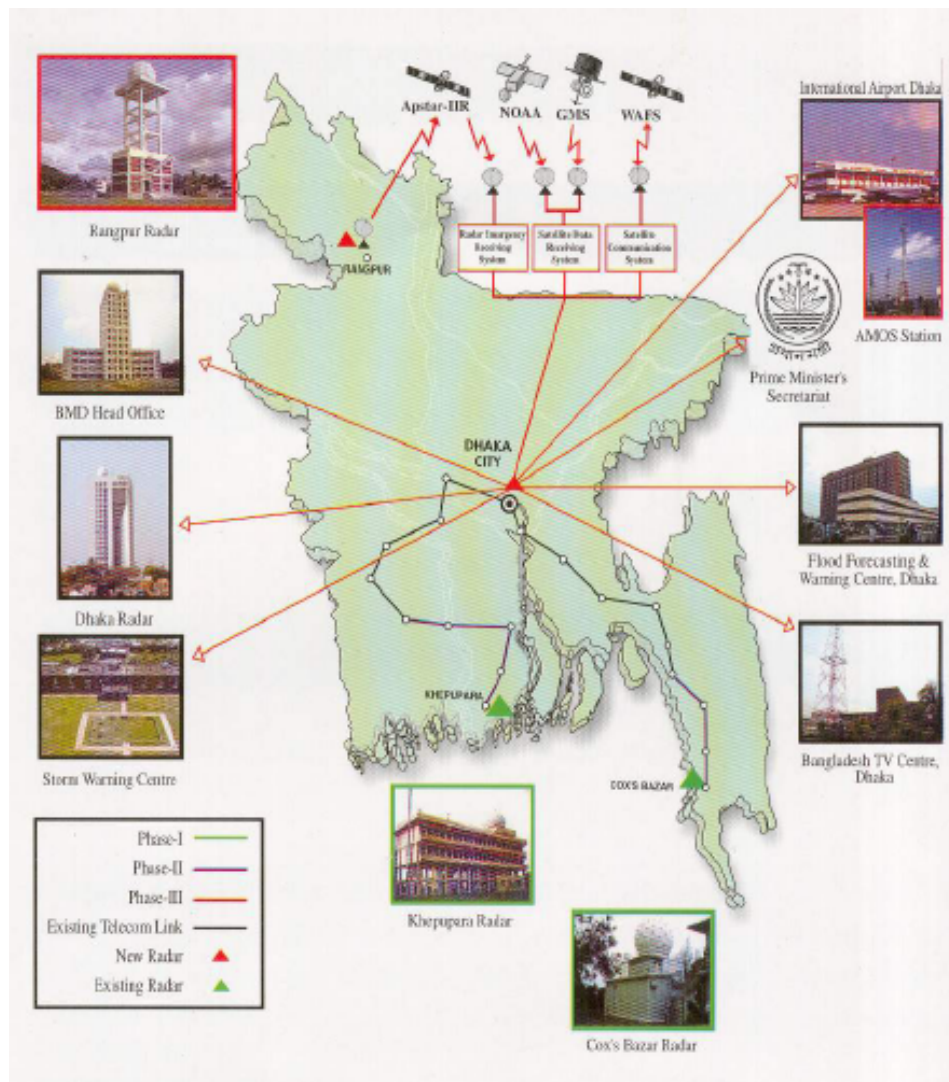
(BMD = Bangladesh Meteorological Department; BWDB = Bangladesh Water Development Board; DAE = Department of Agriculture Extension; DoE = Department of Environment; FFWC = Flood Forecasting and Warning Centre; JMA = Japan Meteorological Agency; PTWC = Pacific Tsunami Warning Center; DPHE = Department of Public Health Engineering)

Adopted from A. Habib et al, in Maryam Golnarghi edited *Institutional Partnerships in Multi-Hazard Early Warning System: A Completion of Seven National Good Practices and Guiding Principles*, (21012:39)

The current organizational networking structure to procure, process, and disseminate atmospheric information, as shown in Figure 10, is efficient and effective.

Figure 10

Bangladesh Meteorological Department Network



Sources: Bangladesh Meteorological Department

(2) **Analysis of risks and forecasting the hazards:** When any impending threat is detected by the SWC then they gather the data and analyze those by conventional model. After analyzing they immediately provided the warning message to followings:

- (i) The Honourable President;
- (ii) The Honourable Prime Minister;
- (iii) Control room, Ministry of Food and Disaster Management (MoFDM);
- (iv) All ministries;
- (v) The Sea Port Authorities at Chittagong, Mongla and Cox's Bazar;
- (vi) The Cyclone Preparedness Program (CPP), Bangladesh Red Crescent Society;
- (vii) The Armed Forces division, Bangladesh Navy, Bangladesh Air Force;
- (viii) Inland river ports authorities;
- (ix) Airport authorities;
- (x) Concerned government officials;
- (xi) The general public (through Betar (Radio) Television, electronic media and mass media);
- (xii) Fishing boats and trawlers in the sea;
- (xiii) Coast Guard; and
- (xiv) The NGOs.

Recently Bangladesh changed its cyclone warning system because sometimes people were confused between maritime and riverine signals regarding wind speed at different stages and places of landfall of cyclones with the old signal systems. The new signal system has been developed on wind speeds and the signal number will increase with the increasing wind of the impending cyclone, besides maritime and riverine signals are incorporated in the new system to avoid confusion which is shown in Chart 6 and Chart 7.

Chart 6
New Signal System for Maritime Ports

SL. NO.	Signals	Explanations
1	Distance Cautionary Signal Number -I	There is a region of squally weather in which a storm may be forming (well marked low or depression) with surface winds up to 61km/h. {33knots})
2	Distance Warning signal number -II	A storm has formed (Cyclonic storm with surface winds 62-87 km/h. {34-47 knots})
3	Local Cautionary signal number -III	The port is threatened by squally weather (cyclonic circulation with surface winds 40-50 km/h. (22-27 knots) or squalls due Nor \square westers)
4	Local warning signal number -IV	The port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution (cyclonic circulation) with surface winds 51-61 km/h. {28-33knots})
5	Danger Signal -VI	The port will experience severe weather from a cyclonic storm of moderate intensity (Cyclonic storm with surface winds 62-88 km/h. {34-47 knots})
6	Great Danger Signal -VIII	The port will experience severe weather from a storm of very great intensity (Severe cyclonic storm with surface winds 89-117 km/h. {48-63})
7	Great Danger Signal -IX	The port will experience severe weather from a storm of very great intensity (Severe cyclonic storm with a core of Cyclone winds with surface winds 118-170 km/h. {64-119 knots})
8	Great Danger Signal -X	The Port will experience severe weather from a storm of very great intensity (Severe cyclonic storm with a core of Cyclone winds with surface winds 171 km/h and above {120 knots and above})

Source: Bangladesh Meteorological Department

Chart 7

New signal System for Inland River Ports

SL. NO.	Signals	Explanations
1	Local Cautionary Signal number - III	Your area is threatened by squally winds of transient nature (Nor'wester squall of wind speed 40-50 km/h. (22-27 knots)). Look out for further development
2	Local Warning signal number - IV	A storm (of depression intensity, associated sustained winds 51-61 km/h (28-33 knots)) is likely to strike you vessels of length 65feet or less are to seek shelter immediately
3	Danger Signal - VI	A storm of moderate intensity or Nor'wester squalls associated sustained winds 62-88 km/h (34-47 knots) may strike you. All vessels are to seek shelter immediately and keep in shelter till further notice.
4	Great Danger Signal - VIII	A violent storm or Nor'wester, associated sustained wind 89-117 km/h (48-63 knots) may strike you. All marine vessels have to keep in shelter till further notice.
5	Great Danger Signal - IX	A very severe cyclonic storm with very high intensity with sustained wind 118-170 km/h (64-119 knots) may strike you. All marine vessels are to be in shelter till further notice.
6	Great Danger Signal - X	A very severe cyclonic storm with the intensity of super cyclone with sustained wind of 171 km/h or more (120 knots or more) may strike you. All marine vessels are to be in shelter till further notice.

Source: Bangladesh Meteorological Department

Tropical cyclone warnings for the high seas in Bangladesh are provided from the Storm Warning Centre at Dhaka and are broadcast from the coastal radio station at Chittagong (ASC). Warnings are issued for the Bay of Bengal region north of 18o N latitude. In accordance with international procedure, ports are

warned and advised to hoist "Signals" whenever adverse weather is expected over the ports for the oceanic areas, in which it is located due to the tropical cyclone. However, regional difference exists. The warning messages normally contain information on the location, intensity, direction and speed of movement of the tropical cyclone and the expected weather over the port as shown in above tables.

(3) Dissemination of timely warnings: Warnings are disseminated through high priority landline telegrams, telefax, telephone and teleprinter. In addition, warnings are also transmitted to Betar (Radio) Bangladesh, Dhaka, Chittagong, Khulna, Rangpur, Rajshahi and Sylhet for broadcast. Alert messages are broadcast four to five times a day. "Warnings" are broadcast every hour and "Danger" and "Great Danger" messages are broadcast frequently.⁴⁹

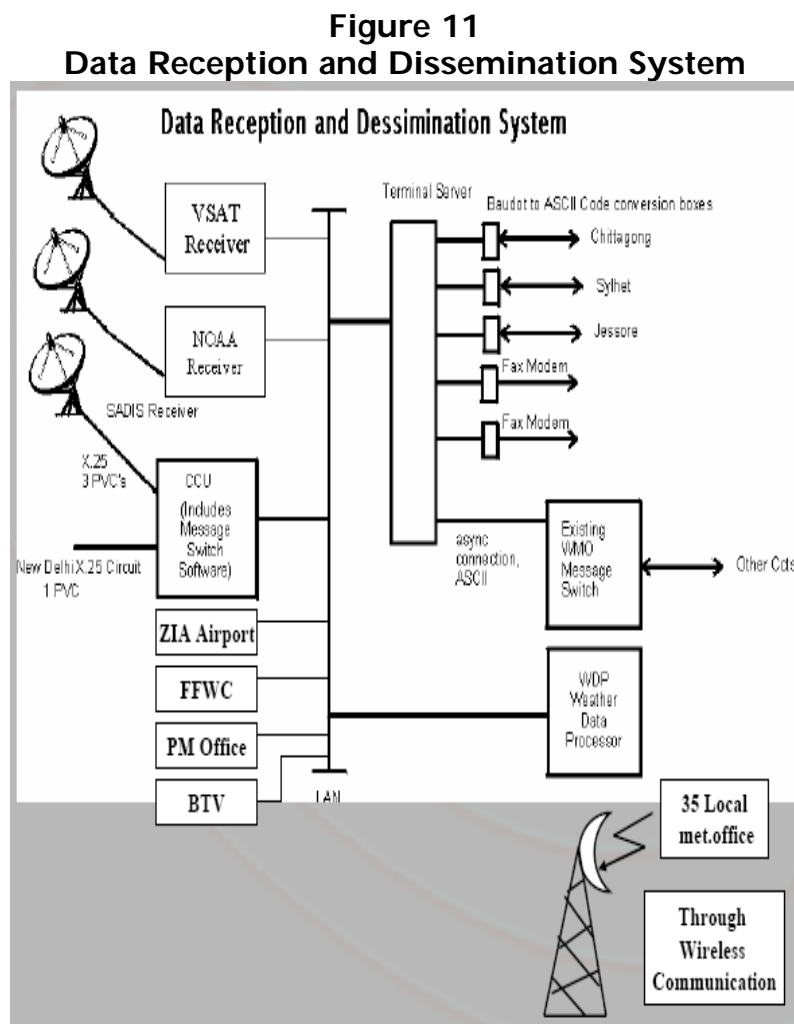
Instruments used in dissemination of Cyclone Warning:

- (i) Telefax;
- (ii) Telephones;
- (iii) Automatic Message Switching System (AMSS);
- (iv) Bangladesh Betar (Radio);
- (v) Television;

⁴⁹World Meteorological Organization, *Review of the Tropical Cyclone Operational Plan*, (Thailand: WMO/ESCAP Panel on Tropical Cyclones, 2010), p 10

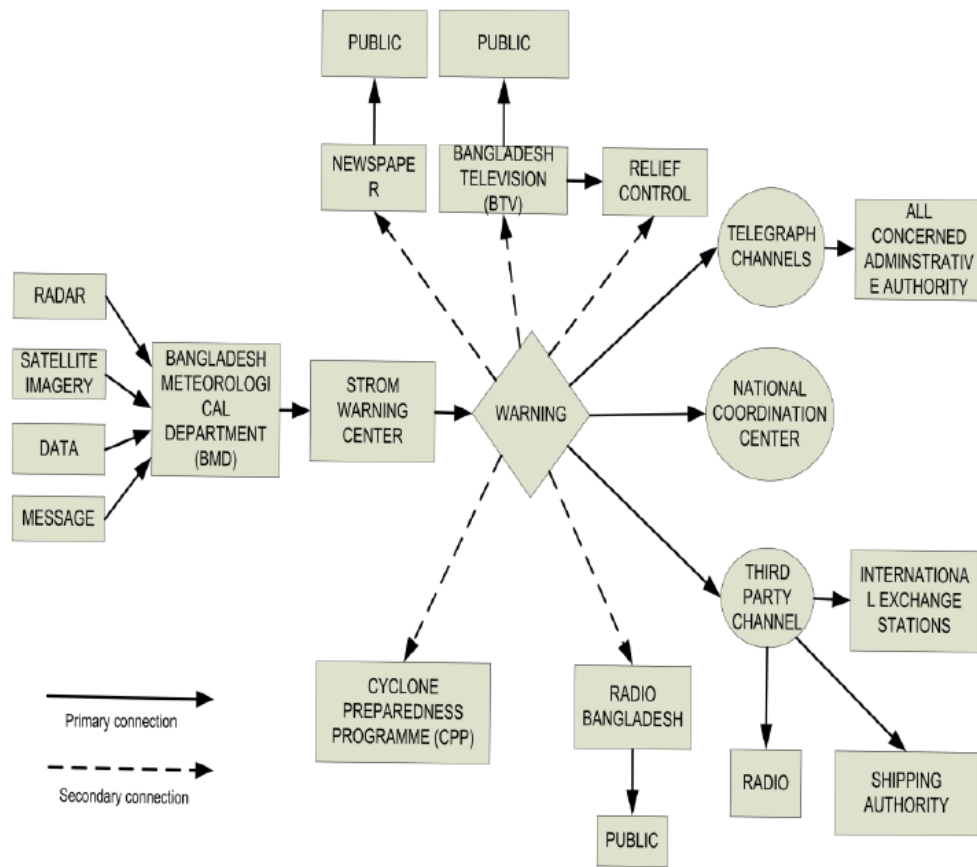
- (vi) Through print & electronic media;
- (vii) Wireless/ Tele printer; and
- (viii) Internet, by keeping information on BMD website (<http://www.bmd.gov.bd>).

Bangladesh Meteorological Department (BMD) performs four stages of actions by informing concern ministries, departments, agencies and NGOs' as they take rapid actions to eliminate cyclone risks. Figure 11 and 12 showed data receiving mechanism and dissemination procedure of SWC about tropical cyclone:



Source: Bangladesh Meteorological Department (BMD)

Figure 12
Details Dissemination System



Source: Adopted from Haque, 1997:184

- (4) Activation of emergency plans to prepare and respond:** The main purpose of warning systems is two fold: to enable people to take precautionary measures to minimize loss, and to insist on evacuation of an area in advance of an approaching hazard; success depends on the reactions and responses of people. Human responses to these warnings involve a complex set of socio-psychological, socioeconomic and cultural variables, which together lead to a wide variation in reactions, even including reluctance to either take precautionary action or

evacuate. In this connection, psychological block factors that might hamper effective warning responses are stressed by some investigators. Although response to a hazard is largely related to perception of the threat and to awareness of opportunities to make adjustments, like the response to warnings, it is also profoundly influenced by socioeconomic and cultural constraints.⁵⁰

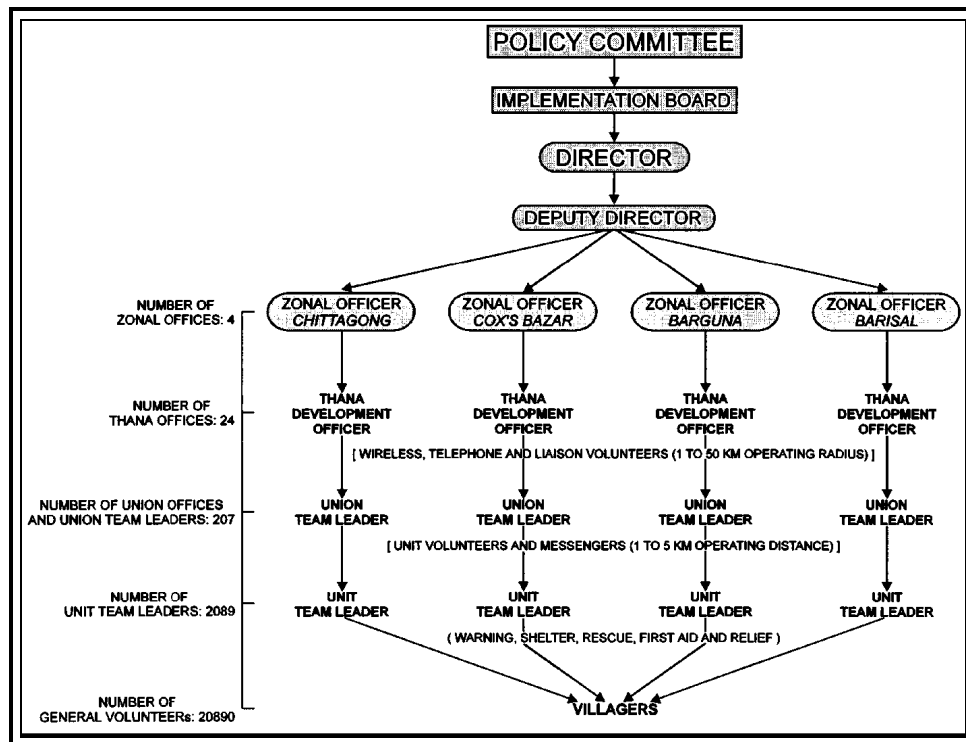
To prepare a resilient community the Cyclone Preparedness Program, was established in 1972 under an agreement between Bangladesh Red Crescent Society and Bangladesh Government. It aims to perform effective and rapid preparedness measures by involving local stakeholders of coastal belts (i.e. affected people) as in core of the program and to prevent their lives and properties.⁵¹ It aims to train-up around 62500 volunteers within 2021. Presently, the CPP has around 43000 trained volunteers in 2845 units, divided among 274 unions of 11 coastal districts. Each union roughly has 10 units, individually involving at least 10 volunteers— usually these include school teachers, social workers, *moulavis*

⁵⁰ C. E. Haque, “Atmospheric Hazards Preparedness in Bangladesh: A Study of Warning, Adjustments and Recovery from the April 1991 Cyclone”, *Natural Hazards*, vol.16, p186

⁵¹ C. E. Haque and Muhammad Q. Zaman, “Human responses to riverine hazards in Bangladesh: a proposal for sustainable floodplain development”, *World Development*, (Pergamon: 1993) vol 21, p96

(clergymen), local government officials, and community leaders (figure 13).⁵²

Figure 13
The Organizational Structure of CPP



Source: Adopted from Haque, 1997: 186

The CPP has a total of 159 full-time personnel, and 28,450 male and 14,225 female trained volunteers. Each Unit team has 10 male and five female 4 members headed by a Team Leader.⁵³ Unit teams function as first responders in the cyclone warning system with a mandate to disseminate cyclone warnings among villagers. These teams are equipped with basic warning

⁵² Asian Disaster Reduction Center, *Total Disaster Risk Management- Good Practices-2007*, (ADRC: 2007) p32

⁵³ Bangladesh Red Crescent Society, "Cyclone Preparedness Program", (BDRCS:2013), <http://bdrcs.org/programs-and-projects/cyclone-preparedness-program>, [accessed 11 November 2013]

equipment such as hand sirens, megaphones, and transistor radios. Activities of the volunteers are supported by full-time offices based in 32 Upazillas; each office is equipped with a transceiver radio.⁵⁴

To establish community based disaster preparedness program, Bangladesh Government provides specific directives in the Standing Orders for Cyclones to ensure speedy and systematic management of any emergency situation. Several administrative groups are given specific functions and responsibilities during pre-disaster, disaster occurrence and post-disaster stages; these include: the concerned ministries, regional administrations (such as divisional commissioners), district commissioners, local administrations such as (*thana parishads* or councils, union *parishad*) and the Bangladesh Army, Navy, and Air Force. The National Coordination Committee (NCC) in Dhaka regulates the necessary steps as the central national body, while the Ministry of Relief and Rehabilitation coordinates the post-disaster activities in collaboration with the Bangladesh Red Crescent Society (BDRCS) and other voluntary and international agencies.⁵⁵

⁵⁴ Edris Alam and Andrew Collins, "Cyclone disaster vulnerability and response experiences in coastal Bangladesh", *Disasters*, (Blackwell Publishing Ltd: 2010), vol. 34, P 933, <http://dx.doi.org/10.1111/j.1467-7717.2010.01176.x> [accessed 14 May 2012]

⁵⁵ C. E. Haque, "Atmospheric Hazards Preparedness in Bangladesh: A Study of Warning, Adjustments and Recovery from the April 1991 Cyclone", *Natural Hazards*, vol.16, p188

4.3 Technologies of Cyclone Tracking and Forecasting

4.3.1 Adaptable Technologies for Cyclone Tracking and Forecasting:

Bangladesh is using Radar Emergency Receiving System (ERS), Satellite Data Receiving System (SRS) and Satellite Communication System (SCS) to detect, monitor and predict tropical cyclone. The first two ways of receiving system is mentioned as Geostationary Meteorological System (GMS) and rest is World Area Forecasting System (WAFS). The Bangladesh Meteorological Department has four radar, out four two are Doppler Radar, station at Dhaka, Khepupara, Cox's Bazar and Rangpur—new Apstar-IIR radar—transmitting hourly and half-hourly data to Storm Warning Center (SWC). As BMD's (Bangladesh Meteorological Departments) existing radar system is unable to measure the rainfall amount of the total catchments area of Meghna river located beyond the Bangladesh border into the hilly regions of Meghalaya state of India and responsible for sever flooding almost every year, this research meteorological radar at Moulvibazar will enable BMD to provide FFWC (Flood Forecasting and Warning Centre) with the rainfall data of the catchments area of the river Meghna and thus help FFWC for issuance of effective and accurate flood forecasting / warnings well ahead in time. For this reason a new flood forecasting Doppler Radar is under constructing in Moulvibazar Sadar.⁵⁶

⁵⁶Bangladesh Meteorological Department, "Role of Bangladesh Meteorological Department in Disaster Risk Reduction in Bangladesh", The 4th Conference on "Management of Meteorological and Hydrological Services in Regional Association II (Asia), Islamabad, Pakistan", 5-9 February 2007, p6

Figure 14 shows the location of Radar Station and technologies uses to gather data and predict cyclone.⁵⁷ When any inundation determines in the Bay of Bengal the BMD gather data form its 35 surface observatories and processes those to inform SWC for forecasting. SWC is using three networks system to disseminate the warnings:

a) **BMD Domestic Network:**

- i. Lan and ii. Man

b) **International Circuits:**

- i. Dhaka - Delhi GTS link: Two Way Analogue leased line Speed : 2400 bps Only for data
ii. SADIS for only Aviation purposes (Data/Image reception)

c) **Local Circuits:**

- i. Teleprinter Circuit :
- Dhaka-Kurmitola (Two-way)
 - Chittagong-Coxs's Bazar
 - Dhaka-Chittagong (Two-way)
 - Chittagong-Chilimpur
 - Dhaka-Bogra
 - BMD-Radio Office (Dhaka)
 - Dhaka-Ishurdi
 - BMD-Flood Forecasting Centre
 - Dhaka-Sylhet
 - BMD-Navy
 - BMD-BAF (Met.)

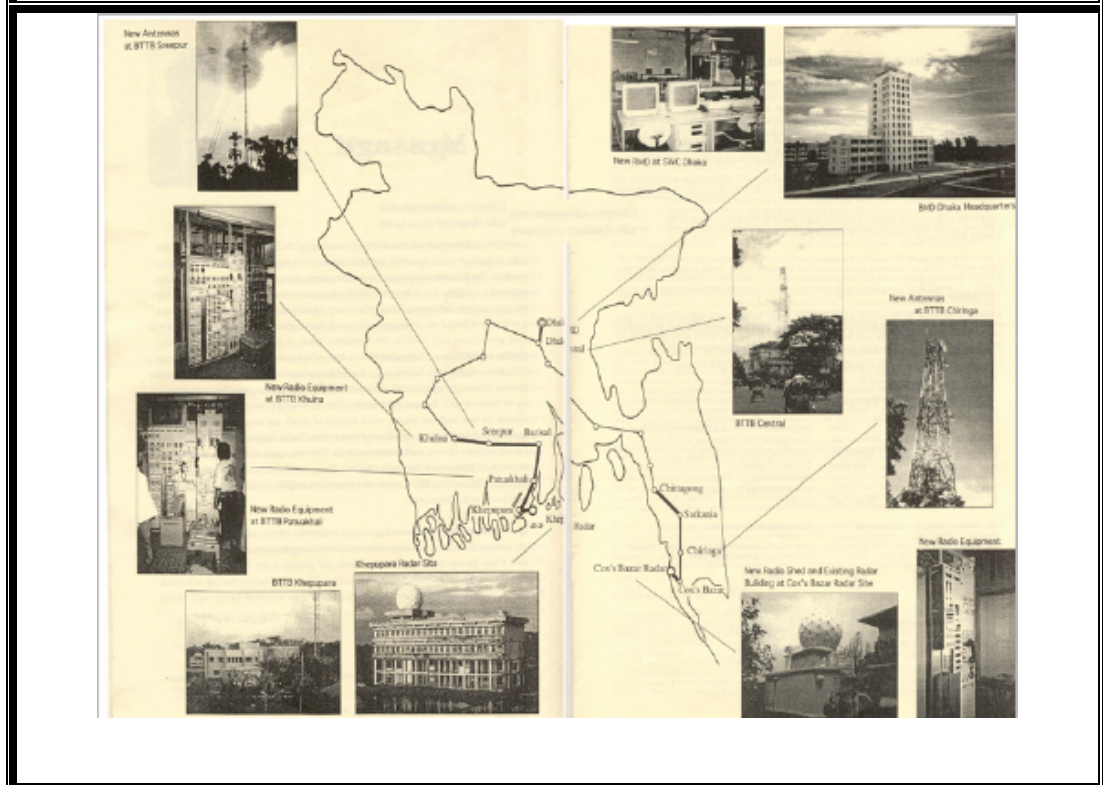
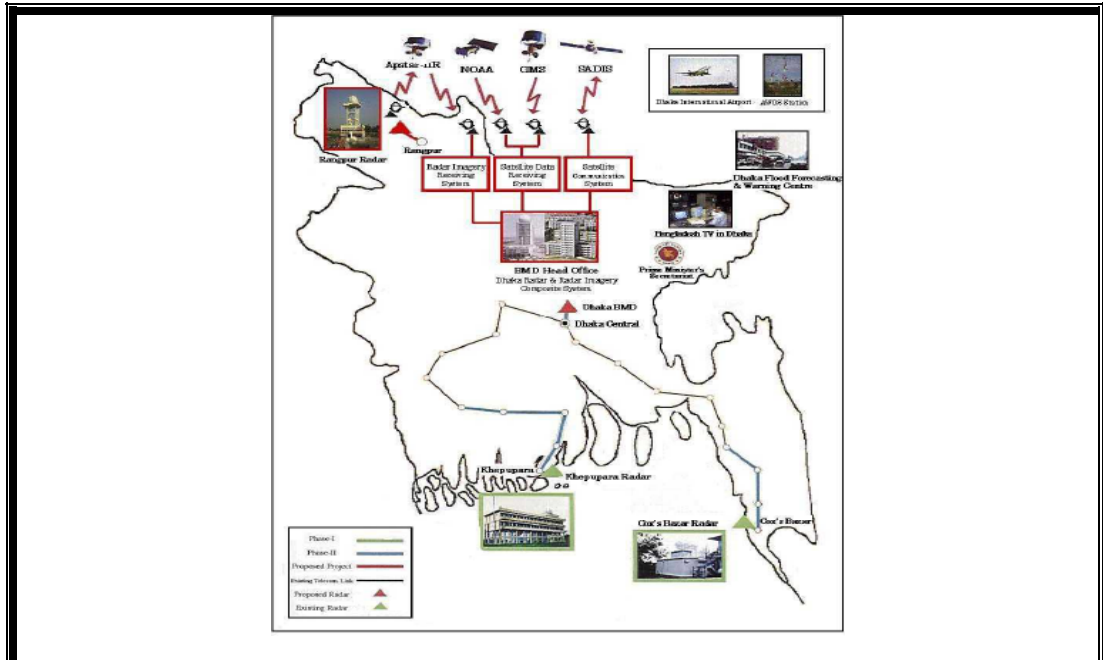
⁵⁷Bangladesh Meteorological Department, "Early Warning System, Telecommunication and ongoing activities in Bangladesh Meteorological Department", The 4th Conference on "Management of Meteorological and Hydrological Services in Regional Association II (Asia), Islamabad, Pakistan", 5-9 February 2007, p11

- ii. Weather Chart Facsimile Receiver
Dhaka, Kurmitola, Chittagong, Cox's Bazar,
Sylhet.
- iii. SSB Set
35 stations Standby

Bangladesh Meteorological Department also uses direct connection with Prime Minister Office, Water Development Board, Shajalal International Air Port, Bangladesh Television, Bangladesh Betar and Bangladesh Air Force by Local Area Network. It also uses Dhaka New Delhi GTS Link to connect internationally and gather update data. Over the last few years, meteorological, hydrological and climate forecasts of Bangladesh Meteorological Department (BMD) have become increasingly accurate and available as a result of remarkable international co-operation, facilitated by the World Meteorological Organization (WMO) (figure 14).

Figure 14

Location of Radar Station and Technologies Using BMD



Source: Bangladesh Meteorological Department

4.3.2 Observational Facilities of BMD:

1. 35 First Class Surface Observatories
2. 10 Pilot Balloon Observatories
3. 3 Rawinsonde Observatories (One is in functional)
4. 12 Agromet Observatories
5. 4 Radar Stations at Dhaka, Rangpur, Cox's Bazar and Khepupara
6. Satellite Ground Receiving Station of GMS, NOAA and INSAT
7. World Area Forecasts Charts (WAFS) from the World Area Forecasting Center, Braknell London.
8. Receiving System of Satellite Distribution (SADIS)
9. Two high-gust anemometers in operation over the country.

4.3.3 Cyclone Warning Processes in Sidr and Aila:

Super Cyclone Sidr: Cyclone sidr, formed in the central Bay of Bengal, was first observed on 9 November 2007 by Indian Meteorological Department (IMD), south-east of the Andaman Islands, with weak low-level circulation near the Nicobar Islands. Later that day, it intensified into a deep depression as it moved slowly north-westward. Vertical shear decreased greatly as the circulation became better defined, and a Tropical Cyclone Formation Alert was issued on November 11 while located a short distance south of the Andaman Islands. Around the same time, the India Meteorological Department (IMD) designated the

system as Depression BOB 09. The Joint Typhoon Warning Center (JTWC) upgraded it to Tropical Cyclone 06B after Dvorak estimates indicated winds of 65 km/h (40 mph).⁵⁸

It showed indications of the formation of a tropical cyclone on 11 November while located a short distance south of the Andaman Islands, and by 13 November, the depression had turned into a cyclonic storm with a core of cyclone force winds. In the mean time, Bangladesh Meteorological Department (BMD) issued alert on 11 November as per Standing Orders for Disaster (SOD). After that BMD issued four stages cyclone warnings: distant cautionary signal and distant warning signal, local cautionary signal and local warning signal was issued 24 hours before the cyclone landfall, danger signal issued 18 hours before Sidr landfall and when the port was likely to experience severe weather then BMD issued greater danger signal before 10 hours of Sidr landfall. The Government of Bangladesh and Bangladesh Meteorological Department issued emergency evacuation order and hoisted the highest danger signal almost 27 hours before the Sidr reached the coast. In addition to warnings continuously broadcast via radio and television, government officials, local administrators, CPP volunteers, and some villagers themselves disseminated cyclone warning and evacuation orders via megaphones, handheld bullhorns, bicycle-mounted loudspeakers, over mobile phone and house-to-house contacts. They also advised people in coastal areas

⁵⁸ Comprehensive Disaster Management Programme, "Cyclonic Storm- Sidr- Situation Report", (Dhaka: Ministry of Food and Disaster Management, 2007), on 12 December 2007

under evacuation orders to take refuge in cyclone shelters specifically built for them.

When super cyclone Sidr was located in 11 November 2007, Bangladesh Government introduced a bundle of method of disaster management system as per Standing Order for Disaster (SOD). Some initiatives are given bellow:

On 13 November, when the System turned into a SCS (H) maritime ports were advised to hoist Warning Signal Number Four and all fishing boats and trawlers over North Bay were advised to take shelter immediately. A meeting of National Disaster Management Committee (NDMC) was held immediately after hoisting Signal Number Four. In that meeting all the concerned authorities were instructed to take the necessary steps according to SOD. The Armed Forces Division (AFD) and government officials were also placed on standby.

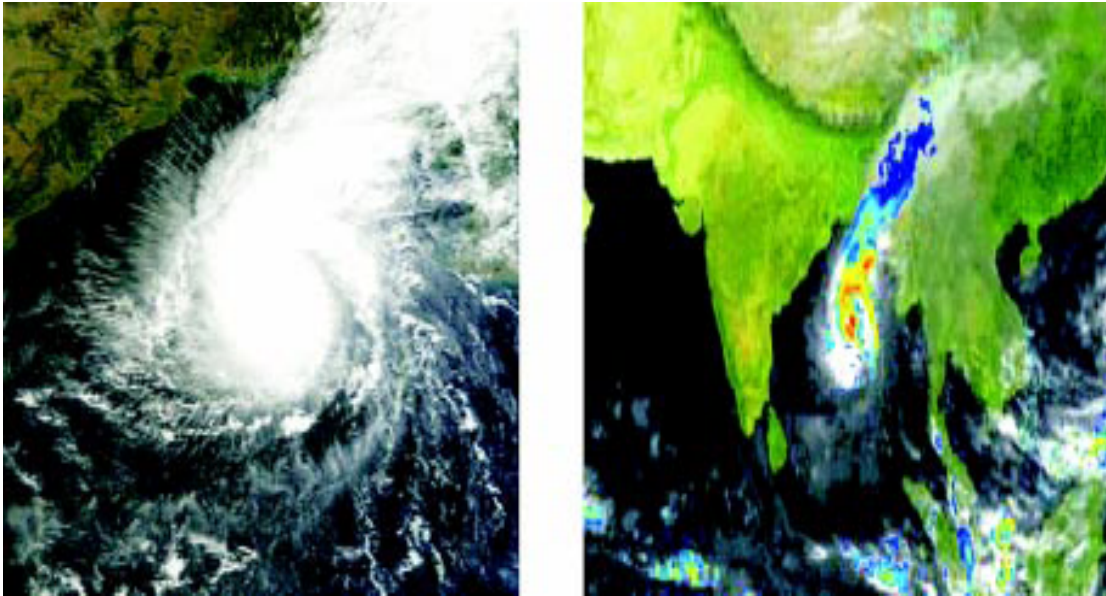
Several central control rooms were opened by various agencies at national, district and upazila levels while the DMIC was opened. A series of meetings and arrangements were in place to quickly mobilize staff and resources. At 9 PM on 14 November 2007, SIDR was centered about 725 km Southsouthwest of Chittagong port, 645 km South-southwest of Cox's Bazar port and 670 km South of Mongla port. In

this situation BMD advised the maritime port of Mongla to hoist Great Danger Signal Number Ten. BMD also included the coastal districts of Bhola, Barisal, Patuakhali, Barguna, Pirojpur, Jhalakhathi, Bagerhat, Khlna, Satkhira and their offshore islands and chars under Great Danger Signal Number Ten.

The ports of Chittagong and Cox's Bazar were advised to hoist Great Danger Signal Number Nine and all other coastal districts were included under Great Danger Signal Number Nine. BMD predicted that SIDR would likely to cross Khulna-Barisal coast by afternoon of 15 November 2007. BMD estimated about SIDR's maximum wind about 210 -230 kph and associated storm surge of height 15-20 feet above normal astronomical tide. Government as well as National and International NGOs mobilizes their staff and volunteers with a number of pre-positioning staff and relief materials closer to the forecasted impact areas. Cyclone Sidr hit Bangladesh's offshore islands at approximately 6:30 p.m. on the evening of 15 November and made landfall across the Barisal coast at 9:00 p.m. during ebb tide. At landfall, Sidr was a Category 4 storm, with a diameter of nearly 1,000 km and sustained winds of up to 240 km per hour. Storm surge analysis indicates surge levels of 5.5 to 6 m at the outfall of Baleswar River (figure 15).⁵⁹

⁵⁹Comprehensive Disaster Management Programme, "Cyclonic Storm- Sidr- Situation Report", (Dhaka: Ministry of Food and Disaster Management, 2007), on 17 December 2007

Figure 15
Satellite Images of Super Cyclone Sidr



Source: Bangladesh Meteorological Department

Cyclone Aila: Cyclone 02B, later named as Aila (Severe Cyclonic Storm) hit the south-western coastline of Bangladesh and eastern part of the West Bengal province of neighboring country India on the midday of May 25, 2009. Aila made landfall with sustained winds between 65 and 75 mph (74 mph is the lowest threshold for a Category one cyclone). When landfall occurred, it brought with it a deadly storm surge between 10-13 feet high along the western Bangladesh coastlines.⁶⁰ The cyclone Aila affected at least 12 coastal districts with heavy damage to mainly Satkhira, Khulna, Bholra, Bagerhat and Noakhali.

⁶⁰ Roy K. et al. *Initial Damage Assessment Report of Cyclone AILA with focus on Khulna District*, (Khulna: Unnayan Onneshan -Humanity Watch, 2009), p7

Severe Cyclonic Storm (SCS) Aila, formed in the south Bay of Bengal, was first observed by the Indian Meteorological Department and Joint Typhoon Warning Centre (JTWC) on 21 May 2009 declared that a low level circulation was developed in the Bay of Bengal. It developed into a Vortex with center 11.50 N/85.50 E and intensity T1.0 at 1730 hr IST of the same day. It gained intensity of T1.5 corresponding to depression with centre 16.5N/88.0E at 1130 hrs IST of 23 May 2009. On 23 May 2009 Bangladesh Meteorological Department (BMD) notified that under favorable condition the formed depression intensified into a well marked low (WML) depression. Then BMD issued Local Cautionary Signal iii for all sea ports and its adjoining areas and forecasted it was likely to intensify and move in a northwest and northerly direction. It further intensified into a cyclonic storm 'ALIA' at 1730 hours IST of 24th May and lay centered near Lat. 18.5°N/Long 88.5°E. It continued to move in northerly direction and intensified into a severe cyclonic storm at 1130 hours IST of 25th May and lay centered over northwest Bay of Bengal near Lat. 21.5°N/Long 88.0°E close to Sagar Island.⁶¹

When severe cyclonic storm Aila was located in 23 May 2009, Bangladesh Government introduced a bundle of method of disaster management system as per Standing Order for Disaster (SOD). Some initiatives are given bellow:

⁶¹ Comprehensive Disaster Management Programme, "Cyclonic Storm- Aila- Situation Report", (Dhaka: Ministry of Food and Disaster Management, 2009), on 25 May 2009

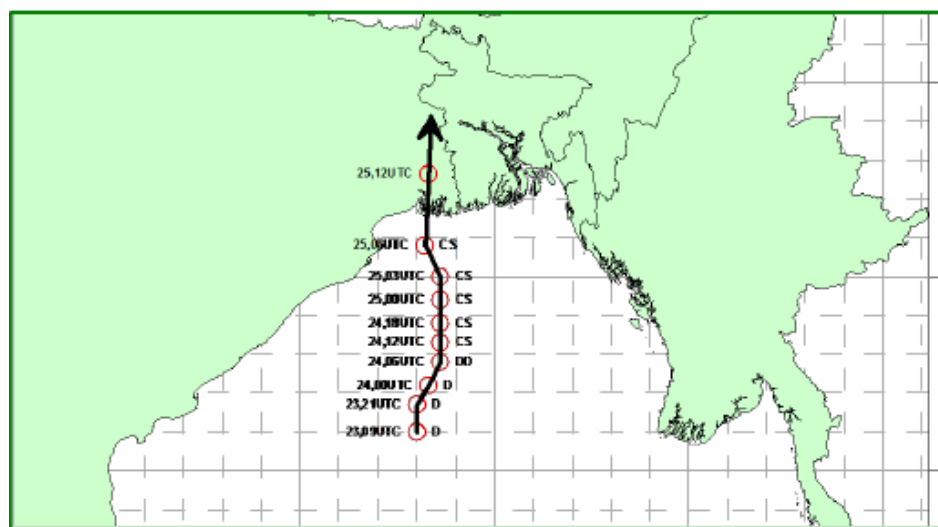
On 23 2009: May Considering the vulnerability in the Bay of Bengal and coastal areas of Bangladesh, BMD issued the Local Cautionary signal no. 3 for the maritime ports at 0300UTC of 23 May 2009 and advised the fishermen engaged in fishing over there to come close to the coast and proceed carefully and not to venture into the deep sea.

On 24 May 2009: When the cyclonic storm moved into severe cyclonic storm Aila and far behind the three sea ports Chittagong, Mongla and Cox's Bazar 565 km, 460 km and 510 km respectively, BMD issued local cautionary signal 5—The port is threatened by a storm (wind speed of 51-61 kms/hour) but it doesn't appear that the danger is as yet sufficiently great to justify extreme precautionary measures.

On 25 May 2009: When the wind speed of Aila was maximum wind within 54 km radius of the depression centre is about 70 Kph rising 90 Kph in gust/Squalls and sea condition was very rough with storm surge of 05 - 07 above normal astronomical tide as well as Aila far behind the three sea ports Chittagong, Mongla and Cox's Bazar 495 km, 365 km and 445 km respectively, BMD issued Danger Signal no vi—the port will experience severe weather from a storm of slight or moderate intensity (wind speed of 62-88 kms/hour) that is expected to cross the coast in the left side of the port—for Chittagong and Cox's Bazar and vii—the port will experience severe weather from a storm of

light or moderate intensity (wind speed of 62-88 kms/hour) that is expected to cross over or near the port—for Mongla port. The BMD also forecasted the peripheral affect of cyclone 'Aila' was already affecting the coastal districts of Bangladesh. It started crossing West Bengal- Bangladesh coast by 02 PM 25 May 2009 (figure 16).

Figure 16
Cyclone Tracking Image of AILA



Source: Bangladesh Meteorological Department

Prior to the hoisting of signal no. 4 BMD opined in the Inter-ministerial Disaster Management Coordination Committee held at MoFDM in the afternoon of 24 May that the system could be concentrated into a cyclonic storm at night time of the same day and explained the related hazards in the coastal areas of Bangladesh. On 26 May 2009, Cyclone Aila over Bangladesh adjoining West Bengal and Sub-Himalayan moved further northward, weakened into a deep depression and lay centered

at 0830 hours IST over Sub -Himalayan West Bengal, about 50 km to the north of Malda.⁶²

4.4 Nature of Warning and Cyclone Victims Perception

People usually pass through several socio-psychological steps in the process of responding to a warning. These can include hearing the warning, understanding the meaning of the warning, personalizing the risk, and finally deciding to respond to the warning. Therefore, the first step is receiving or hearing the cyclone warning as siren or message.⁶³ The people of the study local received the hazard warning quite efficiently in 2007 rather than any prior natural hazards. Nevertheless, at the time of Aila in 2009 the efficiency of warning dissemination was higher than that of Sidr.

At the time of Sidr and Aila, the sub district administration of Sharonkhola Upozilla and various Non Governmental Organizations led by NCC and CPP were first informed about the cyclones. The inhabitants of Rayenda were informed by the CPP volunteers in Sidr and Aila period. As the Uttar Sauthkhali is quite isolated from the headquarters, they received the warning messages quite later than the Rayenda at Sidr and Aila. Some of the inhabitants who lived in the

⁶²Comprehensive Disaster Management Programme, “Cyclonic Storm- Aila- Situation Report”, (Dhaka: Ministry of Food and Disaster Management, 2009), on 27 May 2009

⁶³ S.K. Paul and Routray, “An analysis of the causes of non-responses to cyclone warnings and the use of indigenous knowledge for cyclone forecasting in Bangladesh”, *Climate Change and Disaster Risk Management*, (Berlin: Springer, 2013), p26

shore of Balswhar in both villages opined that they did not hear the warning messages from the CPP volunteers in Sidr time despite Aila as they were not easily accessible. The inhabitants of Uttar Sauthkhali who lived on the embankment of Baleshwar opined that though the dissemination of warnings was efficient in Sidr and Aila, they were trapped on tiny islands along the coastline with no place to go because of the flatness, low elevation of the land, and having no higher ground for shelters.

It was empirically found that respectively above three-fourth (80.83%, n=120) and nearly total (90.37%, n=135) of cyclone affected people of Rayenda and Uttar Sauthkhali did not aware about the circumference of flag 1 that covered the disaster signal 1 to 3, respectively 82.50 percent and 75.56 percent of Rayenda and Uttar Sauthkhali were not aware about the circumference of flag 2 that covered disaster signal 4 to 7, while 67.50 percent and 72.59 percent cyclone affected people of Rayenda and Uttar Sauthkhali respectively unawared about the circumference of flag 3 that covers disaster signal 8 to 10. Nevertheless, only 19.6 percent, 24.6 percent and 32.9 percent of total population of cyclone-affected people of Rayenda and Uttar Sauthkhali were aware about flag 1, flag 2 and flag 3 respectively (Table 42).

4.4.1 Awareness about Different Types of Signals

Table 42
Awareness about Different Types of Signals of the Cyclone Affected People (N= 255)

		Rayenda N=120		Uttar Sauthkhali N=135		Total N=255	
		n	%	n	%	n	%
Flag No: 1 (Signal no. 1 to 3)	No	97	80.83	122	90.37	219	80.4
	Yes	23	19.17	13	9.63	36	19.6
Flag No: 2 (Signal no. 4 to 7)	No	99	82.50	102	75.56	201	75.4
	Yes	21	17.50	33	24.44	54	24.6
Flag No: 3 (Signal no. 8 to 11)	No	81	67.50	98	72.59	179	67.1
	Yes	39	32.50	37	27.41	76	32.9

Survey revealed the fact that the education level, knowing about of different types of signals and tools of information of the cyclone affected people were significantly correlated. According to informative tools before Sidr and Aila the awareness level of the cyclone affected people of Uttar Sauthkhali were significantly correlated. But after cyclone Sidr the situation of Rayenda about this informative tools was stronger because of Go and NGO's aids. In contrast to the two villages Uttar Sauthkhali was more vulnerable because of its poor education and lack of informative tools (Table 43).

Table 43
Correlation among education, informative tools and different types of signals
Correlation^a

		Education	Knowing about Signal (First flag)	Knowing about Signal (Second Flag)	Knowing about Signal (Third Flag)
Education	Pearson Correlation	1.000	.463**	.405**	.295**
	Sig. (2-tailed)	.	.000	.000	.001
Knowing about Signal (First flag)	Pearson Correlation	.463**	1.000	.946**	.611**
	Sig. (2-tailed)	.000	.	.000	.000
Knowing about Signal (Second Flag)	Pearson Correlation	.405**	.946**	1.000	.664**
	Sig. (2-tailed)	.000	.000	.	.000
Knowing about Signal (Third Flag)	Pearson Correlation	.295**	.611**	.664**	1.000
	Sig. (2-tailed)	.001	.000	.000	.
Informative Tools Before Sidr	Pearson Correlation	.234*	.083	.029	.052
	Sig. (2-tailed)	.010	.368	.756	.570
Informative Tools Before Aila	Pearson Correlation	.116	.136	.076	-.016
	Sig. (2-tailed)	.207	.138	.407	.862

a Rayenda N= 120

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Correlation^b

		Education	Knowing about Signal (First flag)	Knowing about Signal (Second Flag)	Knowing about Signal (Third Flag)
Education	Pearson Correlation	1.000	.393**	.110	.078
	Sig. (2-tailed)	.	.000	.206	.368
Knowing about Signal (First flag)	Pearson Correlation	.393**	1.000	.574**	.475**
	Sig. (2-tailed)	.000	.	.000	.000
Knowing about Signal (Second Flag)	Pearson Correlation	.110	.574**	1.000	.887**
	Sig. (2-tailed)	.206	.000	.	.000
Knowing about Signal (Third Flag)	Pearson Correlation	.078	.475**	.887**	1.000
	Sig. (2-tailed)	.368	.000	.000	.
Informative Tools Before Sidr	Pearson Correlation	.077	-.171*	-.286**	-.318**
	Sig. (2-tailed)	.377	.048	.001	.000
Informative Tools Before Aila	Pearson Correlation	-.287**	-.191*	-.066	-.059
	Sig. (2-tailed)	.001	.026	.445	.500

b Uttar Sauthkhali N=135

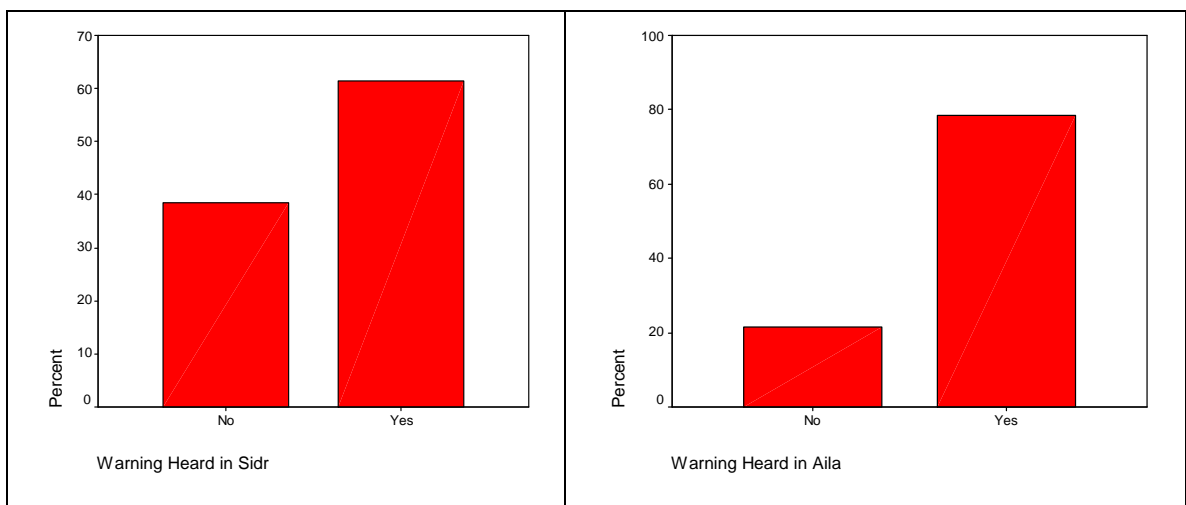
4.4.2 Warning Reception in Study Locale

According to the field survey capability of hearing warning was a dependent phenomenon. It was depend upon respondents' economic

ability, access to information, availability of informative tools, awareness level of the individuals, responding ability to warning etc. It was evident from the cyclone victims that, in Sidr period, nearly two-third (61.5%, n=135) households of Uttar Sauthkhali heard the cyclone warning. It was obviously a good sign. Only one-third (38.5%, n=135) households did not hear the cyclone warning in Sidr period. In the time of Aila, above two-third (78.5%, n=135) households heard the cyclone warning. Although warning procedures, mechanisms and dissemination capacity were high in the time of Aila in contrast to Sidr, 21.5 percent respondents did not hear the warning (Figure 17). This study revealed comparatively weaker dissemination of cyclone warning in the central areas of the coast of Bangladesh in 2007. Those who were living near the sub district head quarters, they received cyclone warning in Sidr and Aila rather than the inhabitants of coast line of Baleshwar.

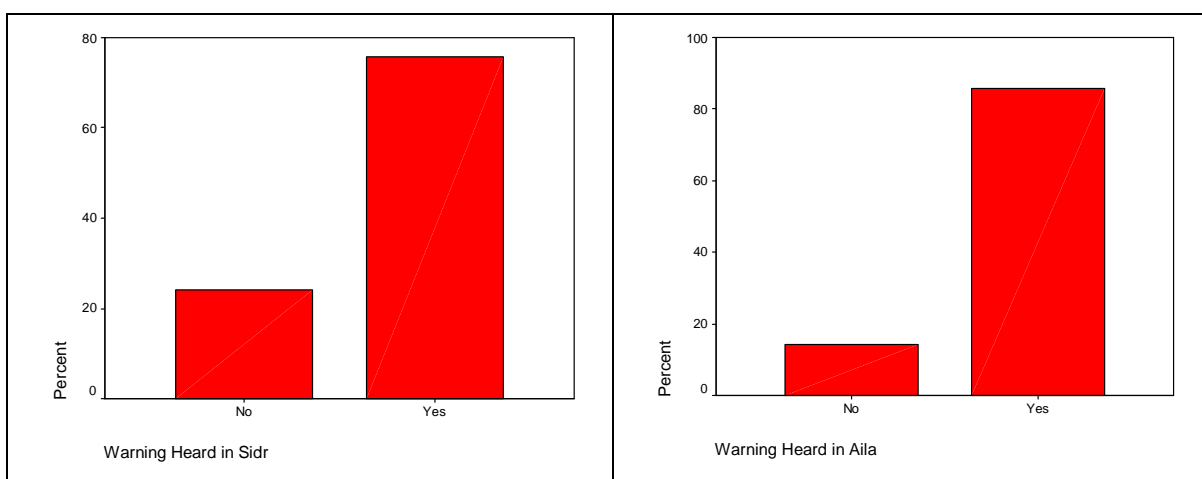
Figure 17

Warning Heard by the Households in Uttar Sauthkhali



Rayenda is the sub district head quarter of Sharonkhola Upazilla so that warning dissemination and receiving warning is high rather than Uttar Shauthkhali. It was reported by the cyclone victims that above two-thirds (75.8%, n=120) and above two-thirds (85.8%, n=120) households heard the warning while 24.2 percent and 14.2 percent did not hear the warning of Sidr and Aila respectively (Figure 18). Such disparities in cyclone warning dissemination were closely associated with the different levels of situation and severity at different locations. Similarly, primary sources of cyclone warning significantly varied among the villages. Bangladesh Red Crescent Society Volunteers had played a vital role in disseminating the warning, while radio broadcasting and word-of-mouth from neighbors were the major sources of cyclone warning in two study villages.

Figure 18
Warning Heard by the Households in Rayenda



It was evident from the cyclone victims, when only the respondent who heard the warnings are considered, nearly 89 percent (n=91 of 120) and 86.64 percent (n=103 of 120) of the cyclone victims heard

warning 1 day before the cyclone landfall in Sidr and Aila respectively, while maximum, remaining respondents, received the warnings 3 to 5 hours before the cyclone Sidr and Aila landfall in Rayenda (table 45). But maximum respondents who received the warnings earlier in Sidr claimed that the Government authorities began issuance of evacuation order about 24 to 12 hours before it landfall. It was revealed from the conversation of the respondents that they received the cyclone warning in earlier in Aila rather than Sidr. Nevertheless, in time of Aila the authorities issued evacuation order at least 1 day before it landfall.

Table 45

Hearing Date of Sidr and Aila Warning before it Landfall (Rayenda)

Number of Date of Hearing Warning for Sidr					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3 to 5 hours ago	7	5.8	7.7	7.7
	1 day ago	81	67.5	89.0	96.7
	2 days ago	3	2.5	3.3	100.0
	Total	91	75.8	100.0	
Missing	Not applicable	29	24.2		
Total		120	100.0		

Number of Date of Hearing Warning for Aila					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3 to 5 hours ago	3	2.5	2.9	2.9
	1 day ago	89	74.2	86.4	89.3
	2 days ago	10	8.3	9.7	99.0
	3 days ago	1	.8	1.0	100.0
	Total	103	85.8	100.0	
Missing	Not applicable	17	14.2		
Total		120	100.0		

Note: Not Applicable = Do not heard warning

It was reported by the cyclone victims in Uttar Sauthkhali that nearly 41.4 percent (n=83 of 135) respondents heard cyclone Sidr warning 1 to 5 hours ago before it landfall, while only 11.1 percent (n=112 of 135) respondents heard Aila warning 3 to 5 hours ago before it landfall. Data revealed the fact that 13.3 percent respondents heard the Sidr warning 2 to 1 day before it landfall while 64.5 percent respondents heard Aila warning with that time (Table 46). So, by this field survey, it can be said that warning dissemination and response to warning in Aila was high in terms of Sidr in Uttar Sauthkhali. It was revealed from the conversation that nearly 80 percent respondents did not hear any kind of evacuation order in time of Sidr in Uttar Sauthkhali while in Aila local authorities began the issuance of evacuation order 24 hours before its landfall in Uttar Sauthkhali.

Table 46
Hearing Date of Sidr and Aila Warning before it Landfall (Uttar Southkhali)

Number of Date of Hearing Warning for Sidr					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 to 2 hours ago	23	17.0	27.7	27.7
	3 to 5 hours ago	33	24.4	39.8	67.5
	1 day ago	9	6.7	10.8	78.3
	2 days ago	13	9.6	15.7	94.0
	3 days ago	5	3.7	6.0	100.0
	Total	83	61.5	100.0	
Missing	Not applicable	52	38.5		
Total		135	100.0		

Number of Date of Hearing Warning for Aila					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3 to 5 hours ago	15	11.1	13.4	13.4
	1 day ago	78	57.8	69.6	83.0
	2 days ago	9	6.7	8.0	91.1
	3 days ago	10	7.4	8.9	100.0
	Total	112	83.0	100.0	
Missing	Not applicable	23	17.0		
Total		135	100.0		

Note: Not Applicable = Do not heard warning

4.5 Respondents Perception on Institutional Warning

It was evident from the respondents that only one-third (33.33%, n=255) cyclone victims heard institutional warning dissemination in Sidr. When only the respondents who heard the institutional cyclone warning in Sidr considered (Table 47) and whom they were informed by about nearly two-thirds (79.7%, n=53 of 120) of the respondents opined for organizational dissemination and only 20.3 percent opined for community provided dissemination of warning in Sidr. In contrast to Rayenda, organizational dissemination of warning in Uttar

Sauthkhali was little in Sidr. But warning dissemination by the NGO's was higher in Uttar Sauthkhali rather than Rayenda in the time of Sidr.

Table 47
Who Disseminate of Institutional Warning in Sidr

Actors	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Neighbors	11	20.75	3	9.38	14	16.47
Government	27	50.94	13	40.63	40	47.06
NGO	15	28.30	16	50.00	31	36.47
Total	53	100	32	100	85	100

It was evident from the respondents that only nearly two-third (63.93%, N=255) cyclone victims heard institutional warning dissemination in Aila. In Aila (Table 48), warning dissemination by the different institution was higher than Sidr. Nearly 75.9 percent (n=162 of 255) of the respondents heard organizational warning in Aila while 24.1 percent (n=162 of 255) heard community provided dissemination. It was very much remarkable that community participation in institutional warning dissemination in Aila was 7 times high in Uttar Sauthkhali in contrast to Sidr. But organizational participation was low in terms of needs and population density in both villages.

Table 48
Who Disseminate Institutional Warning in Aila

Actors	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Neighbors	16	17.98	23	31.51	39	24.07
Government	54	60.67	34	46.58	88	54.32
NGO	19	21.35	16	21.92	35	21.60
Total	89	100	73	100	162	100

So, Survey data suggested that there were significant lapses to disseminate cyclone warning in Sidr time. In some areas basically Baleswar coast areas, local authorities responsible for assuring dissemination of warning messages fell short of this important responsibility.

Respondents who heard warnings and take part in warning dissemination, and CPP volunteers were asked about how before the institutional warning disseminates in time Sidr. It was very much remarkable that above two-third (69.41%, n=85 of 255) cyclone victims opined institutional warning dissemination was began during cyclone day in Sidr and nearly one third (30.69%, n=85 of 255) cyclone victims opined institutional warning dissemination was began 1 to 2 days before cyclone landfall and this dissemination was performed near the than head quarters of Sharonkhola. It was very much remarkable that

nearly two-third (62.26%, n=53 of 120) and above three-fourth (81.25%, n=32 of 135) cyclone victims of Rayenda and Uttar Sauthkhali heard institutional warning dissemination during the disaster day of Sidr (Table 49).

Table 49

Actors	How before the Institutional Warning Disseminate in Sidr Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
During Cyclone day	33	62.26	26	81.25	59	69.41
One Day Before	17	32.08	3	9.38	20	23.53
Two Days before	3	5.66	3	9.38	6	7.06
Total	53	100	32	100	85	100

In Aila, it was evident from the respondents that there were remarkable changes in warning dissemination, 16.05 percent (n=162 of 255) cyclone victims of Rayenda and Uttar Sauthkhali opined that the local authorities disseminate warning three to four days before the Aila landfall. It was evident from the respondents that respectively two-third (66.29%, n=89 of 120) and above half of the total (54.79%, n=73 of 135) cyclone victims of Rayenda and Uttar Sauthkhali opined that dissemination was completed 1 to 2 days before the Aila landfall. Those who did not hear the institutional cyclone warnings, they received warnings from personal sources such as, friends, peer, kin and over mobile (Table 50).

Table 50
How before the Institutional Warning Disseminate in Aila

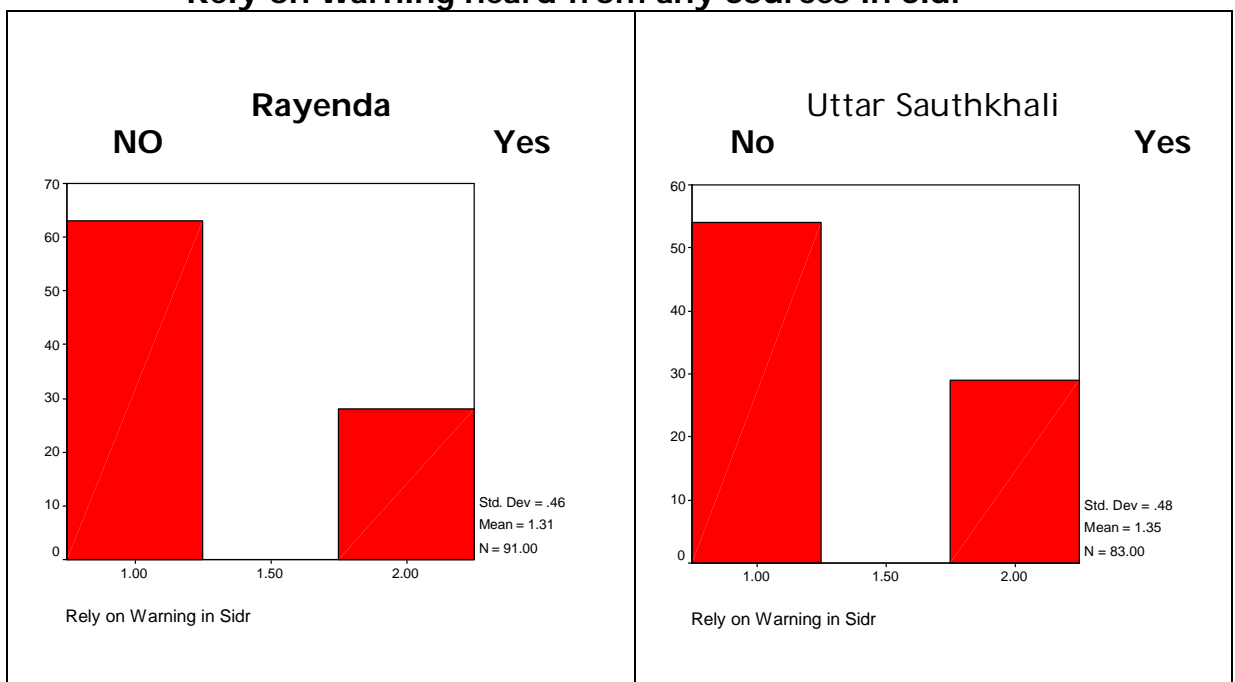
Actors	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
During Cyclone day	14	15.73	23	31.51	37	22.84
One Day Before	22	24.72	27	36.99	49	30.25
Two Days before	37	41.57	13	17.80	50	30.86
Three to Four Days Before	16	17.98	10	13.70	26	16.05
Total	89	100	73	100	162	100

The CPP volunteers who took part in warning dissemination in Sidr and Aila argued communication system play the vital role to send the warnings due to rainfall and storm this communication system was breaking down in Sidr time and their warning dissemination tools, such as megaphone, hand mic, siren were damaged and they became helpless.

According to survey result, disbelieving of cyclone warning was the major underlying factor. It was evident from the cyclone victims that above two-thirds (69.23%, n=91 of 120) and above two-thirds (65.06%, n=83 of 135) of the respondents did not believe in cyclone warning in Sidr in Rayenda and Uttar Sauthkhali respectively (Figure 18). Survey

result revealed that respondents had received a high- alert tsunami warning two months previously but nothing would happened for this reason they did not rely on Sidr warning. It is, however, worth mentioning that several residents of the Uttar Sauthkhali village and all of the respondents who were fishing in the sea suspected the occurrence of a cyclone, but never imagined the magnitude Sidr deployed. They suspected a cyclone might be eminent after observing that sky was becoming dark and wind was becoming more violent. They used these as environmental cues for impending danger.

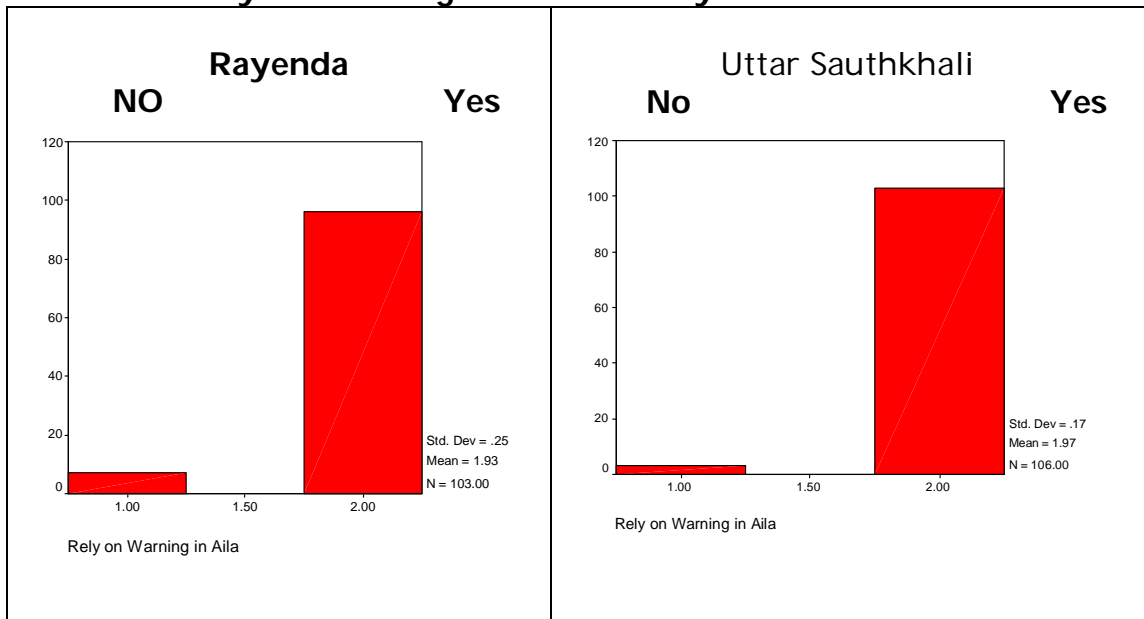
Figure 18
Rely on Warning heard from any Sources in Sidr



But, it was evident from the respondents, situation was changed during Aila, 93.20 percent (n=103 of 120) and 97.17 percent (n=106 of 135) of the respondents believed cyclone warning without hesitation.

However, 4.8 percent respondents still showed disbelief in cyclone warning in Aila (Figure 19).

Figure 19
Rely on Warning heard from any Sources in Aila



So according to survey result it can be said that people had received cyclone warnings several times since the severe cyclone of 1991, but in most cases the storm had changed its trajectory to hit elsewhere. Although not all coastal residents under the threat of cyclone Sidr and Aila received early warnings and evacuation orders, dissemination of these alerts was more intensive compared to the last cyclone of similar magnitude that occurred in 1991 along the Chittagong coast. Official communications and disseminated cyclone early warnings had turned out to be false on many occasions in the past. It was mentioned that

coastal people sought refuge several times and stayed in the shelters for several hours; when the storm weakened, they returned home.

In November 2007, the BMD warned that Sidr was going to make landfall at noon in Bangladesh: unfortunately it struck that evening at 6.30 p.m. Some respondents therefore mentioned that they went to the cyclone shelters, waited there for some time, then went back home. In May 2009, the BMD warned that Aila was going to make landfall 2 p.m. but unfortunately it made landfall 2 hours earlier. Some respondents mentioned that they thought they would take shelter after noon but they could not. Cyclone warnings issued through radio, television and by CPP volunteers usually indicated the degree of potential hazard along with preparatory activities that should be undertaken. However, it is very important to observe and understand to what extent signals were transmitted to the community at this level. Another cause of disbelief was the relatively small number of occurrences of severe cyclones. Fatalism is another cause of inaction. Respondents in tow villages are Muslims, and a common statement was "The cyclone is Allah's will. Allah will save us and people can do very little".

4.6 Indigenous Knowledge of Warning of the Respondents

Indigenous Knowledge (Indigenous Fashion) is the bases of community coping practices that have helped vibrant communities survive natural calamities over centuries. Such local practices are based on sound

principles of interaction between humans and nature.⁶⁴ Natural hazards are not new and people have been living in hazard-prone areas for centuries—in some cases for thousands of years. They have, inevitably, devised their own methods for protecting themselves and their livelihoods. Indigenous knowledge is also not something which remains static in space and time. It changes as the communities learn to adapt with the changing contexts and challenges. It also varies from one area to another and within the same area from one community to another. Indigenous knowledge is essentially local knowledge which is practiced in the local situations and, therefore there would be thousands of innovative ways that the community would use and adapt such knowledge for their survival against the odds of nature.

Indigenous Knowledge is based on individuals own skills and resources, as well as their experiences. Their knowledge systems, skills and technologies are usually referred to under the heading of 'indigenous knowledge'. It is based on experience, often tested over centuries of use, adapted to local culture and environment, dynamic and changing. Nevertheless, Indigenous Knowledge is based on, and is deeply embedded in local experience and historical reality of a community. It develops over centuries of observation on how to adapt to local conditions. It therefore represents all the skills and

⁶⁴ Rajib Shaw and N. UY, "Shaped by wind and Typhoon: The Indigenous Knowledge of the *Ivantas* in the Batanes Island, Philipines," Rajib S., Noralene and J. Baumwoll (ed). *Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from the Asia-Pacific Region*, (New York: ISDR, 2008),p60

innovations of a people, and embodies the collective wisdom and resourcefulness of a community. Indigenous knowledge is unique to a specific culture and plays an important role in defining the identity of a community. Indigenous Knowledge (IK) refers to the unique, traditional local knowledge existing within and developed around the specific conditions of a community indigenous to a particular geographical area, covering all aspects of life including management of the natural environment upon which their livelihoods and survival depend. So acknowledge that people in a given community have developed over time, and continue to develop.

People in the coastal habitat are used to ignore early warnings for several reasons: lack of knowledge, inaccessibility to information, lack of understanding current warning systems, economic factors and also their experience that the institutional warnings are infallible. In some cases the institution given high warning and alert but the cyclone or natural hazards did not landfall or veers away to hit the coast elsewhere. So, in the time of early warning indicators maximum coastal habitat besides institutional warning rely on their experiences—based on the natural phenomena—which they gathered traditionally.

Case 3

Sattar Majhi, Male of Uttar Sauthkhali Age: 67

I saw different magnitudes of cyclones in 1968, 1970, 1991, 1998, 2007 and 2009. Nowadays, I know there are disaster signals ranging from 1 to 10, but I have no exact idea what those really mean. Before the two days of Sidr landfall I went to know the formation of cyclone from the radio broadcasting but I did not pay attention what they really mean. But from the gloomy sky, wind blows from the south-eastern end and hot river water I suspected a heavy cyclone is coming soon. So, I did all of my work and waited to cyclone. In the very day of Sidr I carried all of my valuable things in a cloth and took shelter in a big tree when wind blew away my hut roof and destroyed my hut poorly.

Behind the indigenous knowledge local belief system plays a vital role. Belief systems shape people's understanding, perceptions, and responses to natural hazards. These perceptions are mediated by cultural interpretations, in combination with a range of other factors proper to each community and household at a specific time and place which will influence how people are going to prepare themselves or not. The coastal people believe that when people full their lives with sin then nature takes revenge by natural disaster with periodic intervals. One more aspect of their belief about cyclone is that they believe that a mighty cyclone will hit the coast every five years. This belief came to exist because of the periodical cyclone hits of 1960, 1963, 1965, 1970, 1991, 1998, 2007 and 2009.

Case 4

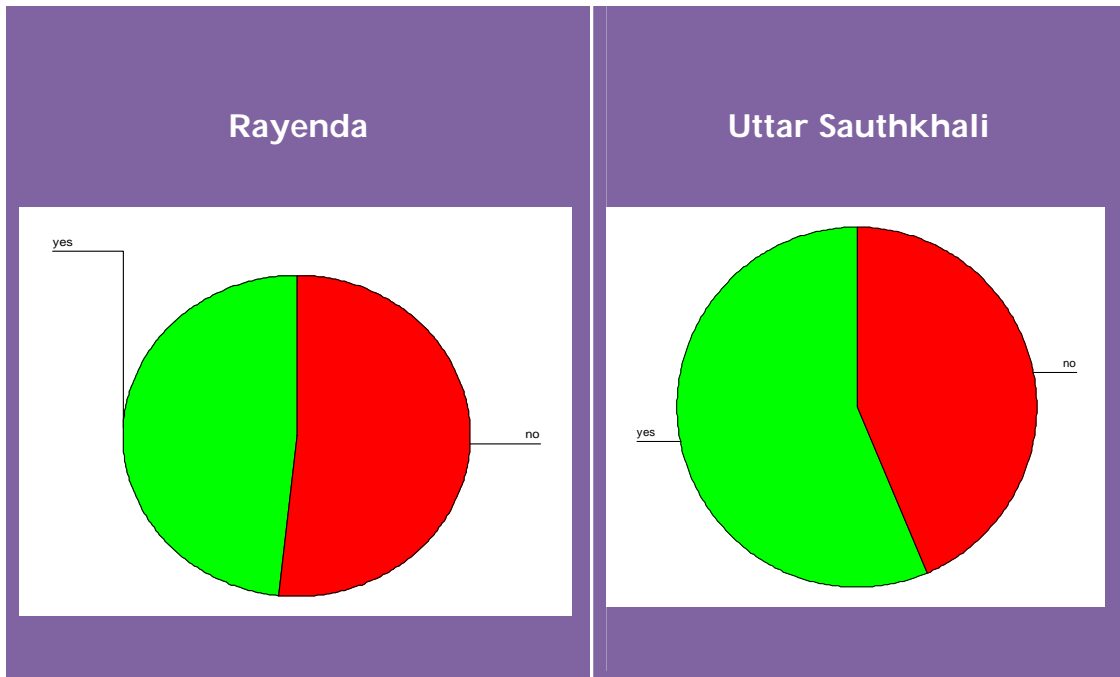
Nasir Uddin Majhi, Male of Uttar Sauthkhali, Age 72

I know about the signal no 7—it is very dangerous. Before the cyclone Sidr hit the coast, it was raining all day and wind was blowing from south-eastern end but this was happening every year. So, I did not think such kind of mighty cyclone would happen. But at the early day of Sidr when I saw the wave of Balaswer and the bitter taste of rain water then I thought Allah would send a cyclone to punish us. When he was asked about shelter taking, he said, "Allah sends cyclone as punishment. So, it is very ungrateful to escape from it. And only Allah can decide who can survive or not." For this reason I was staying my house and praying to Allah while women and children were sent to a school cum cyclone shelter.

When cyclone affected people are asked about their local knowledge regarding cyclone indicators—how they used to detect cyclone without having institutional warning, maximum of them answered positively and illustrated their vast experiences. It was evident from the respondents that respectively 48.3 percent and 56.3 percent respondents of Rayenda and Uttar Sauthkhali have experienced about the local indicators of cyclone early warning. That means only 47.5 percent of the total respondents have not experienced about indigenous early warning indicators (Figure 20). As the maximum respondents of Uttar Sauthkhali are fishermen and lived nearby the river, so they are more experienced by inheritably about the cyclone indicators rather than the people of Rayenda has.

Figure 20

Cyclone Affected People Opinion about Indigenous Knowledge



This indigenous knowledge is varying from sex and age. Focus group discussion observed that most of the female respondents are less ware about the indigenous indicators of cyclone rather than male. The young aged respondents see this indigenous knowledge as old fashion which has been superseded by the newer scientific early warning system. But they respect their elder conception and try to realize those logically.

FGD 3, Area: Rayenda

Amena Begum, age 57, is a widow who lost his husband in Sidr. She said that wind was blowing roughly after the morning in the Sidr day. We had no Radio to listen the warning but by seeing south-eastern wind blowing, dark rolls of water and jumping fishes in the river my husband told a massive cyclone would come while I was not aware of those signs. Firoj Khan, age 42, is a ward member told that in 2009 noticing the abnormally hot water in the river, dark rolls of water and continuous barking of dogs my father predicted a cyclone and sent our wives and children in safe places. He could not mention any other prediction indicators and said that he had not pay attention to identify local indigenous knowledge because of his busy movements. Jesmin Nahar, age 32, is a housewife who lost one of his daughters in Sidr, said there was no radio in that days my mother in law told me to finish all tasks before the sunset and tied the cattle into the backyard. She had closely observed the wind blowing, dogs barking, smoky and cloudy shapes in the river.

Data showed indigenous warning indicators (IWI) of cyclone gathered from both villages. It was observed that IWI of cyclone depends on several factors. Coastal inhabitants did not take a single indicator to predict a cyclone. By the combination of all indicators made a complete sense of predicting hazards like cyclone. Most of the respondents called cyclone as *Bonne, Jhar* and *Tufan* and this may take effect on April to November (figure 21).

However, Mustafa⁶⁵ (2000) reported that severe cyclone associated with surges occur mostly during pre monsoon—April to May—and post monsoon—October to December—periods. So, their prediction about

⁶⁵ M. M. Mustafa, , "Towards an Understanding of Indigenous Knowledge," in P. Sillitoe (ed.) *Indigenous Knowledge Development in Bangladesh: Present and Future*, (Dhaka: The University Press Limited, 2000), p29

time period is justified. According to expert cyclone formation occurs when the weather was hot and humid and water in sea becomes hot.

Figure 21
Indigenous Predicting Indicators of Cyclone

Perception	<ul style="list-style-type: none"> • <i>Bonne</i> (Cyclone with tidal surge)* • <i>Jhar</i> (Cyclone with heavy wind)* • <i>Tufan</i> (Cyclone with heavy wind, thunder bolt and tidal surge)
Prediction	<ul style="list-style-type: none"> • <i>Baishak- Jayshita</i> (April and May) * • <i>Kartik- Agrahayan</i> (October and November)*
Weather Condition	<ul style="list-style-type: none"> • Weather unusually hot and humid* • Strong wind blows from south* • Strong wind blows from south-east* • East wind blows at full moon
Sea and River Pattaerns	<ul style="list-style-type: none"> • Big waves of water* • Dark rolls of water* • Smooky and cloudy shapes in the sea* • Huge roar of waves of the sea
Water Condition	<ul style="list-style-type: none"> • Abnormally hot* • Dark in color* • Bitter taste of rain water • Slainty of rain water*
Animal Behavior	<ul style="list-style-type: none"> • Insects (moving out of their nest and move to high places)* • Fishes (Jump in the river and pond)* • Cattle becomes restless and stop eating grass • Dogs wail continously at night* • Ant climbs tress with teir eggs on their backs* • Bees move around their cluster* • Increaseing number of flies and insects • crabs come into the courtyard • Foxes bark during the day • Birds fly without destination*
Cloud Condition	<ul style="list-style-type: none"> • Sky turns gloomy and overcast* • Black rolls of cloud* • Dark rainbow color and shape cloud
Cylone Appearance	<ul style="list-style-type: none"> • Wind blowing in circle can be seen in the deep sea from the coast*
Other	<ul style="list-style-type: none"> • Muddy smell in the wind* • Frogs bark constantly • Water hyacinth in the canal

* Most commonly mentioned by the both villagers

It was empirically found that the cyclone victims of Rayenda and Uttar Sauthkhali could understand a cyclone was coming by weather and wind blowing. The cyclone victims opined that they could guess a cyclone is coming when weather becomes unusually hot and humid with south-east strong wind. The fisherman of Uttar Sauthkhali also argued they could easily understand a cyclone is coming better than those who were not involving in fishing. When they saw big waves of sea water and dark roll of water with roar, they stopped their fishing and boating their fishing vehicles near the coast.

Some of the fisherman who was involving crabs collecting they told before cyclone crabs swimming away from sea to coast. They also observed fishes are jumping in the sea and big river towards the coast. By this indicator they could perceive well a cyclone is coming with big tidal surge.

It is observed that most the indigenous warning indicators (IWI) are based on natural phenomena and animal behaviour. Indigenous warning indicators (IWI) of coping practice which people have developed through experiment and observation. It is obvious that some of these indicators are related with the scientific alert system and has high potentiality to indicate a cyclone. Nevertheless, we can achieve more reliable, accurate and more believable warning if a particular combination of most common indicators will give more extra validation in the official warning system.

4.7 Conclusion

Cyclone, is not a recent phenomenon in this country, causes significant damages of lives and properties in every year. Recently cyclone forecasting system and disseminating mechanism of our country is developed while complexity of warning language and different types of alerts for maritime and river ports sometimes create problems. Nevertheless, mass people of the coastal areas are not aware about the cyclone warnings and some times they do not receive those positively. Many factors were responsible for this mass inaction, such as the poor road network and the long distance of cyclone shelters from homes, the fear of stealing, disbelief, fatalism, and the low capacity of shelters. People did not believe official warnings for several reasons, including a lack of understanding of cyclone warnings, past experience of the failure of warnings, a lack of income earning activity at the place of removal, and pressure from an employer on inhabitants to continue fishing.

Besides organizational warning, the coastal habitat has strong Indigenous Warning Indicators (IWI) to achieve reliable warning. Most importantly, understanding of such indicators does not require any special or sophisticated equipment; a deep understanding and close monitoring of environmental factors are the only requirements. Proper integration of indigenous knowledge-based cyclone forecasting with modern early warning systems is essential for greater acceptance and

of disaster risk reduction. The transfer of such knowledge to the vast majority of the population of the coastal community would lead to better disaster mitigation and emergency management in coastal Bangladesh.

CHAPTER 5

COMMUNITY AND ORGANIZATIONAL SUPPORT TO ADAPTATION

The Chapter 5 is designed to discuss the community and organizational strategies for adaptation of victims to precarious coastal habitat devastated by cyclone in the study locale. This chapter focuses on firstly standing framework of organizations and community about DRR and climate change; secondly community based adaptation in study locale associated with SOC and SOD; thirdly indigenous adaptive mechanisms of the cyclone victims of coastal Bangladesh, lastly organizational initiatives for adaptation of the victims to cyclone affected coastal areas of Bangladesh.

Tropical cyclones, like other natural hazards are not, in themselves, disasters. Disaster is a function of the human population that resides in the areas impacted by natural hazards. It is convincingly argued that the attribute that causes a natural hazard to become a disaster is the vulnerability of the individual or the community.⁶⁶ Communities are the first real time responder to any disaster situation. Disaster is a sudden, calamitous event bringing great damage, loss, and destruction and devastation to life and property. The damage caused by disasters

⁶⁶ Berry, J. Linda “Community Vulnerability to Tropical Cyclone: Cairns 1996–2000.” *Natural Hazards*, (Berlin: Springer, 2003) vol. 23, p 210

is immeasurable and varies with the geographical location, climate and the type of the earth surface/ degree of vulnerability. This influences the mental, socio-economic, political and cultural state of the affected area. Generally, disaster has the following effects in the concerned areas,

1. It completely disrupts the normal day to day life
2. It negatively influences the emergency systems
3. Normal needs and processes like food, shelter, health, etc. are affected and deteriorate depending on the intensity and severity of the disaster.

As community is the first real time responder of any tropical cyclones, it is needed to approach their vulnerability related to effective disaster management. While it is clear that the poor are often the most affected in a disaster, it is too simplistic to assume that there is a direct and absolute correlation between poverty and vulnerability. In addition to the economic dimension, there are also other aspects of social positioning such as class, ethnicity, community structure, community decision making processes and political issues that determine poor people's vulnerability. There is another aspect of vulnerability of the poor people, which is frequently ignored, that it is often local in nature. As Maskrey (1999) points out, "the creeping impact of small scale disasters on the lives and livelihoods of vulnerable communities, whose economy is largely in the informal or subsistence sectors is

rarely documented given that often the most vulnerable communities are those with the least assets to lose".⁶⁷

After 1970 cyclone's aftermath and destruction, it is recognized that the need for vulnerability reduction for effective disaster management is essential due to the failure of the top down management approach. As a result many feel it is important to adopt a new strategy, which directly involves vulnerable people themselves in planning and implementation of mitigation measures. This bottom up approach has received wide acceptance because considered communities are the best judges of their own vulnerability and can make the best decisions regarding their well being. To enhance community adaptation to disaster Bangladesh Government initiates decentralized administration and engage NGO's to develop vulnerable communities by socio-economic development through their local resources. The decentralization of administration and the development of infrastructural facilities in sub-districts during the 1980's have contributed to a substantial improvement in efficient service delivery in areas of affected by natural hazards.

It is clear that the nature of disaster vulnerability of communities is very much complex and varied by localities. For this reason, after

⁶⁷ Shuvit Yodmani, "Disaster Risk Management and Vulnerability Reduction: Protecting the Poor," paper presented at the "Social Protect Workshop 6: Protecting Communities – Social Funds and Disaster Management" (Manila, 2002), p4

1990s, the rapid spread of the grass root level organizations, developed by NGOs' for gear up local communities income enhancing activities, trained communities in numerous anti poverty programs and enhancing their coping strategies related to disasters. The NGOs have now mobilized nearly about 3.31 million rural households in groups and centers which are regularly attended by their workers.⁶⁸ Because of this bottom up approach the organizations, taking community as in center of the disaster management and using their local resources and knowledge as central leverage, have been playing an increasingly important role in coping with natural disaster like cyclonic disaster.

5.1 Community Based Disaster Management and Adaptation

The impacts of the disasters are deeply related with the socio economic conditions, tradition, culture, and climate of the communities. Historically the coastal communities have faced the furies of nature and have inherited an intuitive and holistic knowledge of the way the nature behaves and the impact it has on animals, plants and human lives and livelihood. Accordingly, communities have learnt to develop indigenous coping mechanisms for survival, which were internalized as life style activities and transmitted from one

⁶⁸ Mahbub Hossain, "Development policy, Growth Process and Coping with Natural Disaster," *From Crisis to Development—Coping With Disasters in Bangladesh*. Edited by Hossain, Dodge and F. H. Abed. (Dhaka: University Press Limited, 1992) p.139

generation to another. Many isolated communities in the coasts have survived through this process.

Over the past 30 years, there has been a continuous evolution in the practice of crisis or disaster management. It is important to establish a common understanding of the basic tenets of disaster risk reduction. Disaster risk reduction in the modern era draws its relevance largely from earlier contributions and previous practices in the field of civil defense and later disaster management. In this respect, the traditional focus has been on the preparation and improved operational capacities for more timely and effective response to an impending event, or the provision of urgent services to restore basic requirements of the public if a disastrous event has already occurred. In many places political commitment and the allocation of resources to address hazardous conditions have been concentrated overwhelmingly on short-term emergency contingencies.

In recent years the notion of disaster management emphasizes the severity and frequency of disaster as well as the communities—local political authorities, a broad range of professional and commercial interests, public organizations, educational institutions and community leaders—closely affected by disaster and recognizes the essential public value of sustained efforts to reduce the social,

economic and environmental costs of natural hazards. In recent era there is a growing recognition underlying such a rationale; the risk of disasters is fundamentally linked to environmental problems and unresolved issues essential for sustainable development. So it is need for much greater attention on implementation of protective strategies which can contribute to saving lives and protecting property and resources before they are lost. For this reason, more holistic approach that emphasizes vulnerability and risk factors has coalesced around the concept of risk reduction, or disaster risk management.⁶⁹

Disaster risk reduction policies and strategies need to be implemented with a two-fold aim:

- I. To enable societies to be resilient to natural hazards by involving vulnerable communities and
- II. Ensuring development efforts do not increase vulnerability to those hazards.

5.1.2 Community Involvement: If the community were not well prepared, control over the disaster event would be usually lost during its occurrence. Therefore, preventive steps need to be taken before, during and after the disaster events. If each individual in the community is familiar with ways of coping and precautionary

⁶⁹ UNISDR, *Living with risk: a global review of disaster reduction initiatives*. (New York: UNISDR, 2004)

measures, then the disruption by a disaster can be reduced. So, the key aspect of community involvement is the sustainability of community level initiatives for disaster reduction. All communities and villages have some vitally important assets to deal with disasters. These may include knowledge of disaster warning signs, locally safe and vulnerable areas, experience of past disasters, methods of survival and social relations that are often vitally important in coping with crisis. This understanding is essential if communities are to become more resilient to the effects of hazards so that disaster losses can be reduced in coming years.

5.1.3 Ensuring Development policies: Decreasing the vulnerability of socio-economic sectors and ecological systems to natural climate variability through a more informed choice of policies, practices and technologies will, in many cases, reduce the long-term vulnerability of these systems to disaster risk reduction. While members of the scientific community and policy-makers are particularly concerned about adaptation to disaster risks, so it is essential to get attention to adaptation to current climate condition and nature of communities. Many organizations working to develop policy issues collaborating with local communities to reduce poverty and disaster risks are now trying to incorporate the effects of climate change and adaptation into their work. These points towards the need to find practical ways of integrating DRR, livelihoods, and climate change adaptation. These integrated frameworks of development are still largely untested and

there are likely to be challenges in handling the array of factors to be considered, as well as in encouraging the different support institutions needed to tackle vulnerability to work together.

5.1.4 Managing Disaster Risks: A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, and economic or environmental losses that exceed the community's or society's ability to cope using its own resources. A disaster occurs when hazards impact on vulnerable bio communities—human, animals, plants and trees, and bio factors. So, the combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster. It can be formulated in an equation:

$$(\text{VULNERABILITY} + \text{HAZARD}) / \text{CAPACITY} = \text{DISASTER}$$

Disaster management is not a term which is used recently while it becomes changing its theme, concepts and metaphor. In early societies, there are lot of example that they took various activities protecting their people and their important resources from disaster. The ways of protecting from disaster were accomplished first by anticipating potential catastrophes based on knowledge of hazardous conditions and possible destructive events, then by investing in protective measures.

Disaster risk management implies addressing the underlying social, economic and environmental vulnerabilities and thereby reduce the probability of a disaster occurring. In an ideal world preventive measures would make disaster relief efforts obsolete, but realistically they complement relief efforts, minimizing disaster impacts and therefore the human and economic cost of disasters. Ideally disaster risk management would take a comprehensive multi-hazard focus, which includes simultaneous consideration of the various types of geological and/or hydro-meteorological hazards to which a particular country or region is exposed.⁷⁰ Disaster risk management tries to address hazard risks as an integral part of development. Consequently, it is less events and more process focused. It is based on a continuous assessment of vulnerabilities and risks and involves many actors and stakeholders, such as governments, technical experts and local communities.⁷¹

To minimize the damages caused by disasters, various efforts have been taken by government, international communities including donor agencies. Without sustainability, disaster management efforts will not preserve. A critical element of sustainable disaster management is communities' participation in these activities. The most common elements of community involvement are partnership, participation,

⁷⁰ UNFCCC, "Montreal Climate Change Conference - December 2005", (UNFCCC: Canada, 2005)

⁷¹ UNISDR, *Living with risk: a global review of disaster reduction initiatives*. (New York: UNISDR, 2004)

empowerment and ownership by the local people. The emphasis of disaster management efforts should focus on communities and the people who live in them. Unless the disaster management efforts are sustainable at individual and community level, it is difficult to reduce the losses and scale of the tragedy. There needs to be an opportunity where people can be involved from the initial programming stage of disaster management activities.

Community based disaster risk management is a comparatively new area of social concern and practice. However, it is a very relevant concern for development cooperation given that natural disasters have devastated an increasing number of regions, destroyed investments and set back progress in development. Often, countries victim to the large-scale impacts of cyclones, tornadoes, typhoons, floods or droughts are barely able to respond, and recovering can take years or decades. Following the United Nations initiative for an International Decade for Natural Disaster Reduction (1990-99), this theme has climbed much higher on the international agenda.

Through these community-based activities, people should be able to participate along side government officials and experts group as the direct stakeholders of these activities. While people should own the problems, consequences and challenges of any mitigation and/or

preparedness initiative, it is necessary to take people's involvement further, into policy and strategy. This process induces sense of ownership to the people which results in their continuous engagement and long term commitment to these activities. Involvement of communities is important in both pre-disaster mitigation and post disaster response and recovery process.

Community Based Disaster Management as point out by UNISDR (2007)⁷² is, "Community based disaster management involves plans, structures and arrangements established to engage the affected communities, the normal endeavors of government, voluntary and private agencies in a comprehensive and coordinated way to respond to the whole spectrum of emergency needs. This is also known as disaster management."

As quoted by International Institute for Environment and Development (IIED) (2009), "Community-based disaster risk management is a community-led process, based on communities' priorities, needs, knowledge, and capacities, which should empower people to plan for and cope with the impacts of climate change."⁷³

⁷²UNISDR, *Disaster Risk Reduction: 2007 Global Review*. (New York: UNISDR, 2007), part 2

⁷³ Hannah Reid, *Community-based Adaptation to Climate Change*, (London: IIED, 2009). p16

The disaster risk reduction framework is composed of the following fields of action:

1. Risk awareness and assessment including hazard analysis and vulnerability/ capacity analysis;
2. Knowledge development including education, training, research and information;
3. Public commitment and institutional frameworks, including organizational, policy, legislation and community action;
4. Application of measures including environmental management, land-use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments; and
5. Early warning systems including forecasting, dissemination of warnings, preparedness measures and reaction capacities.

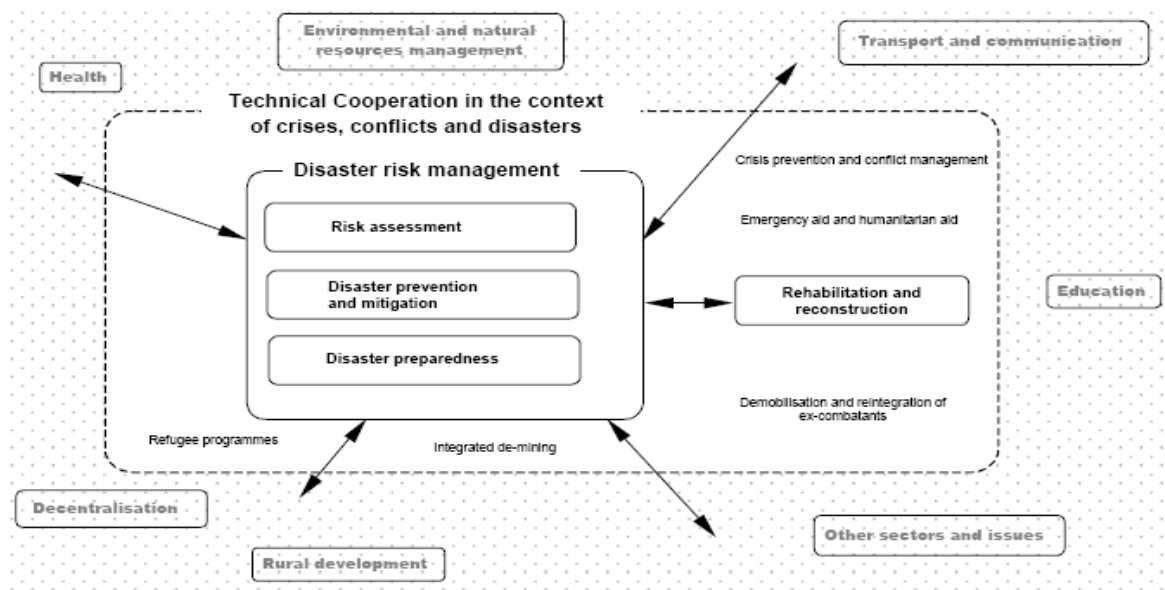
Another important terminology is community based adaptation depends on the processes which people reduce the adverse of climate on their lives, health and well being, and advantage of the opportunities that their environment provides and easily adapted.

Community adaptation as quoted by Smit (1993), "Adaptation involves adjustments to enhance the viability of social and economic activities and to reduce their vulnerability to climate,

including its current variability and extreme events as well as longer-term climate change.”⁷⁴

Mentioned two, Community Based Disaster Risk Management (CBDRM) and Community Based Adaptation (CBA), are very much coherent and interdependent fields of activity in nature have been identified for strengthening community based disaster risk management, which will be accumulated in a figure (22) below:

Figure 22: Understanding Community Based Disaster Management and Adaptation



Source: Adopted by Wolfgang G. and C. Bollin cited in Bob Foster (2001:18)⁷⁵

⁷⁴ Hannah Reid, *Community-based Adaptation to Climate Change*, (London: IIED, 2009). p17

⁷⁵ Bob Foster, “IPCC’s Third Assessment Report: Too Much ‘Imagination Block’”, (Geneva: IPCC, 2001) p18

Main Characteristics of Community Based Disaster Risk Management:

- a) Implementation of Community Based Disaster Risk Management points to the following essential features: The community has a central role in long term and short term disaster management. The focus of attention in disaster management must be the local community.
- b) Disaster risk or vulnerability reduction is the foundation of CBDRM. The primary content of disaster management activities revolves around reducing vulnerable conditions and the root causes of vulnerability. The primary strategy of vulnerability reduction is by increasing a community's capacities, their resources and coping strategies.
- c) Linkage to the development process. Disasters are viewed as unmanaged development risks and unresolved problems of the development process. CBDRM should lead to a general improvement of the quality of life of the vast majority of the poor people and of the natural environment. CBDRM contributes to people's empowerment – to possess physical safety; to have more access and control of resources; to participate in decision making which affects their lives; to enjoy the benefits of a healthy environment.
- d) Community as a key resource in disaster risk reduction. The community is the key actor as well as the primary beneficiary of disaster risk reduction. Within the community, priority attention

is given to the conditions of the most vulnerable as well as to their mobilization in the disaster risk reduction. The community participates in the whole process of disaster risk management from situational analysis to planning to implementation.

- e) Application of multi-sectoral and multi disciplinary approaches. CBDRM brings together the multitude of community stakeholders for disaster risk reduction to Integrating Poverty Reduction Programs with Disaster Management Sector expand its resource base. The local community level links up with the intermediate and national and even up to the international level to address the complexity of vulnerability issues. A wide range of approaches to disaster risk education is employed.
- f) CBDRM as an involving and dynamic framework. Lessons learned from practice continue to build into the theory of CBDRM. The sharing of experiences, methodologies and tools by communities and CBDRM practitioners continues to enrich practice.

The communities are the first ones to become vulnerable to the effects of such hazardous events. On the other hand, they have the most to gain if they can reduce the impact of disasters on their community. This concept gave rise to the idea of community-based disaster management where communities are put at the forefront. The CBDM approach provides opportunities for the local community to evaluate their own situation based on their own experiences initially. Under this approach, the local community not only becomes part of creating

plans and decisions, but also becomes a major player in its implementation. Although the community is given greater roles in the decision-making and implementation processes, CBDM does not ignore the importance of scientific and objective risk assessment and planning. The CBDM approach acknowledges that as many stakeholders as needed should be involved in the process, with the end goal of achieving capacities and transferring of resources to the community, which level who would assume the biggest responsibility in over disaster reduction as well in adaptation to climate change.

5.2 Action Plan of Organizations and Community

5.2.1 International Review:

Recently the United Nations General Assembly Resolution 66/199 requested UNISDR to facilitate the development of a post-2015 framework for disaster risk reduction. The Chair's Summary of the Third Session of the Global Platform for Disaster Risk Reduction in 2011 referred to a first outline of a post-2015 framework at the Global Platform in 2013. A draft should be finalized towards the end of 2014 to be ready for consideration and adoption at the World Conference on Disaster Reduction in 2015.⁷⁶

⁷⁶ Unisdr, "Sendai Framework for Disaster Risk Reduction 2015-2030", Sendai Declaration, (New York: UNISDR, 2015)

In 2003 and 2004, the secretariat of the International Strategy for Disaster Reduction (UNISDR) carried out a review of the Yokohama Strategy and Plan of Action for a Safer World. The Yokohama Review formed the basis of the HFA and was submitted at the World Conference on Disaster Reduction in Kobe, Japan, in January 2005. The key areas for developing a relevant framework for action for the decade 2005–2015 are identified the specific gaps and challenges in the following five main areas⁷⁷ (The UN Hyogo Framework 2005):

- (a) Governance: organizational, legal and policy frameworks;
- (b) Risk identification, assessment, monitoring and early warning;
- (c) Knowledge management and education;
- (d) Reducing underlying risk factors; and
- (e) Preparedness for effective response and recovery.

To attain these frameworks and obtain expected outcome, the Conference resolves to adopt the following strategic goals (The UN Hyogo Framework 2005):

- (a) The more effective integration of disaster risk considerations into sustainable development policies, planning and programming at

⁷⁷ UNISDR, “Hyogo Framework for Action 2005-2015,” The UN Hyogo Framework 2005- Kobe, Japan, (New York: UNISDR, 2005)

all levels, with a special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction;

(b) The development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards;

(c) The systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programs in the reconstruction of affected communities.

In UN approach to disaster risk reduction, regional and international organizations and other actors concerned should take into consideration the key activities listed under each of these five priorities and should implement them, as appropriate, to their own circumstances and capacities. These are:

- a) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation
- b) Identify, assess and monitor disaster risks and enhance early warning

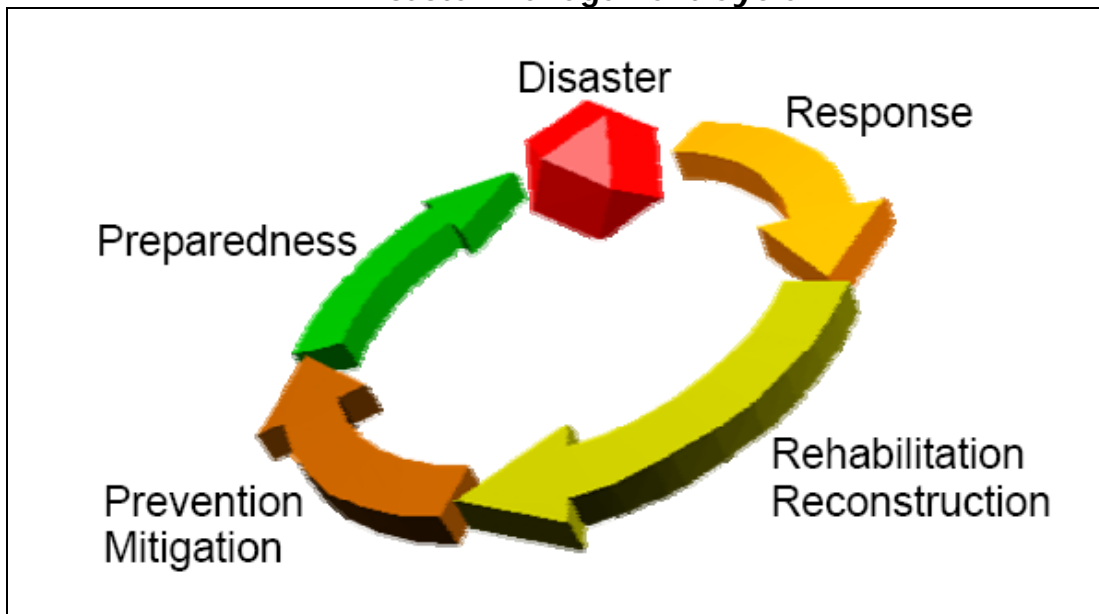
- c) Use knowledge, innovation and education to build a culture of safety and resilience at all levels
- d) Reduce the underlying risk factors and,
- e) Strengthen disaster preparedness for effective response at all levels. (UNISDR, Towards Post 2015 HFA)

5.2.2 Regional Review: Bangladesh

Disaster management is a cycle process which involves some fundamental aspects: preparedness, prevention, mitigation, recovery, reconstruction, relief, rehabilitation, rescue, response and adaptation to changing climate and environment. The disaster management cycle, consists of four phases: Mitigation and Preparedness in the pre-disaster stage, prevention and rescue in during disaster moment, and Response and Rehabilitation/ Reconstruction in post-disaster stage. In the "Mitigation" phase, efforts are made to prevent or mitigate damage (e.g. construction of cyclone shelter and awareness building against cyclone disaster). Activities and measures for ensuring an effective response to the impact of hazards are classified as "Preparedness" (e.g. emergency drills and public awareness) and are not aimed at averting the occurrence of a disaster. In the "Rescue and Prevention" phase, efforts are made to save lives and properties. "Response" includes such activities as rescue efforts, first aid, fire fighting and evacuation. In the "Rehabilitation/Reconstruction" phase,

considerations of disaster risk reduction should form the foundations for all activities (Figure 23).

Figure 23
Disaster Management Cycle



Source: Adopted by ADRC: Total Disaster Risk Management-Good Practices, 2005

The adverse impacts of all the natural hazards affecting socio-economic condition need to be reduced for sustainable development. On realization of this reality, the Government of Bangladesh has undertaken a lot of plans and programs for disaster reduction through disaster management. Although development of a comprehensive approach and appropriate technique for managing disaster is really a complex tasks for the Government of Bangladesh because of heavy population pressure and high density. Disaster prone areas cannot be transformed into disaster free areas by over nightly due to

overpopulation and economic under development. It is not possible to stop population growth in distant future and develop sustainable economic growth overnight. By considering the above factors the disaster mitigation strategies of Bangladesh includes some basic factors: what is the perception of the people about disaster, how people perceives disasters and their occurrences, how people faces disasters in historical past, what are indigenous strategies to manage those disasters and how community adapt to changing environment from the historical past.

Effective disaster mitigation does not just happen; it is achieved by hard work with the collaboration of disaster facing communities, Government agencies and Non Government Organizations. By realizing that policy framework of disaster management involves six operational aspects:

- 1) Identifying risks; related to lives and properties
- 2) Risks assessment of the types and magnitude of disaster,
- 3) Planning and decision making on the response to these risks,
- 4) Implementation of the plans and strategies at the community level,
- 5) Provides institutional opportunities and constrains to risk treatment, and

6) Evaluation and feedback.

5.2.3 Disaster Management Practice in Bangladesh: Bangladesh is struggling to initiate well-developed institutional mechanism at the national and field levels for managing particularly the consequences of natural disasters. The historical data about disaster management of Bangladesh shown that the disaster mitigation program undertaken by the Bangladesh Water Development Board (BWDB) and other agencies like Bangladesh Meteorological Department (BMD) in early 1970s for implementing three important components:

- I. Involvement and participation of the local people in the design and implementation of the program,
- II. Conduction of Environmental Impact Assessment (EIA), and
- III. Provide clear statement of negative points and aftereffects instead of highlighting only the sustained points of the program.⁷⁸

In recent years, the Government of Bangladesh (GoB) has been placing increased emphasis on reduction of the human, economic and environmental costs of disasters, through enhancing the national capacity for disaster mitigation. Based on the new concept of disaster management, GoB has given equal importance to both structural as well as non-structural mitigation measures keeping in view the aspect of better coordination within overall disaster management system. It is rather strongly believed by the GoB that

⁷⁸ Chowdhury et al. "Cyclone Aftermath: Research and Direction for The Future." *From Crisis to Development—Coping With Disasters in Banglades*, Edited by Hossain, Dodge and F. H. Abed, (Dhaka: University Press Limited, 199)

non-structural mitigation measures need to be complemented by structural mitigation measures in order to modify or reduce some disaster effects.

The programs on disaster management in Bangladesh focus equally on structural and non-structural practices intended for disaster mitigation as point out by the Disaster Management Bureau on National Plan for Disaster Management 2010 :

Structural Mitigation: GoB has so far constructed 1,841 cyclone shelters and 200 flood shelters. During the last four decades 482 water and flood control projects have been implemented, through which flood protection embankments totaling about 8,200 km, drainage channels of total length 3,400 km and 9,000 sluice gates and regulators on different rivers and canals have been constructed as safety measures against inundation by tidal waves, storm-surges and flooding.

Non-Structural Mitigation: Non-structural mitigation practices pursued by the GoB focus on

(1) Preparedness and possibilities for action to reduce risks and losses, and

(2) Better coordination mechanisms between all actors involved (GoB, NGO and community people at the grass-roots level) during all phases of disaster.

Warning Systems: In Bangladesh there are two warning systems: flood warning and cyclone warning.

Flood Warning System:

Flood warning has been in a state of continuous development since 1972. There was a significant improvement in the Flood Forecasting and Warning system (FFWS) with the introduction of the hydrodynamic super model MIKE 11 and an increase in the number of real-time monitoring stations to 30. With such modernization, FFWS yielded a successful result during the devastating flood of 1998.

Cyclone Warning System: The existing cyclone warning has two signal numbers inherited from British India. In line with growing need, the warning signals were simplified and made specific and easily understandable in June 2002. The modified system is now under consideration by the GoB.

e) Local Disaster Action Plans: The Disaster Management Bureau (DMB) drafted a model action plan at local levels. It was modified after discussion at a workshop attended by eminent experts involved in disaster-related activities. Based on that, the DMB has been able to finalize the Local Disaster Action Plan (LDAP) with the help of national consultants. The main purpose of the LDAP is to mobilize local communities in the most disaster-prone areas to

increase their own capacities to cope with and recover from a disaster.

5.2.4 Disaster Management Strategy and Mechanism: After the floods of late 1980s and the killer cyclone of 1991, the concept of acting only after the occurrence of disaster has been replaced by the concept of total disaster management involving prevention, mitigation, preparedness, response, recovery and development. The Government of Bangladesh (GoB) has, therefore, total commitment towards reduction of human, economic and environmental costs of disasters by enhancing overall disaster management capacity. Efforts have been continuing for optimum coordination and best utilization of resources along-with ensuring community involvement so that they are aware of what they can do for protecting their lives and properties against disasters.

The plan and conduct of disaster management by GoB involve preparedness, response, recovery and mitigation as key notes for building up self-reliance of the community people.

The lead actor in disaster management is the Ministry of Food and Disaster management (MoFDM), which was known as the Ministry of Disaster Management and Relief (MDMR) until 2002. It has the role of inter-ministerial coordination, planning and response to disaster management. Under the MoFDM, there are two line agencies: the Disaster Management Bureau (DMB) and the Directorate of relief and Rehabilitation (DRR). DMB is a small professional unit at the national

level to perform specialist functions, working in close collaboration with the district and Thana (Sub-district)-level authorities, and the concerned line ministries, and under the overall guidance of the IMDMC. It is a catalyst for planning, for arranging public education campaigns, and for organizing the systematic training of government officers and other personnel from the national down to the union/community level. The DRR, as another line agency of MoFDM, is mainly charged with managing the post-disaster provision of relief and rehabilitation works. Of all the other ministries, it is the Ministry of Water Resources (MWR) which plays a vital role in flood management. It is involved in the planning of water resources in relation to water-related natural disasters, such as cyclone protection, flood proofing, riverbank erosion control and drought management, although the mitigation of disasters remains beyond its mandate. The Flood Forecasting and Warning Center (FFWC) of MWR play an important role in providing early warning to the agencies involved.⁷⁹

Among other organizations, the Bangladesh Red Crescent/Cross Society (BRCS) and donors play important roles. The Cyclone Preparedness Program (CPP) was established in 1972, following the devastating cyclone of 1970, under an agreement between the Bangladesh Red Crescent Society (BRCS) and the Government of Bangladesh, with the aim of undertaking effective cyclone

⁷⁹ Disaster Management Bureau, *National Plan for Disaster Management 2008–2015*, (Dhaka: Ministry of Food and Disaster Management and Relief, 2008)

preparedness measures in the coastal areas. CPP under the Bangladesh Red Crescent Society (BRCS) has a joint management structure, with two committees—a 7-member Policy Committee headed by the Minister of MoFDM and a 15-member Implementation Board, led by the Secretary of the MoFDM. Now the CPP has about 43120 trained volunteers, including 5,520 female volunteers.⁸⁰

5.2.5 Co-ordination Mechanism: GoB has formulated a set of mechanisms to maintain proper co-ordination amongst the concerned Ministries, organizations and line agencies and also to ensure their effective functioning during emergency. The high powered National Disaster Management Council (NDMC) and In-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

⁸⁰Bangladesh Red Crescent Society, “Cyclone Preparedness Program.” (BDRCS:2013).<http://bdracs.org/programs-and-projects/cyclone-preparedness-program>, [accessed 11 November 2013]

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

So, it is needed to develop better understanding and interactions among the GO, NGO's, People's Organization (PO) along with the stake holders—affecting communities—for total disaster management, socio economic progress and quality of the life of coastal people.

5.3 Organizational Plan for Risk Reduction and Climate Change

Disaster management experiences in contrasting to old age, Bangladesh has already developed institutional framework and plan that describes the role of different stakeholders for disaster management and mitigation. Historically, non-governmental and community-based organizations (NGOs/ CBOs) and other informal support mechanisms in Bangladesh also have made significant contributions during and after disaster recovery. But the current disaster management approach warrants moving from risk assessment to post-disaster recovery efforts to including disaster management in development planning.⁸¹ The priority of pre-disaster mitigation and preparedness has been accorded to focus on community level preparedness, response, recovery and rehabilitation.

5.3.1 Disaster Management Vision of GoB: The Disaster Management Vision of the Government of Bangladesh is to reduce the risk of people, especially the poor and the disadvantaged, from the effects of natural, environmental and human induced hazards, to a manageable and acceptable humanitarian level, and to have in place an efficient emergency response system capable of handling large scale disasters.

5.3.2 Disaster Management Policy of GoB Achieving the vision of disaster management the GoB has formulated National Policy on

⁸¹ Mizan Khan and M. Rahman, "Partnership Approach to Disaster Mngement in Bangladesh: A Critical Policy Assessment," *Nat Hazards*, (Berlin: Springer, 2007) vol. 41p361

Disaster Management 2009⁸² by emphasizing group broad-based strategies.

5.3.3 Institutional Framework of GoB: The present institutional framework of GoB is divided by two stages:

1) National Level

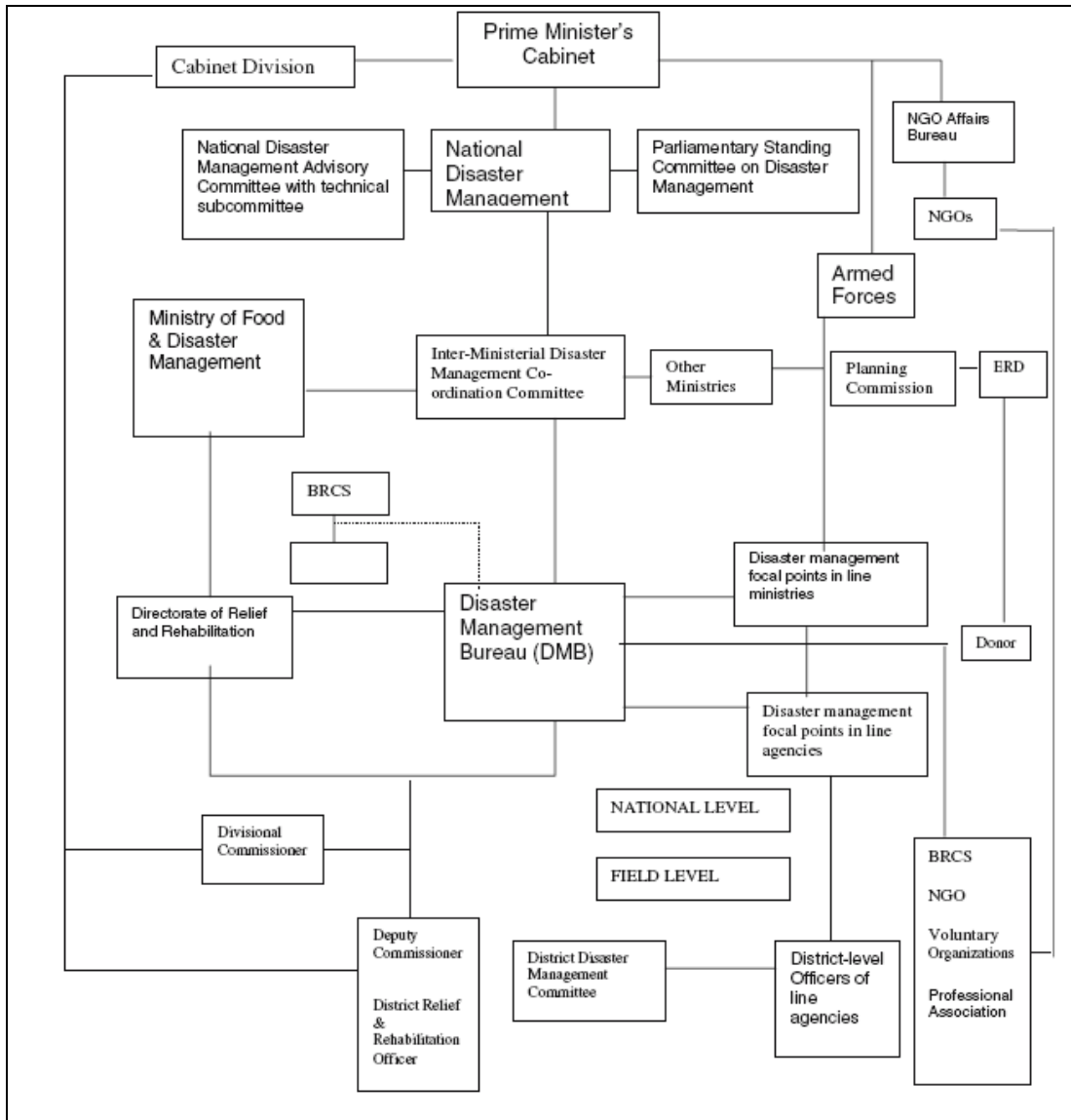
2) Local Level

National Level: In the national level, there are three high-profile bodies for multi-sectoral co-ordination: the National Disaster Management Council (NDMC), headed by the Prime Minister; the Inter-Ministerial Disaster Management Coordination Committee (IMDMCC), led by the Minister of Food and Disaster Management; and the National Disaster Management Advisory Committee (NDMAC), headed by a specialist who is nominated by the Prime Minister. Besides, there is the Parliamentary Standing Committee on Disaster Management, which is an organ to supervise over national level policies and programs. The mission of these bodies is to provide policy and management guidance as well as coordination of activities related particularly to relief and rehabilitation. Figure 24 shows organizational structure and institutional arrangements for disaster management in national level.

⁸² Disaster Management Bureau, *National Plan for Disaster Management 2010-2015*, (Dhaka: DMB, DMRD, 2010)

Figure 24

Organizational Structure of National Level DM



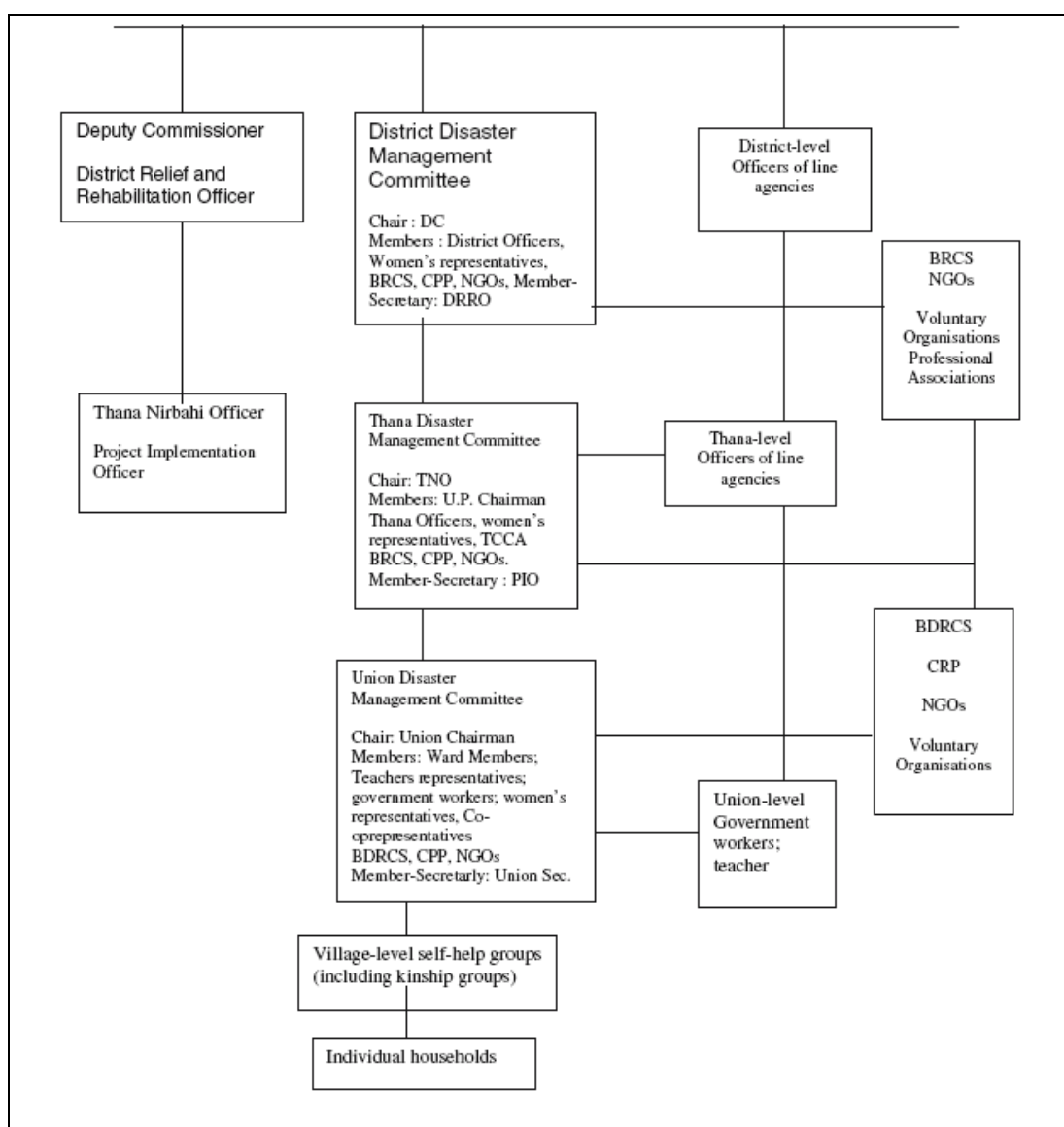
Source: Adopted by DMB, 2010

Local Level: At the local level, disaster management organizational structures start with the district administration covering all 64 districts of Bangladesh as shown in figure 25. The District Disaster Management Committee (DDMC) is chaired by the Deputy Commissioner, who is the administrative head of the district. The members of the committee include departmental officers and women,

NGOs, BRCS and CPP representatives. In similar manner, below the district level, there is the sub-district/ Thana, union and village tiers of disaster management committees. All these local level committees include representatives from almost all relevant groups in society.

Figure 25

Organizational Structure of Field/Local Level DM



Source: Adopted in DMB, 2010

The legal frameworks for addressing disaster risk reduction in Bangladesh are the Allocation of Business for the Ministry of Food and

Disaster Management (presently Ministry of Disaster Management and Relief) and the Standing Orders on Disaster. Through the Allocation of Business, the Ministry of Food and Disaster Management is the entity responsible for coordinating disaster management across all of Bangladesh's government agencies. The Standing Orders on Disaster were issued by the Government of Bangladesh in 1997 to provide the nation with a guide for disaster risk reduction and emergency management activities. It defines the duties of relevant government entities responsible for disaster management at various levels of are tasked with disaster management activities. Their roles are summarized in Figure 26.

Figure 26

Roles of the DMC of National and Local Level

Level	Summary
National Level Bodies	<p>National Disaster Management Council (NDMC) headed by the Prime Minister to formulate and review the disaster management policies and issue directives.</p> <p>Inter-Ministerial Disaster Management Co-ordination Committee (IMDMCC) headed by the Minister for Food and Disaster Management to implement disaster management policies and decisions of NDMC/Government.</p> <p>National Disaster Management Advisory Committee (NDMAC) headed by an experienced person nominated by the Prime Minister.</p> <p>Cyclone Preparedness Programme Implementation Board (CPPIB) headed by the Secretary, MoFDM, to review the preparedness activities at the initial stage of an impending cyclone.</p> <p>Disaster Management Training and Public Awareness Building Task Force (DMTATF) headed by the Director General of the Disaster Management Bureau (DMB) to co-ordinate disaster related training and public awareness activities of the government, NGOs and other organisations.</p> <p>Focal Point Operation Coordination Group of Disaster Management (FPOCG) headed by the Director General of the DMB to review and co-ordinate the activities of various departments and agencies working on disaster management and also to review the Contingency Plan prepared by relevant departments.</p> <p>NGO Coordination Committee on Disaster Management (NGOCC) headed by the Director General of the DMB to review and co-ordinate the activities of NGOs working on disaster management.</p> <p>Committee for Speedy Dissemination of Disaster Related Warning/Signals (CSDDWS) headed by the Director General of the DMB to examine, ensure and identify the ways and means for speedy dissemination of warnings and signals to the population at risk.</p>
Sub-National Level Bodies	<p>District Disaster Management Committee (DDMC) headed by the Deputy Commissioner (DC) to co-ordinate and review the disaster management activities at the district level.</p> <p>Upazilla Disaster Management Committee (UZDMC) headed by the Upazilla Nirbahi Officer (UNO) to co-ordinate and review the disaster management activities at the Upazilla level.</p> <p>Union Disaster Management Committee (UDMC) headed by the Chairman of the Union Parishad to co-ordinate, review and implement the disaster management activities of the concerned union.</p> <p>Pourashava Disaster Management Committee (PDMC) headed by the Chairman of Pourashava (municipality) to co-ordinate, review and implement the disaster management activities within its area of jurisdiction.</p> <p>City Corporation Disaster Management Committee (CCDMC) headed by the Mayor of City Corporations to co-ordinate, review and implement the disaster management activities within its area of jurisdiction.</p>

Source: DMB, CDMP, 2009

5.3.4 Disaster Preparedness and Prevention Plan of GoB: Preparation is the third main operational area. The intention is to prevent or minimize deaths or other losses and damage in the case of an extreme natural event. Prior to the event it is necessary to prepare the institutions involved (above all disaster preparedness and civil protection, the fire department, the health service, the food and relief department, civil administration, defense administration, police and local community leaders) and the endangered population as to

possible situations, and take precautionary steps. Measures may include:

1. Establishing a legal framework and specifying government assistance for disaster preparedness.
2. Establishing a deployment and coordination apparatus, task allocation and communications structure; drawing up emergency plans: clarifying the competences, resources available and tasks of the population; evacuation plans; securing contingency supplies (first aid, food, drinking water, and medication).
3. Building up or strengthening local and national disaster preparedness capabilities and rescue services (particularly, personnel and financial resources, logistics and communications).
4. Infrastructure measures: fitting out possible emergency accommodation, securing lines of communication and evacuation routes.
5. Training: conducting disaster protection exercises in evacuation, recovery, rescue, emergency medical measures, occupation and organization of emergency accommodation.
6. Improving abilities for rapid assessment of the requisite assistance as well as damage in the case of an emergency in order to ensure rapid and systematic delivery of needed. And

7. Building up appropriate decentralized early-warning systems to ensure that endangered population relevant local and national actors receive timely information.

5.3.5 Legal Framework and Disaster Management Plan of GoB:

Though the GoB has no laws specifically designed for disaster management but the overall objective is to strengthen the capacity of the Bangladesh disaster management system to reduce unacceptable risk and improve response and recovery management at all levels. The first legal framework of GoB regarding disaster management was Drought Code which was formulated in 1980 prior that Famine Code was formulated in 1967. After those various orders are formulated by GoB: Standing Order for Flood-1984, Standing Order for Cyclone-1985. After the massive destruction and damages caused by the super cyclone Sidr, the Ministry of Food and Disaster Management (MoFDM) of GoB formulated some policies and act regarding disaster management. At first the GoB formulated a regulatory framework and by this framework the GoB aims to establish an interdependent linkage among its responsible departments and agencies. Figure 18 shows the inter linkage between various regulative instruments and implementing framework.

Disaster Management Act: To achieve these goals of Hoygo Framework Action Plan (HFAP) the GoB formulated a legislative framework which was developed in 2008 named Disaster Management Act (DMA) 2008 took in action in 2009. The DMA defines to reduce the

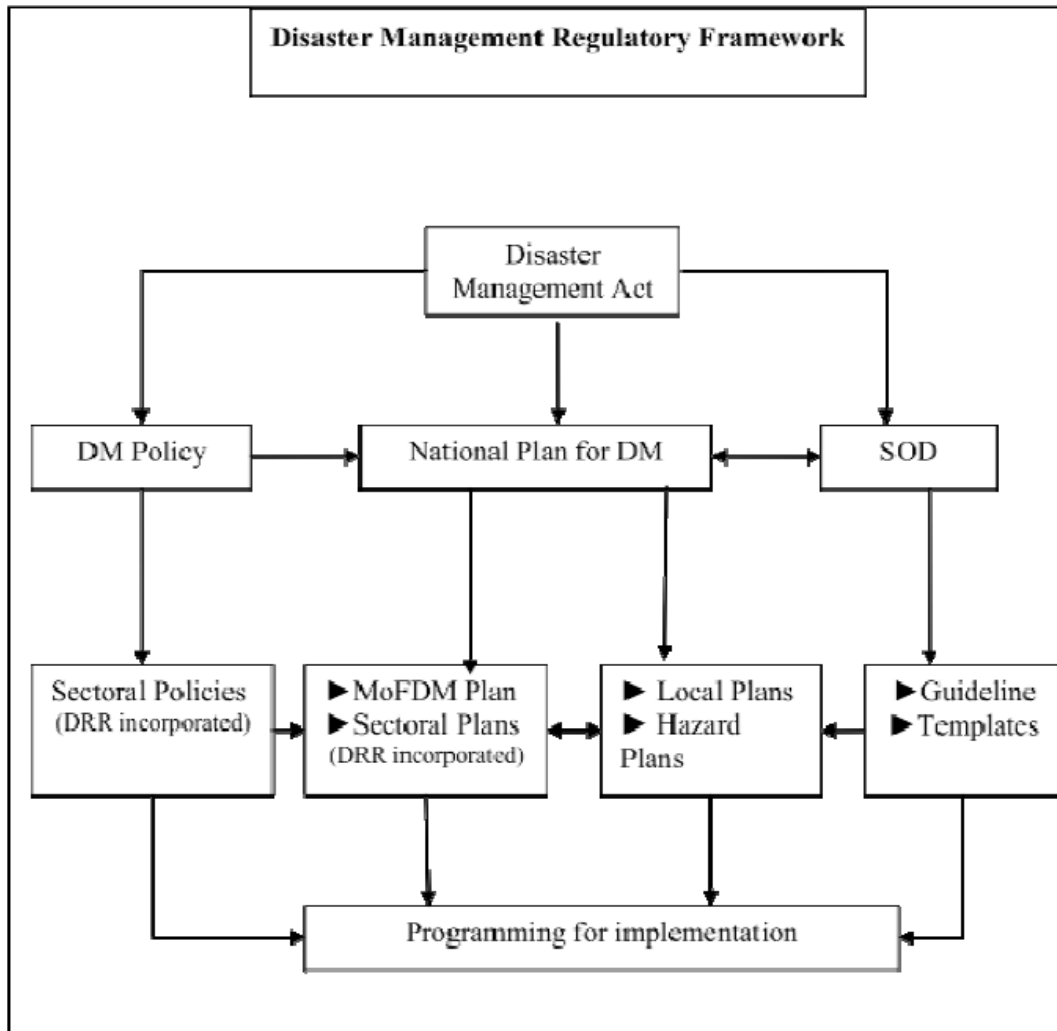
risk of people from the effects of natural, environmental and human induced hazards to a manageable and acceptable humanitarian level, and to have in place an efficient emergency response system capable of handling large scale disasters (MoFDM ,2009) (Figure 27). The National Disaster Management Act 2012⁸³ aims to

- a) Helping communities to:
 - (i) mitigate the potential adverse effects of hazard events,
 - (ii) prepare for managing the effects of a disaster event,
 - (iii) effectively respond to and recover from a disaster or an emergency situation, and
 - (iv) Adapt to adverse effects of climate change.
- b) Providing for effective disaster management for Bangladesh.
- c) Establishing an institutional framework for disaster management.
- d) Establishing risk reduction as a core element of disaster management.

⁸³ GoB, “Disaster Management Act,” *Bangladesh Gazette*, (Dhaka: Bangladesh National Parliament, 2012)

Figure 27

Disaster Management Regulative Framework of GoB



Source: MoFDM, 2010

5.3.6 National Policy on DM: The National Disaster Management Policy (NDMP) was formulated in 2008 which was taken into action in 2009. It defines the national policy on disaster risk reduction and emergency response management, and describes the strategic policy framework, and national principles of disaster management in Bangladesh.

The Strategic Goals of the GoB according to NDMP-2008 are:

GOAL 1: Professionalizing the Disaster Management System

GOAL 2: Mainstreaming Risk Reduction

GOAL3: Strengthening Institutional Mechanisms

GOAL 4: Empowering at Risk Communities

GOAL 5: Expanding Risk Reduction Programming

GOAL 6: Strengthening Emergency Response Systems

GOAL 7: Developing and Strengthening Networks

5.4 Standing Order on Cyclone and Community Based Adaptation

Standing Order on Cyclone: The Standing Orders for Cyclone (SOC) proclaimed by the Government of Bangladesh (GOB) as of November, 1985 and updated thereafter constitute the basic plan for coping with cyclone disasters. SOC laid down the guidelines for action at various stages of disaster by all government agencies to cope with situation arising out of cyclone havoc. Within the framework of SOC, concerned authorities are required to deal with unforeseen and complex situations swiftly using initiative and imagination. The local authorities are required to take necessary action to prevent or reduce

loss or damage to life and property by making maximum use of local resources instead of waiting for external assistance.⁸⁴

The guidelines for disaster preparedness and management under SOC are organized into 5 stages as follows:

- (a) Pre-Disaster Stage (Off-cyclone season)
- (b) Alert Stage (Signal No. I, II and III)
- (c) Warning Stage (Signal No. IV)
- (d) Disaster Stage (Signal No. V, VI, VII and VIII, IX, X)
- (e) Post-Disaster stage (Immediately after the cyclone till normaly is attained

According to standing order on cyclone the responsibilities of Bangladesh Meteorological Department as pointed out in National Plan for Disaster Management 2010 -2015 are given bellow:

Normal Times

- a) Develop sectoral emergency response system.
- b) Develop a contingency plan.
- c) Keep ever careful watch over weather conditions, and ensure improvement of cyclone forecast procedures and supply of information on regular basis.

⁸⁴ Disaster Management Bureau, *National Plan for Disaster Management 2010-2015*, (Dhaka: DMB, DMRD, 2010)

d) Ensure full time effectiveness of the quickest channel of communication for disseminating weather warnings to all concerned. Fax, email and other message transmission arrangement must be established between SWC of BMD and Radio, Television and the MoFDM.

Alert Stage

a) Issue as soon as possible the alert warning signals of cyclone, at least 36 hours ahead of formation of depression in the Bay of Bengal.

b) Supply information through Fax/telephone/tele-printer to CPP about the formation of depression in Bay of Bengal so as to allow CPP to take appropriate actions including dissemination of information to all concerned.

c) Issue warning signals code 'Whirlwind' as per Annexure-A to all concerned officials through telephone, tele-printer, telegram, fax, email etc.

d) Prepare and submit Special Weather Bulletin and broadcast/publicize the same through national news media such as the all stations of Radio and Television and in national newspapers for the benefit of the general people. In case of Local Cautionary Signal no. 3, arrange for adequate and full time coordination

between SWC of the BMD, Bangladesh Betar, and Bangladesh Television for publicity beyond normal broadcasting hours.

e) Send Special Weather Bulletins to EOC at the MoFDM, the DRR, the CPP and BRCS for undertaking adequate arrangements.

Warning Stage

Publicize warning signals at each of the following specified stages.

(a) Warning 24 hours before

(b) Danger At least 18 hours before

(c) Great Danger At least 10 hours before

The same warning signals are to be repeated to the EOC at the MoFDM, Control Room of the DMB, the DRR, the CPP and the BDRCS.

The following information should be mentioned in the signals to be disseminated.

a) Position of the storm centre.

b) Velocity and direction of the storm.

c) Mention of the Upazilas of the Districts likely to be affected, if possible.

d) Appropriate time of commencement of gale wind at different places (velocity above 32 miles/hour or 51.84 km/hour).

In case of danger signals messages are to be sent to the addresses under code name "Cyclone" through Fax/telephone/tele-printer or teleFigure. For the purpose of Inland Water Transportation, appropriate separate messages should be sent to addresses mentioned therein through Fax/telephone/tele-printer or teleFigure under code name "Water ways and Authority". Alert/Warning signals should be sent to the concerned authorities for publicity through all centres of Bangladesh Betar and Bangladesh Television.

Rehabilitation Stage

Work in collaboration with the DMB to perform the following tasks.

- i. Compare the severity of cyclone with that of warning signal
- ii. Collect data from affected areas for research purpose
- iii. Obtain opinion of the people about the signals issued

Community Based Adaptation According SOC: To implement Standing Order on Cyclone the Cyclone Preparedness Program (CPP), plays a crucial role in the dissemination of cyclone warnings, evacuation, rescue, first aid and emergency relief works through its 32,796 volunteers in the coastal districts, is made to develop self motivated adaptive communities in coastal areas of Bangladesh.

Detailed duties of CPP are specified below as mentioned in National Plan for Disaster Management 2010–2015:

CPP (Directorate)

Normal Time

- a) Organize Preparedness Program in cyclone prone areas on continuing basis and hold Mobilization drill on disaster in April and September every year to check status of preparedness.
- b) Ensure that recruitment and training of volunteers are complete before April every year.
- c) Ensure that unit, union and thana committees are organized and ready accordingly.
- d) Availability of authorized equipment with the volunteers and trouble free functioning thereof.
- e) Ensure proper functioning of wireless communication between CPP HQ and CPP officers at Thana level and between CPP thana office and CPP Union offices.
- f) Assist local level disaster management committees to chalk out thana and union contingency plans including earmarked shelters, killas, high rise safe places and ensure that evacuation plans are known to the people in general.

g) Ensure that members of thana and Union Disaster Management Committee, Ansars, V.D.Rs. and Social workers are trained/oriented on cyclone warning system.

h) Create awareness amongst the people about cyclone warning signals and popularize preparedness measures through meeting, discussions, posters, leaflets and film shows, drills, and demonstration dramas etc. in co-ordination with Disaster Management Bureau (DMB).

i) Maintain FAX for ensuring communication to Storm Warning Centre at all times.

Alert Phase

a) Establish Control Room at CPP HQ and CPP Zonal offices and co-operate with District, Thana and Union authorities in establishing control rooms at those levels.

b) Maintain close contact with Department of Meteorology.

c) Receive Special Weather Bulletins from Met. Office and pass the same to Thana, Zonal offices and advise Thana offices to pass the same to Union offices on post-haste basis.

d) Advise Thana Asstt. Directors, CPP, to contact Union Tam Leaders through wireless or send liaison Volunteers to the Union Team leaders with instruction for the CPP Volunteers to listen to Radio broadcasts. Union Team Leaders and their Co-workers to commence activity as per

instructions laid down in the volunteer's Guide Book (Ghurnijhor Nirdeshika) published by CPP.

e) Alert Chairmen and Members of the Implementation Board of CPP.

f) Alert DCs, TNOs and Union Parishad Chirman, Ward Members and local NGOs.

Warning Phase

a) Propose emergency meeting of the Implementation Board.

b) Check deployment and functioning of CPP volunteers in the field.

c) Advise people to shift livestock, poultry and other domestic animals to high rise places and killas under adequate safety measures.

d) Instruct Development Officer(s) of the CPP to advise Thana Nirbahi Officer, Chairman Thana Disaster Management Committee to immediately convene Committee meeting.

e) Instruct Development officers to advise Union Management Committee to convene meeting.

f) Implement decisions of the emergency meeting of the Implementation Board.

g) Instruct Development officer to ensure that decisions of Thana Disaster Management Committees and Union Disaster Management Co-ordination Committees are implemented.

h) Transmit Special Weather Bulletins to all Zonal, Thana and union field offices.

i) Ensure that people have been warned by the development officers and the volunteers.

j) Keep the Chairman, Implementation Board, Director General Disaster Management Bureau and Directorate of Relief and BDRCS informed of the situation in the field from time to time.

Disaster Phase

a) Co-ordinate activities with all other agencies and N.G.Os.

b) Instruct Development Officers to collect preliminary damage reports from the respective union team leaders.

c) Prepare preliminary damage report by collecting information from the Development Officers for the Chairman of the Implementation Board.

d) Ensure that Development Officers and volunteers carry-out rescue operations and provide First Aid as needed.

e) Advise Development Officers to instruct union team leaders to keep wireless communication open and make frequent contact with development officer and transmit damage report as collected.

Recovery Phase

a) Direct field offices to:

1. Extend assistance to inoculation and vaccination drive and other health measure.
2. Participate in rehabilitation efforts.
3. Co-ordinate activities with local NGOs.

CPP at Study Locale

It was manifest from the in-depth interview with the officials of Saronkhola Upazila CPP headquarter that the field officers of the CPP at the level of district zonal officer and the development officer and union leaders and volunteers has been discharged the following functions, besides other functions within their respective jurisdiction.

Normal Time

- a) Organize simulated preparedness program in cyclone prone areas on continuing basis and hold mobilization drill on disaster in April and September every year to check status of preparedness.
- b) Complete before April recruitment and training of volunteers as per CPP procedure and organize grouping of families through them for facilitating evacuation in time of need.
- c) Check up stock of authorized equipment with volunteers and undertake repair and acquire if necessary needed equipments.

d) Check and keep in proper functioning of wireless communication and continue wireless communication with CPP Headquarters and CPP officers at thana and union level.

e) Educate and create awareness amongst the local people about cyclone preparedness program and understanding of warning signals of various types. Motivate and popularize preparedness measures through meetings, discussions, posters, leaflets and film shows.

f) Earmark and keep shelter, killas, high rise safe places fit and ready and publicize and make known to the people evacuation plans towards these.

g) Co-ordinate with the thana and the union parishad to motivate the public and the volunteers about the cyclone danger responses.

Alert Phase

a) Set up Control room and maintain contact with the Thana, the Unions and the CPP.

b) Keep close contact with the local office of the department of Meteorology and other offices and use means of communication for input of cyclone alertness.

c) Receive Special Weather Bulletins from the CPP and pass the same to the local officers.

d) Alert local Chairman and Members of District/ Thana/ Union Disaster Management Committees and local NGOs, religious leaders and teachers.

e) Instruct sub-ordinate offices and officers to send liaison volunteers to the union Team Leaders with instruction for CPP volunteers to listen to Radio Broadcast. Do ensure that union Team leaders and their co-workers commence activity as per instructions laid down in the volunteer guide book (Ghurnijhar Nirdeshika) published by CPP.

Warning Phase

a) Inform DC/TNO/Union Parishad Chairman to hold emergency meeting of the Disaster Management Committees.

b) Implement decisions of emergency meetings of the committees.

c) Detail and check development and functioning of CPP Volunteers to ensure that livestock, poultry and other domestic animals are shifted to raised land, killas etc. under adequate safety measures.

d) Transmit Special weather Bulletins to all field offices including District, Thana, Union and Zones.

e) Warn the people about the threat.

f) Advise and help people in taking shelters when evacuation order is given.

g) Use Megaphone, Signal Light and signal flag to give final warning to the people.

- h) Keep all including Thana, District, D.G. Relief and Rehabilitation informed of the situation in the field from time to time
- i) Co-ordinate activities with all other agencies, NGO's.

Disaster Phase

- a) Prepare a report on the impact of the cyclone by collecting information and submit it to

CPP Headquarter, union disaster management committee, and the thana and district control rooms.
- b) Carry out rescue operation and provide First-Aid as needed in co-ordination with the union and thana authorities.
- c) Assist local administration in distribution of relief goods.

Recovery Phase

- a) Keep wireless communication open and make frequent contact with CPP and transmit damage reports as soon as received.
- b) Help local bodies/local administration in disposal of dead bodies and carcasses.
- c) Assist in inoculation vaccination drive and other Health measures.
- d) Participate in rehabilitation efforts along with other Agencies including NGOs.

The Warning Orders identify at each stage the relation between the Bangladesh Red Crescent society, Cyclone Preparedness Program and the various concerned Government Ministries, Department and Agencies.

According to SOC the duties and responsibilities of Cyclone Preparedness Centre are:

- a) Organize preparedness programs in cyclone prone areas in continuing basis.
- b) Create awareness among the people about the CPP and various types of warning signals and popularize preparedness measures through meetings, discussion, leaflets and film shows.
- c) Transmit special weather bulletin to all thana field offices.
- d) Use siren, megaphone, signal lights and signal flags to give final warning to the people.
- e) Advice volunteers to help people in taking shelters when an evacuation order is given.

Disaster Management Plan of GoB: The Ministry of Food and Disaster Management (MoFDM) developed Disaster Management Plan which is published in 2010 named National Disaster Management Plan 2010–2015. The National Disaster Management Plan 2010–2015 aims to

- a. Articulate the long-term strategic focus of disaster management in Bangladesh.
- b. Demonstrate a commitment to address key issues: risk reduction, capacity building, information management, climate change adaptation, livelihood security, issues of gender and the socially disadvantaged, etc.
- c. Show the relationship between the government vision, key result areas, goals and strategies, and to align priorities and strategies with international and national drivers for change.
- d. Detail a road map for the development of disaster management plans by various entities.
- e. Guide the DM&RD in the development and delivery of guidelines and programs.
- f. Illustrate to other ministries, NGOs, civil society and the private sector how their work can contribute to the achievements of the strategic goals and government vision on disaster management.
- g. Provide a framework within which to report performance and success in achieving goals and strategies.

The National Plan for Disaster Management is divided into following categories and only community level Disaster Management Plan (Union Disaster Management Plan) is mentioning below:

Union Disaster Management Plan (UDMP):

There will be a plan for each Union titled "Union Disaster Management Plan" comprising both disaster risk reduction and emergency response to be prepared by the Union Disaster Management Committee following a proper community risk assessment procedure to be provided by DM&RD with the participation of vulnerable groups and the communities (Figure 28). The UDMP should highlight and articulate, among others, the following:

- a. Defining and redefining community risks to hazards utilizing both traditional and scientific knowledge.
- b. Total resource requirements and the planned action for the District.
 - i. To take measures for prevention and mitigation of disasters by government agencies, NGOs, CBOs and the private sector within the District.
 - ii. Capacity building and preparedness measures to be taken by government agencies, NGOs, CBOs and the private sector.
 - iii. Strengthening emergency response management system plans and procedures in the event of a disaster.
- c. The response plans and procedures in the event of a disaster, providing for:
 - i. Allocation of responsibilities to the departments of the government at District level and other DMC members

- ii. Procedure for mobilization of resources
 - iii. Prompt response to disaster and relief thereof
 - iv. Procurement of emergency supplies
 - v. Operation of disaster shelters
 - vi. Restoration of emergency services, such as water supply, gas supply, power, telecommunication, and road links
 - vii. Provision of emergency medical services
 - viii. Burial of dead bodies
 - ix. Trauma counseling
 - x. The dissemination of information
- d. Recovery plans and procedures delineating damage assessment procedure, restoration of damaged public infrastructure, resumption of educational institutions, restoration of livelihood, rehabilitation of affected people, especially the disabled, and elderly women and children.
- e. The UDMP shall be reviewed and updated annually.
- f. The copies of the UDMP shall be made available to all Union level stakeholders, UNOs and DCs.
- g. A copy of the UDMP will be sent to the Upazila Disaster Management Committee.

h. The DMB/BIDMTR will provide technical advice and capacity building services to all DMCs.

5.5 Implementation of Plans in Study Locale

It was empirically found that in normal time the activities of CPP according to Standikng Order on Cyclone (SOC) was not remarkable. It was evident from the findings that respectively 19.17 percent and 12.59 percent cyclone victims of Rayenda and Uttar Sauthkhali opined about CPP's activities of awareness of warning signals. In alaert phase, it was observed that nearly half of the total (44.17%, n=120) and nearly one-third (29.63%, n=135) cyclone victims opined about CPP's warning dissemination while 32.50 percent and 22.22 percent opined about CPP's evacuation activities in time of disaster (Table 51).

But it was very much remarkable that in disaster phase the CPP performed only 7.45 percent rescue operation and it was evident from the respondets that respectively above three-fourth (85.83%, n=120) and above three-fourth (91.11%, n=135) cyclone victims of Rayenda and Uttar Sauthkhali did not observe any kind of rescue operation of CPP in Disaster. Nevertheless, above thre-fourth (83.92%, n=255) cyclone victims opined that they did not find any cpp volunteers in rehabilitation stage to help them to survive (Table 51).

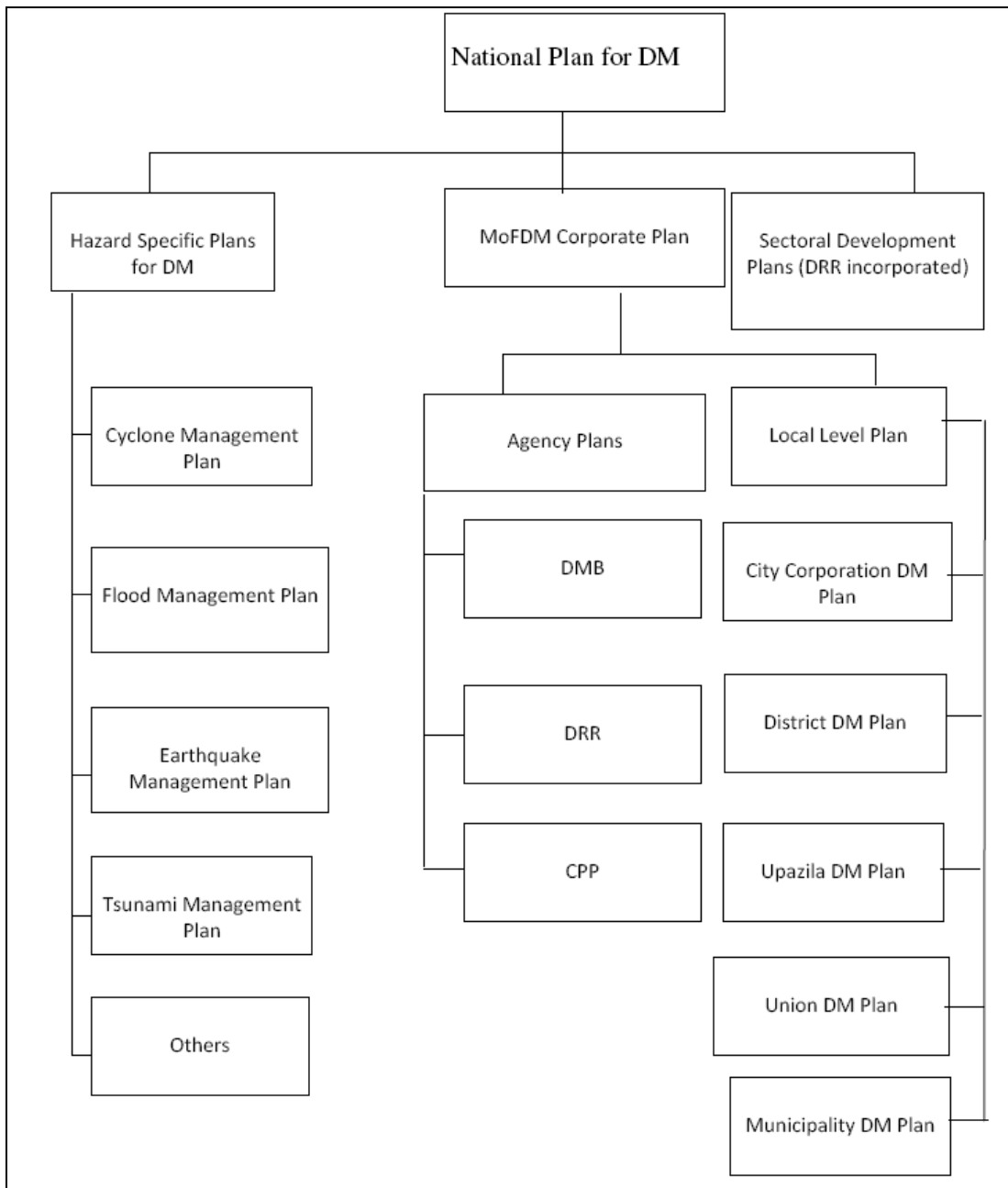
Table 51

CBDM Activites in Study Locale According to SOC and CPP

Stages	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%

Normal Time	Organize Stimulated Preparedness Program	Yes	3	2.50	1	0.74	4	1.57
		NO	117	97.50	134	99.26	251	98.43
	Awareness of warning signals	Yes	23	19.17	17	12.59	40	15.69
		NO	97	80.83	118	87.41	215	84.31
Alert Phase	Alert Local UP Cahirman Community Leaders	Yes	14	11.67	22	16.30	36	14.12
		NO	106	88.33	113	83.70	219	85.88
	Warning Dissemination	Yes	53	44.17	40	29.63	93	36.47
		NO	67	55.83	95	70.37	162	63.53
Warning Phase	Warn People about Threat	Yes	28	23.33	30	22.22	58	22.75
		No	92	76.67	105	77.78	197	77.25
	Evacuation	Yes	39	32.50	30	22.22	69	27.06
		No	81	67.50	105	77.78	186	72.94
Disaster Phase	Rescue Operation	Yes	7	5.83	12	8.89	19	7.45
		No	103	85.83	123	91.11	226	88.63
	Distribution Relief	Yes	20	16.67	16	11.85	36	14.12
		No	100	83.33	119	88.15	219	85.88
Recovery Phase	Help to Disposal Dead Bodies	Yes	6	5.00	9	6.67	15	5.88
		No	114	95.00	126	93.33	240	94.12
	Participation in Rehabilitaion & First Aid	Yes	14	11.67	27	20.00	41	16.08
		No	106	88.33	108	80.00	214	83.92

Figure 28
Framework of National Disaster Management Plan



Source: MoFDM, 2010

5.6 Indigenous Adaptation to Cyclonic Disaster

Scientists are clear that climate change is happening, and that it is due to emissions of greenhouse gases produced largely by industrialized countries. Climate change is detected as a threat for the world. Every year, a large number of potentially damaging natural events take place in the world—windstorms, floods, droughts, cold spells and heat

waves, landslides, and earthquakes, among others.¹ However, in recent years, the frequency and intensity of climatological events have increased, which may be related to global climate change. In the near future there may be more devastating effects of these weather events. At the same time, population growth and unsustainable economic growth put ever larger numbers of people and their assets at risk, while reducing environmental buffering capacities, such as those associated with appropriate vegetation over on steep slopes, intact wetlands in coastal zones, or coral reefs.

Commonly occurring natural events become natural disasters when they affect the population through death and injury, and/or through the destruction of natural and physical capital on which people rely for their livelihood and quality of life. Climate change plays a role in that it tends to increase the frequency and intensity of weather related natural disasters. Additionally, climate change may put people at risk by influencing access to water, coastal flooding, disease and hunger, and leaving them with a more degraded environment, leading, in turn, to increase vulnerability. Climate change may increase the probability of natural hazards by enhancing the frequency and intensity of extreme weather events. Climate change may also increase biophysical vulnerabilities that result from temperature and precipitation modifications, as well as environmental, location, and geophysical

conditions. Natural hazards occur, but they become disasters when there is some sort of vulnerability.⁸⁵

The industrialized countries have accepted they have a responsibility to help poor and vulnerable countries to adapt (UNFCCC). However, until recently, most adaptation efforts have been top-down, and little attention has been paid to communities' experiences of climate change and their efforts to cope with their changing environments. A survey conducted by National Defense University (NDU) of USA in 2009 argued that, "if climate change processes are happening in present frequency, it would have create a great disaster in Africa, Asian region specially in South-east Asian countries that would lead the scarcity of food, safe water and shelter. Nevertheless, to manage those disasters may create the failure of the Government of critically climate change affected countries."

According to UN Intergovernmental Panel on Climate Change (IPCC) (2007)Climate change refers to, " short-, medium-, and long-term changes in weather patterns and temperature that are predicted to happen, or are already happening as a result of anthropogenic emissions of greenhouse gases such as carbon dioxide. These changes include a higher frequency of extreme weather events such as drought and floods, as well as greater

⁸⁵ Ibarraran, et al, "Climate change and natural disaster: macroeconomic performance and distributional impacts", *Environ Dev Sustain*, (New York: Springer, 2007), p 16

unpredictability and variability in the seasons and in rainfall. Overlying this increased variability are expected longer-term changes, such as temperature and sea-level rises, and lower (or in some cases higher) rainfall.”⁸⁶ (IPCC 4th Assessment Report 2007)

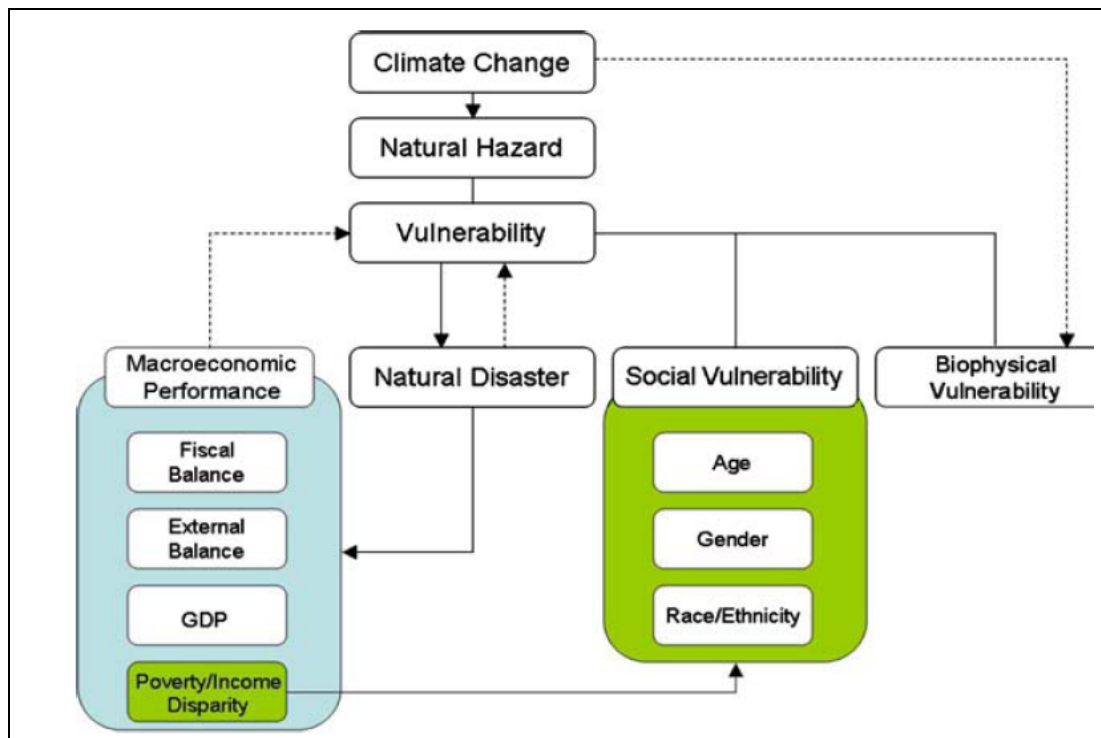
So, this climate change directly affects on economy and environment and lead community more vulnerable. Ibarrran M. E et al (2007) distinguishes two aspects of vulnerability which occurred by climate change: Biophysical and Social. Ibarrraran et al (2007) also argued that Vulnerability to climate change is not just a function of geoFigurey, or dependence on natural resources; it also has social, economic, and political dimensions which influence how climate change affects different groups. Ultimately, vulnerability may be reflected through the macroeconomic performance, and this in turn may affect social and biophysical vulnerability as well (e.g., subsistence agriculture on marginal lands will further degrade the land, increasing both aspects of vulnerability). Macroeconomic performance is altered basically because people and/or economic activity are affected to some relatively large extent.⁸⁷ The economy and particular groups within society are more affected when they are least prepared to face the

⁸⁶Inter Governmental Panel on Climate Change, *Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (Geneva: IPCC, 2007)

⁸⁷ Ibarrraran, et al, “Climate change and natural disaster: macroeconomic performance and distributional impacts”, *Environ Dev Sustain*, (New York: Springer, 2007), p 18-19

effects of natural disasters. Figure 29 shows the group specific vulnerabilities that are led by the climate change.

Figure 29
Climate Change and Group Specific Vulnerabilities



Source: Adopted by Ibarraran M. E et al 2007:3

5.6.1 Indigenous Adaptation to Cyclone Affected Coastal Habitat

The cyclone victims of Rayenda and Uttar Sauthkhali is used to habitate to fight for their survival with cyclones and tidal surge that learned them much knowledge which helped them to fight/ cope with hostile climate. The cyclone victims have multiple perceptions that lead them to deploy multiple responses for their adaptation to disaster management. The cyclone victims used some indigenous

indicators to forecast cyclone and tidal surge, after this they used to deploy their indigenous techniques to adapt such types of disasters.

It was evident from the findings that the cyclone victims of Rayenda and Uttar Sauthkhali developed some strategies to cope with disaster and used some techniques to adapt their disaster prone environment. By the consensus of the findings given by the both villagers, this study divided their indigenous adaptation to cyclonic disaster management into five segments that are given below:

- i. Hazard Assessments;**
- ii. Pre-cyclone Adaptaion and Preparedness;**
- iii. During-cyclone Adaptation and Mitigation;**
- iv. Post-cyclone Adaptaion and Reconstruction; and**
- v. Long-term Adaptation.**

1. Hazard Assessments

The cyclone victims of Rayenda and Uttar Sauthkhali have been using a combination of various biological, environmental, and astronomical indicators to identify cyclone and tidal surge. It was evident from the figure 18 that the cyclone victims forecast a cyclone was coming through intensity of wind flow: wind blowing from the north-eastern corner in the middle March to middle August, animal's behavior: sea fishes did not leave sea

water, cattle became restless and stop eating grass, dark cloud in north-eastern corner, high temperature etc.

It was observed that maximum indigenous indicators to hazard assessments were based on animal behavior and climatology. The hazard assessment mechanisms of the both villages depending on environment and animals' behavior forecasted the cyclone victims and they were conscious about upcoming cyclones, which led them to use some indigenous techniques to save their lives and properties.

2. Pre-cyclone Adaptaion and Preparedness

The cyclone victims of Rayenda and Uttar Sauthkhali when understood a cyclone was coming (in time of Sidr and Aila), they took some preparedness by their indigenous fashion. They concealed their foods: rice, wheat, dry foods etc under earth and kept their valuable things: deeds, ornaments, money etc. in a safe place or along with them to rush to cyclone centers. Nevertheless, the cyclone victims of Uttar Sauthkhali reported that they tied their house roof with bamboo thumb or big trees. They used to letting their cattle free from cattle house. Lastly, they sent their women, children and aged to safe shelter.

3. During-cyclone Adaptation and Mitigation

It was reported from the findings that cyclone victims of Uttar Sauthkhali had strong group cohesiveness rather than the cyclone victims of Rayenda. For that reason, when Sidr stroke them they did not think about their own safety rather they tried to save their family members, saved their neighbors children, women and aged, gave shelter into strong traditional house and gave them foods during disaster. The cyclone victims of both villages stated that at the first time of during disaster they tried to mitigate their losses by teting their traditional housing roof, giving shelter their neighbors' etc. but when the intensity of cyclone was being stronger they tend to try to save their children and themselves by tieding into a big trees. During disaster, who were engaged to protect their valuable belongings took shelter on the roof of the houses or a big trees.

4. Post-cyclone Adaptaion and Recontraction

After Sidr the two study villages were totally destroyed. So, at this stage the cyclone victims employed their all efforts for their surviving and adaptation to post cyclonic period. At first they tried to reconstruct their traditional dwelling houses by the helped of their neighbors with blown up big tree logs and bamboos. They gave their intention to find out their lost family members. They buried their family members with the help of their relatives and neighbors. Those who were homeless they

took shelter into those who were not homeless. In time of shelter taking, the cyclone victims showed more attention by extra caring their neighbors' women and children. The fishermen searched for their nets and boats and the farmers for their cattle. Young girls and children collected floating food and pick up fruit from in and around their houses. In addition, during this post-cyclone period, people took whatever food was available to them, such as wetted rice, bread, sweet potato, pumpkin, green banana, coconut and mango. Some of these fruits were transported from crop fields by surge water.

In time of Aila, when water became saline and could not drink, the cyclone victims of Rayenda and Uttar Sauthkhali used to collect their drinking water by digging the sandy shore of the Bawleshar, and from the coconut and banana trees. Nevertheless, who did not get any aids giving by the organizations in both Sidr and Aila, sold their valuable items and mortgaged their golds to survive or adapt the changing environments.

After both devastating cyclones, the cyclone victims of Rayenda and Uttar Sauthkhali gave top priority to rebuild their homes and to search for house materials to replace those removed by violent winds and surge water. On an emergency basis, the victim constructed a special manchan (tent, a type of temporary house) using whatever materials were available. Cuts, diarrhoea,

dizziness, dysentery, fever, nausea and shivers were widespread in the post-cyclone period. People primarily used leaves, local herbal remedies and other treatments to address these health problems.

5. Long Term Adaptation

This type of adaptation, the cyclone victims of Rayenda and Uttar Sauthkhali employed their several strategies to survive themselves from the killer cyclones. The cyclone victims of Uttar Sauthkhali used to build cyclone friendly dwelling houses that was encircled by a rigid wall made by bamboo or tree logs and one or two rooms was built inside the house by storing ingredients so that during cyclones and tidal surge it could act as the core house. However, the cyclone victims planted different trees around the house so that it could act as obstruction to the intensity of wind. They used *goulpata or khar* (roof of hems) for their roof relatively low and with small slope so that the magnitude of wind during cyclone was low and the roof of hems became heavy with rainy water so that it could be blown away by the stormy wind.

Nevertheless, the fishermen of Uttar Sauthkhali used especial designed fishing boat with relatively light wood so that the boat could not be inebriated into high tides. In time high tides, the

fisherman of the both villages used a especial designed boat called *dingi* which two sides were tied with the two logs of banana tree.

The occurrence of cyclones and tidal surges is a very natural event which is increasing every year due to climate change and which cannot be avoided by any measures. For this reason, the coastal community or cyclone victims develop some indigenous fashion, ascribed by inheritance, to cope with cyclone and adapt to changing environment.

5.6.2 Challenges of Adaptation to Changing Climate

Poor countries and communities are more vulnerable to climate change because they tend to be located in geographically vulnerable areas, such as flood-prone Mozambique, drought-prone Sudan, or cyclone-prone Bangladesh, and in more vulnerable locations. For example, the slums and informal settlements surrounding many developing country cities are usually sited on land prone to landslips or to flooding and river bank erosion. Wealthy people, commerce, and industry can afford to situate themselves on safer land.⁸⁸ Many poor communities in under developed countries are heavily dependent on natural resources for their lives and livelihoods.

Poor people rarely have insurance to cover loss of property due to storms or cyclones. They cannot pay for the healthcare required when

⁸⁸ Hannah Reid and James Mayers, "Climate Change and Development Consultation on Key Researchable Issues," *Journal of International Institute of Environment and Development*, (London: IIED, 2005)p 4

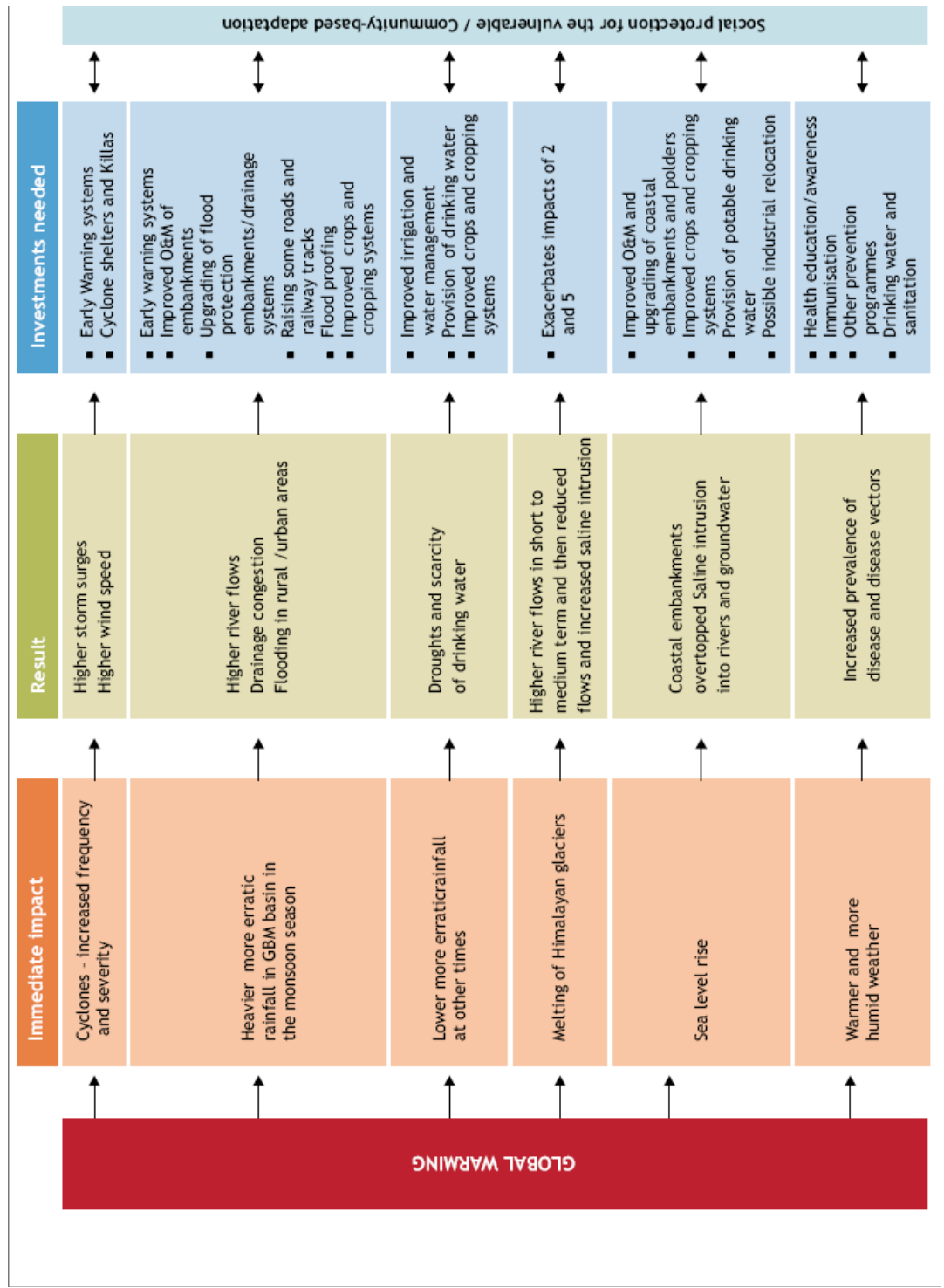
climate change induced outbreaks of malaria and other diseases occur. Poor communities already struggle to cope with the existing challenges of poverty and climate shocks, but climate change could push many beyond their ability to cope or even survive. They have few alternative livelihood options when their only cow drowns in a flood or drought kills their maize crop for the year—and they do not have the political clout to ask why their country's early warning system did not warn them of likely flooding. Climate change will also have psychological and cultural effects, for example beliefs and traditions associated with the seasons being undermined by climate change.⁸⁹

Bangladesh is one of the most victimized countries of the world due to the Climate Change and Global Warming. Figure 30 shows impacts of global warming in Bangladesh. Whilst Bangladeshi communities are struggling to cope with current climatic conditions and the impacts of extreme climatic events on livelihoods and food security, the country is considered to be one of the most vulnerable countries to climate change. It is geographically exposed to a multitude of adverse impacts of climate change because of its location in the delta of three of the world's biggest rivers and its flat low lying deltaic topography. At the same time, the country has low adaptive capacity because it is extremely poor. Northern part of Bangladesh is gradually going to be desert with continued drought. At the same time southern part of Bangladesh destroyed by cyclone and high tidal wave sinks in

⁸⁹ Hannah Reid and James Mayers, "Climate Change and Development Consultation on Key Researchable Issues," *Journal of International Institute of Environment and Development*, (London: IIED, 2005) p 6

the saline water of the sea permanently. Six seasons of Bangladesh now turns three seasons: Summer, Rainy and Winter. But those three does not continue to function with as usual rules—during summer it is so hot, during winter it is unbearable cold. Cold is regularly breaking old record and making new records. There is possibility that people of Bangladesh will see snowing soon. There trend of long duration of the cold in winter and too warm in summer season. But rain is coming in undue time and most of the time it lasts for short time.

Figure 30: Impacts of Global Warming in Bangladesh



Source: BCCACP, 2009

The IPCC in its fourth assessment report which was published in 2007 ranked Bangladesh as the most climate vulnerable country in the

world. The IPCC observed various changes in climate trends, variability and events related to climate of Bangladesh in its fourth assessment report. The following changes are occurred in climatology in Bangladesh as mentioned by the IPCC (2007)⁹⁰:

1. In Bangladesh, the average temperature has registered an increasing trend of about 1°C in May and 0.5°C in November during the 14 year period from 1985 to 1998.
2. The annual mean rainfall exhibits increasing trends in Bangladesh. Decadal rain anomalies are above long-term averages since 1960s.
3. Serious and recurring floods have taken place during 2002, 2003, and 2004. Cyclones originating from the Bay of Bengal have been noted to decrease since 1970 but the intensity has increased.
4. Frequency of monsoon depressions and cyclones formation in Bay of Bengal has increased.
5. Water shortages have been attributed to rapid urbanization and industrialization, population growth and inefficient water use, which are aggravated by changing climate and its adverse impacts on demand, supply and water quality.
6. Saltwater from the Bay of Bengal is reported to have penetrated 100km or more inland along tributary channels during the dry season.

⁹⁰Inter Governmental Panel on Climate Change, *Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, (Geneva: IPCC, 2007)

7. The precipitation decline and droughts has resulted in the drying up of wetlands and severe degradation of ecosystems.

The IPCC also mentioned that the production of rice and wheat might drop in Bangladesh by 8 percent and 32 percent respectively by the year 2050. Bangladesh is especially susceptible to increasing salinity of their groundwater as well as surface water resources, especially along the coast, due to increases in sea level as a direct impact of global warming. With a 1m rise in sea level, the Sunderban mangrove forest is likely to be lost; Bangladesh would be worst affected by the sea level rise in terms of loss of land. Approximately 1,000 square kilometers of cultivated land and sea product culturing area is likely to become salt marsh. Projected sea-level rise could flood the residence of millions of people living in the low-lying areas such as in Bangladesh. Even under the most conservative scenario, the sea level will be about 40 cm higher than today by the end of 21st century and this is projected to increase the annual number of people flooded in coastal populations from 13 million to 94 million worldwide. Almost 60 percent of this increase will occur along the coast in South Asia. The coastal lowlands below the elevation of 1,000-year storm surge are widely distributed in Bangladesh where millions of people live. Global burden (mortality and morbidity) of diarrhea and malnutrition attributable to climate-change are already the largest in Bangladesh. The relative risks for these conditions for 2030 are also expected to be the largest. Bangladesh's

population is expected to increase by 130 million more people over the next 50 years. Climatic changes in Bangladesh would likely exacerbate present environmental conditions that give rise to land degradation, shortfalls in food production, rural poverty and urban unrest. About 15,000 Himalayan glaciers form a unique reservoir that supports perennial rivers such as the Indus, Ganges and Brahmaputra, which, in turn, are the lifeline of millions of people in Bangladesh.

In a recent study Frank Thomalla et al (2005)⁹¹ argued that large-scale subsidence of coastal areas combined with climate change induced sea level rise results in a relative rise in sea level which is more than twice the predicted global rate. So, the gradual rising of sea level would take effect on the climatology and the biodiversity of Bangladesh. Without the protection of low-lying coastal areas elevated sea levels could lead to large-scale intrusion of salt water into surface and groundwater systems. This could have serious implications for drinking water supplies and food production. Sea level rise may also result in drainage congestion and water logging in the delta during high flow periods in the three major rivers. Finally, changes in the flow dynamics as a result of sea level rise could result in the erosion of river and estuary banks. The worst case scenario is the permanent displacement of people from the coast. Some studies have suggested the possibility

⁹¹ Thomalla F. *et al*, "A Comparative Analysis of Vulnerabilities, Responses and Adaptation Strategies to Tropical Cyclones in Asia: Defining the Philippines Country Study", Paper Presented in the Coastal Zone Asia Pacific Conference in Brisbane, (Australi: CZAP, 2004), p648

of an increase in the intensity and frequency as well as changes in the paths of tropical cyclones in the Bay of Bengal as a result of increasing sea surface temperatures, but this is disputed by others. Even though these processes are not well understood, cyclone-induced storm surges are likely to be more destructive in the future due to the elevated sea level.

Various studies, conducted in 2002 to 2010, related to climate change, sea level rise and carbon emission report that impacts of climate change is significantly visible in Bangladesh.

Temperature: Bangladesh experienced the lowest temperature (5°C in the three northern districts) recorded in 38 years during January 2007. Over 100,000 people were affected, and the death toll due to cold-related diseases reached over 130. Crop production was also affected. Extreme high temperature in 14 years (42.08°C in Jessore) was been recorded on 27 April 2009. A record number of patients, since the installation of the facility 45 years ago, were admitted to ICDDR,B.

Rainfall: Intense rainfall in a short spell of time, described as a climate change impact in the IPCC report, is happening in Bangladesh. There was 333mm of rainfall in Dhaka on 28 July 2009 (290mm in six hours, a record six-hour rainfall for the capital in 60 years) resulted in serious drainage congestion. A total of 408mm rainfall in Chittagong

(measured on 11 June until 9 pm, the heaviest in 25 years) resulted in a landslide killing at least 124 people. The community perception has been confirmed by analyzing upper catchments rainfall. Increased rainfall (from an average of 150mm to 250mm) in Meghalaya in March in the last 30 years has increased. The Haor basin, a single crop area (winter rice), hosts over 20 million of people.

Drought: On the other hand there was 21 percent less rain during the monsoon period (June-August) in 2009 and the northern districts suffers from drought. Droughts were reported even in the coastal zone.

Natural Calamities: An increased number of severe floods hit Bangladesh in the last decade. Recurring floods occurred in 2002, 2003, 2004, and twice in 2007 (July-August and September). Flash flood occurring in the hilly terrain of eastern and north eastern part of Bangladesh has been increasing and also occurring a few days earlier in recent years than 40-50 years ago (community perception). Similarly, the number of cyclone reaching landfall and storm surges also increased substantially. For example, Super Cyclone Sidr hit on 15 November 2007 (estimated damage BDT 113 billion (USD 1.6 billion), Cyclone Nargis on 2 May 2008 hit Myanmar, Cyclone Rashmi occurred on 27 October 2008, and Cyclone Aila hit Bangladesh on 26 May 2009.

Impacts on livelihood: In the dry season, 5ppt isohaline intruded more than 90 km landward (than monsoon period, base year 2005) at the western part of the coastal area in the Sundarbans. About 18 percent households of the Sundarbans impact zone are dependent on Sundarban resources (shrimp fry collectors, honey collectors, golpata collectors, shell/crab collectors and medicinal plant collectors) and are vulnerable to the weather extremes and salinity intrusion. Around 0.5 million households' (family members 2.7 million) primary income source is fishing and they lose working days because of rough weather in the Bay. Over 160,000 coastal fishermen and an estimated 185,000 shrimp fry collectors are involved in marine fisheries

The coastal zone of Bangladesh hosts over 35 million of people who are exposed to cyclones, storm surges, rough seas, salinity intrusion and permanent inundation due to sea level rising. There are 72 offshore islands with an area of 4,200 square km where over 3 million people are extremely vulnerable.⁹²

5.6.3 Impacts of Climate Change in Study Locale

The study areas, Rayenda and Uttar Sauthkhali, are mentionably underdeveloped and are expected to suffer the most from the negative impacts of climate change. This is because climate sensitive occupation such as fisheries and agricultural. In table 5, it is observed

⁹²Disaster Management Bureau, *National Plan for Disaster Management 2008–2015*, (Dhaka: Ministry of Food and Disaster Management, 2008 [at present Ministry of Disaster Management and Relief])

that 67.83 percent of the respondents are involved in climate sensitive income earning sectors. The frequent occurrence of extreme weather events such as cyclone, storm surge and water logging are as usual factors for the inhabitants of the two villages. After the liberation, the two villages experienced as much as cyclone experienced by Bangladesh. As the frequency of cyclone of Bay of Bengal was increased since 1584 as reported by the Indian Meteorological Department (IMD) by analyzing 250 depressions rose in Bay of Bengal, and the study area is adjacent to Bay of Bengal so potential impacts of cyclone are alarmingly increase for the study local. Nevertheless, the intensity of cyclonic storm and storm surges are increasing alarmingly as the villages are very adjacent to Bay of Bengal.

The respondents selected all far reaching changes of climate from their experiences, and discussed about their problems. They never missed to follow any kind of changes of weather. Figure 31 showed the experience of climate change by the respondents and its impacts.

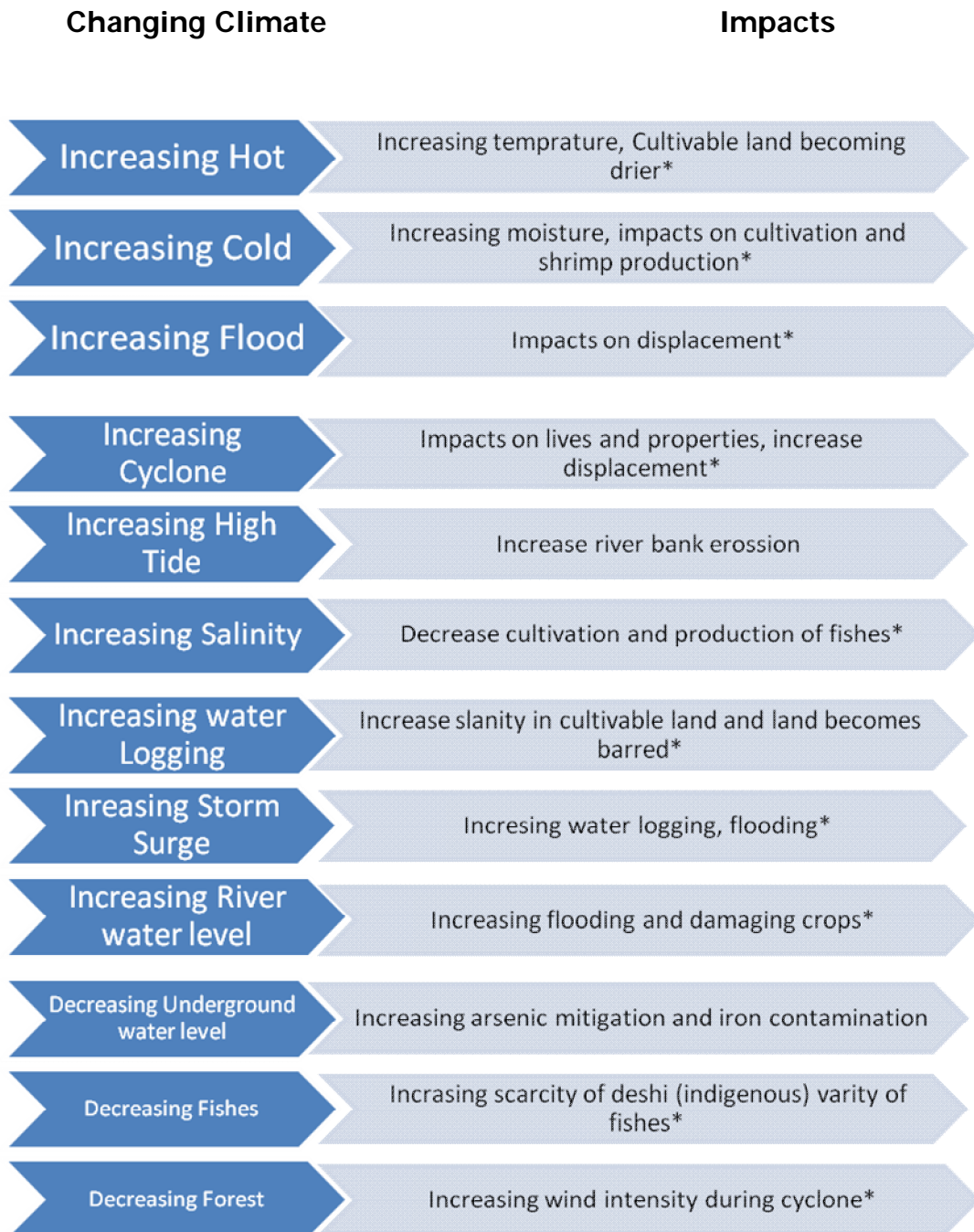
Those were:

1. Hot is increasing. The duration of summer. Previously there was 2/3 months summer time but now summer duration is 5/6 months. For this reasons fertile land is going to become drought land and plants are burning.
2. Gradually all Khals (canal) are going to dry. Underground water is the only resource for the irrigation in summer. Irrigation is expensive resulting in the cost of production of all crops.

3. Underground water level is going down day by day. Previously one pipe (20') for a tube-well was enough to pick up underground water but now is not enough. Besides, there are increasing arsenic and iron in water.
4. Cold is increasing. Cold are destroying so many vegetables and other seasonal crops.
5. Huge amount of water comes from India causing flood sometime. Previously there was flood and people knew time and nature but now flood is coming completely undue time and destroying standing crops.
6. The number of cyclone is on the increase. Simultaneously the strength of cyclone is also increasing. Previous 2/3 years we face some devastating cyclone like Sidr and Aila. People are facing seasonal north-western cyclone every year, but now cyclone are coming now and then.
7. Increasing high tide wave. Spate and speed of flood are more than previous ones. Thousands of people died, cattle died, crops destroyed by the saline water of the high tide sea wave on the Sidr and Aila time.
8. Increasing salinity and duration of saline. Now duration of the saline water in the rivers is 5/6 months but it was 2/3 months previously. Saline water is most harmful for all crops.

Figure 31

Changing Feature of Climate and its Impact



* Most commonly mentioned by the both villagers

9. Increasing water level on the high tide. Many places are sinking now in the high tide but previously it was not flooded. There have possibilities to over-flood the southern part of Bangladesh if the Government dose not increases their embankment level on the river side.

10. Increasing cold and density of fog. Cold and fog are destroying crops every year.

Increasing storm surges cause water logging led to log saline water which will destroy the paddy production of the study local.

Organizational Initiatives for Climate Change

Climate system is fundamental for both issues: 75 percent of all disasters originate from weather-climate extremes. Disaster risk reduction and adaptation to climate change strategies both are aimed at enhancing sustainability, resilient societies and human security. Similar sectoral focus, complexities and challenges rely on the same type of measures and policies. Disaster risk reduction offers opportunities for “bottom-up” strategies for adaptation to current climate variability and climate extremes. In this respect, disaster risk reduction can promote early adaptation to climate risks and impacts. Adaptation is an adjustment in natural and human systems, which occurs in response to actual or expected climate changes or their effects. In human systems, adaptation can reduce harm or utilize opportunities. Adaptation is a matter of acceptance at the cognitive

level of the exposed entity. Disaster Risk Reduction (DRR) is development & application of policies and practices that minimizes risks to vulnerabilities and disasters, applies to managing and/or responding to current disaster risks. In this regard disaster risk reduction options are the front line adaptation. Current risk reduction will lead to reduction of anticipatory risks of climate change in the form of adaptation. The disaster risk reduction options that best suit the user and accepted by them will eventually emerge as adaptation options.

The Government of Bangladesh vision is to eradicate risks of the disasters and achieve economic and social goal through pro-poor climate change strategy that prioritizes adaptation and disaster risk reduction, and also addresses low carbon development, mitigation, technology transfer and the provision of adequate finance. For developing a resilient community the Government of Bangladesh is formulated Bangladesh Climate Change Action Plan 2008 that is published in 2009. Accordingly Government has developed and enacted Bangladesh Climate Change Strategy and Action Plan (BCCSAP) 2009.

The BCCSAP is presented in two parts. The first part provides the background based on physical and climatic contexts, core socio-economic realities and policies in the country and the consequent rationale for a strategy on climate change. The second part elaborates

a set of programs based upon six pillars or broad areas of intervention (not necessarily mutually exclusive) that have been elaborated in the first part. It also describes a ten-year program to build the capacity and resilience of the country to meet the challenge of climate change over the next 20-25 years. Following are the thematic areas as mentioned in BCCSAP 2009⁹³:

- a) Food security, social protection and health to ensure that the poorest and most vulnerable in society, including women and children, are protected from climate change and that all programs focus on the needs of this group for food security, safe housing, employment and access to basic services, including health.
- b) Comprehensive disaster management to further strengthen the country's already proven disaster management systems to deal with increasingly frequent and severe natural calamities.
- c) Infrastructure to ensure that existing assets (e.g., coastal and river embankments) are well maintained and fit-for-purpose and that urgently needed infrastructure (e.g. cyclone shelters and urban drainage) is put in place to deal with the likely impacts of climate change.
- d) Research and knowledge management to predict the likely scale and timing of climate change impacts on different sectors of the economy and socio-economic groups; to underpin future

⁹³ Ministry of Environment and Forest, *Bangladesh Climate Change Strategy and Action Plan*, (Dhaka: MoEF, 2009) p34

investment strategies; and to ensure that Bangladesh is networked into the latest global thinking on climate change.

- e) Mitigation and low carbon development to evolve low carbon development options and implement these as the country's economy grows over the coming decades.
- f) Capacity building and institutional strengthening to enhance the capacity of government ministries and agencies, civil society and the private sector to meet the challenge of climate change.

Objectives:

The objectives of this Plan are to:

- Align the strategic direction of disaster management programs with national priorities and international commitments.
- Articulate the vision and goals for disaster management.
- Outline the strategic direction and priorities to guide the design and implementation of disaster management policies and programs.
- Create a cohesive and well-coordinated programming framework incorporating government, non-government and private sector.
- Ensure that disaster management has a comprehensive and all-hazards focus comprising disaster risk reduction and emergency response.
- Illustrate to other ministries, NGOs, civil society and the private sector how their work can contribute to the achievements of

the strategic goals and government vision on disaster management.

Core Principles

The core principles of this plan have been adopted from the PRSP.

- Country-driven, promoting national ownership of strategies through broad based participation of government, NGOs and civil society.
- Result oriented and focused on outcomes that will benefit vulnerable communities, especially women, the poor and socially disadvantaged.
- Comprehensive in recognizing the multidimensional nature of risk reduction.
- Partnership oriented, involving coordinated participation of development partners (government, domestic stakeholders, and external donors)
- Based on a long-term perspective for risk reduction.

With those pillars, objectives and core principle the BCCASP 2009 is a 10-year program (2009-2018) to build the capacity and resilience of the country to meet the challenge of climate change. The needs of the poor and vulnerable, including women and children, will be mainstreamed in all activities under the Action Plan and build up a self motivated resilient communities.

5.7 Conclusion

According to the above discussion, in Bangladesh, strategies for disaster risk reduction and climate change adaptation have until now evolved largely in isolation from each other through different conceptual and institutional frameworks. In recent years after the Sidr there are different policies, strategies; acts and planning are sought in documentations. But those are still laid in papers rather implementation. The extreme political instability and partisan politics, and lack of transparency at all levels fail to create development bridge among the stakeholders. Holistic management of disaster risk reduction requires action to reduce impacts of extreme events before, during and after they occur. Approaches toward the disaster management, reducing disaster risks and adaptation to climate change impacts also have to consider the reduction of human vulnerability and enhancing capacity building at all levels under ongoing and changing levels of risk.

This study also demonstrates that decision making and implementation of strategies are not a uni-directoral and sequential process rather it is incremental and at times multi directional. As individuals and communities are the first receptor of disasters and changing climatology, it is need to respond those factors in new ways that protect their social, environmental and human rights so that they can enjoy their human security.

Chapter 6

COMMUNITY AND ORGANIZATIONAL RESPONSES TO SURVIVAL

STRATEGIES

The Chapter 6 is aptly focused on the community and organizational behavior, responses and adaptation measures in the super cyclone Sidr and Aila during pre cyclone, during cyclone, and post cyclone periods. This chapter firstly provides information about what are the nature and extent of community and organizational responses; secondly, community responses to individual household survival mechanisms; thirdly, organizational responses for survival in different disaster stages and variation of responses by age, sex and ability; fourthly, comparison between the responses of public and private organizations who addresses disaster affected communities.

6.1 Understanding Response

The organizations are usually structured for responding to various stages of disaster management: preparedness, mitigation, prevention, search and rescue, recovery, shelter, employment, reconstruction, rehabilitation, and the like. It is to be noted here that the disaster affected communities receive such responses in continuing their survival being devastated by the disaster. In recognition of this, emergency management has shifted its roles from a concentration on the traditional phases of preparedness, prevention, response and recovery to a much more community-centered approach. A community-based approach to dealing with disaster is a fundamental

re-orientation of the traditional emergency management structure of preparedness, prevention, response and recovery.⁹⁴

If we simplify the emergency, including three basic segments of response: pre; during and post disaster, management system to three main groups of activities—mitigation, response and recovery—there are distinct identifiable roles and responsibilities. Organizations fit into these three broad areas, but not as exclusive processes. Many organizations, both government and non-government, are involved in multiple aspects of disaster mitigation, response and recovery. But community is the core factors for disaster response, recovery and mitigation. Without community based preparedness the adaptation and response mechanism of organization do not gain a fruitful outcome for the integrated response framework.

The reality of a disaster, in its capacity to overwhelm the emergency services, limits their initial response. The first response is from the impacted community. During the impact of the cyclone, the affected or cyclone victims are usually rescued by other victims. As soon as the storm has settled, the first people care for the injured and look for survivors and collect the dead. People may be traumatized, injured and suffering loss, but despite this they are the first people on the scene, the first to respond and the first to begin the recovery process. Recovery begins the moment a disaster happens. Response has been

⁹⁴ King, D., "Organization in Disaster," *Nat Hazards*, (Springer: Netherland, 2006), p659

typically the emergency management response to a hazard impact or disaster. The event also triggers a response in those organizations that have a responsibility or a role in the disaster mitigation.

So, the response denotes the term that related to the activities developed or undertaken to resolve or eliminate emergency situation developed by disaster agents or natural calamities and its immediate negative consequences.

6.2. Organization and Community Structure of Study Locale

The coastal areas in Bangladesh do not have a separate institutional identity, but, of course, its' unique physical location, distinct natural and ecological features affect the social and economic existence of the local population. The local institutional scene is also not radically different from the rest of the country. But because of extreme poverty and vulnerability and because of the 'peripheral' existence of the area, the institutional rules of the game in some of the areas are somewhat different.

The coastal areas, specially districts and *Upazillas*, in the main land have all the required public and private sector agencies. At *Union Parishad* and Community level, the institutional picture is not very different from the average for the rest of the country. However, in islands and char areas the institutional pictures are varied. For example, Sharonkhola *Upazilla* contains the offices of all the different government agencies, but people and resources are too meager. Owing

to the poor communication link between the coastal areas and the sub-district head quarters, the officers from the district and central government do not find much encouragement to visit these places as often as they should. Nevertheless, in contrast to Rayenda and Uttar Saouthkhali, the institutional and community oriented development projects are limited in Uttar Sauthkhali due to poor communication and environmental settings.

6.2.1 Government Agencies: Being the Upazilla headquarters, the key central Government agencies are located in Rayenda, e.g. the Department of Public Health and Engineering, Department of Agricultural Extension, Education and Facilities department, Project Implementation office, Cyclone Preparedness Center and so on. Resource personnel of those Government agencies are very short due to various civil facilities in contrast to District headquarter. Coordination at sub-district level during the implementation phase does work to some extent, but very little coordination takes place at the planning stage. Participation of political leaders in the decision-making process and priority setting should improve the situation somewhat. For example, in most areas of the coast, agriculture should be the priority because there are huge tracts of undeveloped and uncultivated land. While the majority of the local people are dependent on agriculture for their livelihoods, not much public or private investment in this sector is forthcoming. The economy of the

area could be improved by focusing on increased agricultural production.

6.2.2 Community in Coastal Areas: The institutional environment in the remote coastal areas is obviously less prominent and less complex due to the nature of the low profile socio-economic activities. But the broad institutional framework remains the same—one that is based on a skewed power relationship between a large working class populations dominated by a small group of *Jotedars*. This determines the institutional environment, which is characterised by patronisation and exploitation. Lack of access to resources and services automatically determine the low social and economic status of the majority people.

That the local *Samaj* Institutions are vocal, active and concerned are evident from their participation in the development of local socio-religious micro-institutions like the Committees for the mosque/temples, fisherman association, schools and bazaars etc. They often assume responsibilities in resolving local disputes and participating in socio-cultural activities. The rural communities living in the coastal region, who are not living on chars or islands, are not necessarily much different from other rural communities in the backward areas of the country. But a vast number of people in the coastal areas live in precarious conditions on chars and remote islands and on embankments and polders. These are the most vulnerable

groups most of whom have either lost their homestead to storm surge, migrated from another area for lack of food and employment, or women and children who have been abandoned by their main male bread earners. Life in these places is, to say the least, very different and very difficult especially for female heads of households.

6.2.3 Projects and NGOs: The *Samaj* and *Goshthi* are not consolidated, assertive and active enough. Very few public sector agencies are seen as operational. Health, education, water supply and employment opportunities are in short supply. Because of the communication problem, even the presence of the NGOs is often seen to be not so strong. Linkage with the local administration is pathetically poor. Needs for water and sanitation have not been met by the concerned agency despite being paid for by a donor-funded project. Under this situation, local NGOs come forward to provide some basic health care services along with micro-credit and the like.

NGOs and donor-supported projects create a lot of enthusiasm among the local community. All the major national NGOs are active in Rayenda and Uttar Sauthkhali and their supervision and monitoring structures are relatively effective. Similarly some donor-funded projects are also active and their presence was highly visible. People of course view them as an elite class of 'highly paid' development professionals and so try to cooperate with them. There are also large national based NGOs like, BRAC, DSK, and local NGos like Friendship,

Rupantor, Asroy, CODEC, and TESCO; who are also taken seriously by the local administration and others. However, the key power holders are the public sector agencies and the lack of coordination between themselves make the prospect of the full realization of the local potential of rapid development rather elusive.

Endowed with a similar flexibility and motivation, the donor assisted projects with the help of Government agencies also demonstrate creativity and effectiveness in resource mobilization and innovative institutional arrangements. For example, CARE Bangladesh played an active role for resource mobilization with the co-ordination of local Government organizations. After the super cyclone Sidr the Muslim Aid and CARE constructed 60 and 320 *adha pucca ghar* (Semi Building) respectively in Rayenda. But in Uttar Sauthkhali the Islamic Relief constructed 64 houses and the Muslim Aid repaired 774 damaged houses. This institutional arrangement was expected to facilitate the project to work through the existing organizations and extend support to those areas where government services are unable to reach adequately enough. At the same time this is to stimulate the required coordination and integration among the different agencies concerned.

The other highlight of the program, in so far as the local community is concerned, is the local level participatory planning exercise at Union level. The process of planning is a very effective tool to sensitize the local community about the overall institutional environment they live in and the resource potentials of the areas.

6.2.4 Gender in Local Institutions: The organizational culture and orientation determine the level of emphasis put on gender issues in implementing development programs and projects. In this regard NGOs are found more sensitive than public sector institutions. In the GoB-donor projects, gender issues figure high on their agenda but in practice, there are problems inherent in the local socio-cultural pattern which does not always favor attempts at mainstreaming gender balance issues to the desired level. For example, one community level fisher folk group of 70 members organized by PBAEP and a local NGO in Uttar Sauthkhali had only one woman. This is certainly not a good example of gender balance, but it so happens that fishing practices in the coastal Bangladesh has systematically excluded women—although in fish processing and ancillary activities women do play an important if unrecognized role. In CDSP-II the local institutional structures created comprise functional groups like, Polder Committee (PC), Sub-Polder Committee (SPC), Water Management Committees (WMC), Tubewell User Group (UG) and Agriculture demonstration Groups etc.

There are stipulations in the structure of these committees about specific gender balance, and it is being moderately maintained.⁹⁵

6.2.5 Networking Organizations: Besides the fixed coordination arrangements between the public sector agencies (UDCC and DDCC and NGO Coordination Committees at district and *Upazila* levels), there are also some other functional coordination mechanisms in existence. Besides this there are also coordination mechanisms between certain special technical projects and relevant government agencies. These projects directly liaise with local NGOs who assist them in the mobilization of local communities. This gave local NGOs an institutional anchor, a platform from which they could raise their collective voice. It also intends to help the local civil society to uphold the values of democracy, secularism and cultural openness. It undertakes programs (e.g., Social Justice Program) on preventing injustice to marginalized people and particularly women. It observes different days of significance to remind people of certain progressive values. It is trying to give people a positive cultural and institutional environment in which to live. In these efforts, the local NGOs have been the vehicle for reaching out to remote communities in the coast as elsewhere.

⁹⁵ A. H. Miah., "Integrated Coastal Zone Management Plan project," Paper presented in Technical Discussion on Coastal Zone Landing in WPO31, (Dhaka: Ministry of Water Resource, 2004)

Access to Resources: Among the few available common property resources (e.g., land, water bodies, forest resources), fishing in the river estuaries and near the coast is the most significant source of livelihood for many poor households both Rayenda and Uttar Sauthkhali living on the embankment of Balawesher. Theoretically, access to them is open to anybody but in practice, poor people do not have access simply because they lack the means (boat and equipment which are rather costly) to avail access. As a result it only aids the social polarization process of local communities. It is heartening to note though, that some development projects have already been addressing this particular issue by introducing alternative measures to give some of the poor fisher's community access to such means.

Disaster Planning: There will be a plan for each Union titled "Union Disaster Management Plan" comprising both disaster risk reduction and emergency response to be prepared by the Union Disaster Management Committee following a proper community risk assessment procedure to be provided by DM&RD with the participation of vulnerable groups and the communities. The UDMP should highlight and articulate, among others, the following:

1. Defining and redefining community risks to hazards utilizing both traditional and scientific knowledge.
- II. Total resource requirements and the planned action for the District.

III. To take measures for prevention and mitigation of disasters by government agencies, NGOs, CBOs and the private sector within the District.

IV. Capacity building and preparedness measures to be taken by government agencies, NGOs, CBOs and the private sector.

V. Strengthening emergency response management system plans and procedures in the event of a disaster.

c. The response plans and procedures in the event of a disaster, providing for:

i. Allocation of responsibilities to the departments of the government at District level and other DMC members

ii. Procedure for mobilization of resources

iii. Prompt response to disaster and relief thereof

iv. Procurement of emergency supplies

v. Operation of disaster shelters

vi. Restoration of emergency services, such as water supply, gas supply, power, telecommunication, road links

vii. Provision of emergency medical services

viii. Burial of dead bodies

- ix. Trauma counseling
 - x. The dissemination of information
- d. Recovery plans and procedures delineating damage assessment procedure, restoration of damaged public infrastructure, resumption of educational institutions, restoration of livelihood, rehabilitation of affected people, especially the disabled, and elderly women and children.
 - e. The UDMP shall be reviewed and updated annually.
 - f. The copies of the UDMP shall be made available to all Union level stakeholders, UNOs and DCs.
 - g. A copy of the UDMP will be sent to the Upazila Disaster Management Committee.
 - h. The DMB/BIDMTR will provide technical advice and capacity building services to all DMCs.

According to this UDMP, those plans are restricted in documentation and filling but not in practical. Before the super cyclone Sidr there was no activities sought by the UDMP except volunteer of CPP. But before Aila the UDMP was active with the help of CPP in both the two villages Rayenda and Uttar Sauthkhali.

So, in terms of community level disaster management activities in times of Sidr and Aila, cyclone preparedness through community participation was practically absent in the study locale. After the Sidr the Government agencies and NGOs were working together to mitigate cyclone victims sufferings to achieve the goals of Cyclone Preparedness Programme and tried to make local community resilient. By this group work and community interest 4.70 percent of the total respondents were involved as volunteer of the CPP of Sharonkhola Upazilla. Nevertheless, 3.90 percent respondents received disaster related training by international and national resource person through NGOs training (table 40).

6.3 The Extent of Community Response

The principal responsibility for disaster mitigation still remains firmly with individuals, families and communities to prepare for predictable hazards such as cyclones, storm surges and floods, and to take appropriate mitigation actions. This presupposes knowledge and awareness amongst the population. National, state and local government institutions are expected to play an active role in aiding that awareness and by providing warnings and direct intervention in such events as evacuation and recovery. Thus the awareness, preparedness, vulnerability and resilience of communities are crucial aspects of disaster mitigation. If community vulnerability is to be effectively reduced it is essential to first understand the type and dimensions of the 'risk' that residents face, how they perceive and

understand this risk, how they make decisions about what levels of risk are 'acceptable' and what actions or behaviors they decide to undertake to minimize their risk exposure. The very fact that individuals or families have the power to reduce or increase their vulnerability by their decisions and actions to response mechanism defines it as a dynamic process rather than a static state.

It is up to both community and organization to cope with the effects of disasters and major accidents. Not much research is required to understand that it is not possible for organization alone to be responsible for all aspects of disaster management. Therefore, some questions need to be answered, e.g. the extent to which citizens are able to respond, whether or not progress can be seen over time, what elements influence the response etc.⁹⁶ The following definition of 'community response' before, during and after a disaster and major accidents will be used:

'Community Response' pertains to all actions taken by citizens:

1. preparing for disasters and major accidents
2. during and after disasters and major accidents

⁹⁶ Helsloot and A. Ruitenbergh, "Citizen Response to Disasters: a Survey of Literature and Some Practical Implications", *Journal of contingencies and crisis management*, (London: Blackwell Publishing, 2004), vol. 12, pp98-99

3. with the intent to help themselves or others to limit the effects of the disaster or major accident

Point three of the definition clarifies the fact that community response has two aspects: actions taken for the protection of oneself, and those taken to help others.

It was empirically found that nearly one-third (31.37%, n=228) and above one-third (48.23%, n=219) households opined about the presence of community activities rather two-thirds (68.63%, n=228) and half of total (51.77%, n=219) opined the non-presence of community activities in Sidr and Aila respectively. The extent of community activities seem to be extended day-by-day, data showed the increasing rate of community response in Aila rather than Sidr. And 10.59 percent and 14.12 percent respondent opined that they did not get any kind of responses in Sidr and Aila respectively. It was evident from the respondents that respectively above half of the total (54.17%, n=120) and one-third (33.33%, n=120) cyclone victims of Rayenda and nearly two-third (61.48%, n=135) and nearly half of the total (41.48%, n=135) cyclone vitims of Uttar Sauthkhali did not observe any kind of community activites in Sidr and Aila (Table 52).

6.3.1 Presence of Community Activities

Table 52
Presence of Community Activities in Cyclone Disaster

Community Activites in Sidr	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
YES	39	32.50	41	30.37	80	31.37
NO	65	54.17	83	61.48	148	58.04
Don't take any kind of Responses	16	13.33	11	8.15	27	10.59
Total	120	100	135	100	255	100
Community Activites in Aila	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
YES	67	55.83	56	41.48	123	48.23
NO	40	33.33	56	41.48	96	37.65
Don't take any kind of Responses	13	10.83	23	17.04	36	14.12
Total	120	100	135	100	255	100

Some of the tasks are described in detail in order to better understand the extent of tasks, activities and responses that are occurring three stages of disaster—pre, during and post stages—by the individuals and communities. The following discussion will briefly consider some of the major tasks that were being performed and also note some problems associated with their completion. The study identified fifteen kinds of community activities regarding response usually necessary in cyclonic disaster.

Pre-disaster Response:

1. response to warning
2. response to warning dissemination
3. help neighbor to take pre measure activities
4. response to pre measure activities
5. response to take shelter

During disaster Response:

1. rescue lives
2. response to go safe places
3. help volunteers to take rescue steps
4. help neighbors
5. protect resources and properties

Post-disaster Response:

6. response to reconstruction
7. response to immediate aids
8. response to rescue lives
9. response to handle the dead
10. sheltering the homeless neighbors
11. help volunteers

6.3.2 Pre-disaster Response**Response to cyclone warning**

It was reported by the cyclone victims that 68.24 percent and 82 percent respondents' heard cyclone warning in Sidr and Aila respectively (Figure 7 and 8). But in terms of response to warning it was shown that above two-thirds (69.23%, n=91 of 120) and two-thirds (65.06%, n=83 of 135) (total 67.2%, n=174 of 255) respondents in

Rayenda and Uttar Sauthkhali did not rely on institutional warning in time of Sidr. It was remarkable that two-thirds (65.06%, n=83 of 135) and half of the total (50%, n=112 of 135) cyclone victims of Uttar Sauthkhali did not rely on institutional warning in Sidr and Aila respectively. It was observed that reliability regarding institutional warning did not expectable in time Aila. At the time of Aila 43.84 percent respondents disbelieved in institutional warning and the rest are believed because of the earlier experience of Sidr devastation (Table 53).

Table 53

Response to Cyclone Warning

Rely on Warning (Sidr)	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	N	%	n	%	n	%
Rely	28	23.33	29	21.48	57	22.36
Do not Rely	63	52.50	54	40.00	117	45.88
Don't take any kind of Responses	29	24.17	52	38.52	81	31.76
Total	120	100	135	100	255	100
Rely on Warning (Aila)	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	N	%	n	%	n	%
Rely	67	55.83	56	41.48	123	48.24
Do not Rely	40	33.33	56	41.48	96	37.65
Don't take any kind of Responses	13	10.83	23	17.04	36	14.12

By the above discussion, it is to be said that response to Sidr warning was significantly lower than the Aila warning. And more respondents of Rayenda did not positively response to rely on warning in Sidr in contrast to Uttar Sauthkhali though Rayenda was the CBD of

Sharonkhola Upazilla. Response to rely on warning depends on inhabitants' education, knowledge, beliefs and repeatedly dissemination of institutional warning. So, in terms of response to cyclone warning the community of Rayenda and Uttar Sauthkhali seems very vulnerable.

Response to Participate in Warning Dissemination

As 89.41percent (n=228 of 255) and 85.89 percent (n=219 of 255) cyclone victims opined about the presence of community responses in Sidr and Aila respectively, the next tables, charts and figures will be concenterd N=228 and N=219 in Sidr and Aila respectively.

The cyclone victims opined Community participation in warning dissemination is essential to build up a resilient community in cyclone disaster prone areas. But participation of cyclone affected people depend on their education, awareness, disaster related knowledge, membership of social organization, logistic support, repeated cyclone attack etc. In that sense the community of Uttar Sauthkhali and Rayenda are not enough deserving. It was evident from the cyclone victims that 10.58 percent and 12.90 percent (total 11.84 percent) households of Rayenda and Uttar Sauthkhali respectively took part in warning dissemination in Sidr, and 14.95 percent and 20.54 percent (total 17.81 percent) household members of Rayenda and Uttar

Sauthkhali respectively took part in warning dissemination in Aila (Table 54).

Table 54
Response to Participate in Warning Dissemination

Warning Dissemination (Sidr)	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Participate	11	10.58	16	12.90	27	11.84
Do not Participate	93	89.42	108	87.10	201	88.16
Total	104	100	124	100	228	100
Warning Dissemination (Aila)	Study Villages					
	Rayenda		Uttar Sauthkhali		Total	
	n	%	n	%	n	%
Participate	16	14.95	23	20.54	39	17.81
Do not Participate	91	85.05	89	79.46	180	82.19

That means above two-thirds (78.82%, n=120) and above two-thirds (70.59%, n=135) cyclone victims of Rayenda and Uttar Sauthkhali did not take part in warning dissemination in Sidr and Aila respectively (Table 54). In contrast to Rayenda and Uttar Sauthkhali, it was to be opined that participation in warning dissemination in Sidr and Aila in Uttar Sauthkhali was higher than Rayenda. Why Uttar Sauthkhali community excessively participated in Sidr and Aila though dependable variables were absent in Uttar Sauthkhali. The reasons behind the fact depend on their environmental physiology, their non-fragile mentality, and little dissemination of institutional warning contrast to Rayenda and so on.

Help Neighbors to Take Pre-measures

When cyclone victims have been noticed, through institutional warning dissemination or their indigenous fashion, about an up coming cyclone, they were very much anxious to how they cope with it. As the coastal zone disaster preparedness in Bangladesh is not so well defined and mechanized, coastal inhabitant have to designed their pre disaster planning to cope with up coming disaster situation and it was their inevitable duty to make a neighboring bondage to take pre measures activities. For this reason, it was noticeable that 32.10 percent and 55.20 percent households helped their neighbors to take pre measures in cyclone Sidr and Aila respectively (Table 55).

Table 55
Help Neighbors to Take Pre-measures

Help Neighbors (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	n	%	n	%	
Participate	36	30.00	37	27.41	73	28.63	32.10
Do not Participate	52	43.33	87	64.44	155	60.78	67.90
Absent Community Responses	16	13.33	11	8.15	27	10.59	
Total	120	100	135	100	255	100	100
Help Neighbors (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	n	%	n	%	
Participate	67	55.83	54	40.00	121	47.45	55.20
Do not Participate	40	33.33	58	42.96	98	38.43	44.80
Absent Community Responses	13	10.83	23	17.04	36	14.12	
Total	120	100	135	100	255	100	100

Though the community bondage of Uttar Sauthkhali people was high rather than Rayenda people, according to the perior data it was showed that Uttar Sauthkhali people were less helping their neighbors to take pre disaster initiatives in contrast to Rayenda people in both disasters. In Sidr, nearly two-third (60.78%, n=135) households of Uttar Sauthkhali did not help their neighbors to take any kinds of pre-measures or initiatives (Table 55). The reason behind this non-helping factors lied into the destructiveness of the super cyclone Sidr. As Uttar Sauthkhali was badly affected by Sidr, the mentalities of its inhabitants were break down badly and they were busy to rescue themselves. So, they took part in little to help the neighbors to take pre disaster initiatives.

Response to Take Pre-measures and Shelter before Disaster

When the coastal inhabitants are asked about their own pre disaster and safe shelter taking initiatives, it was showed that nearly two-thirds (60.48%, n=120) and above half of the total (55.77%, n=135) (total 58.40 percent, n=228) respondents of Rayenda and Uttar Sauthkhali took pre measures to save their lives and properties, and took safe shelter to save their own lives and also their family members respectively in Sidr. In the time of Aila safe shelter taking tendency was high, it was showed that above three-fourth (76.678%, n=120) and nearly two-third (61.48%, n=135) cyclone victims took safe shelter respectively in Rayenda and Uttar Sauthkhali (Table 56).

Table 56

Pre-measures and Shelter taking before Disaster

Pre-measures (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	n	%	n	%	
Participate	58	48.33	75	55.56	133	52.16	58.40
Do not Participate	46	38.33	49	36.30	95	37.25	41.60
Absent Community Responses	16	13.33	11	8.15	27	10.59	
Total	120	100	135	100	255	100	100
Pre-measures (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	n	%	n	%	
Participate	92	76.67	83	61.48	175	68.63	79.90
Do not Participate	15	12.50	29	21.48	44	17.25	20.10
Absent Community Responses	13	10.83	23	17.04	36	14.12	
Total	120	100	135	100	255	100	100

Even 41.60 percent and 20.10 percent respondents did not take any kinds of pre disaster initiatives and safe shelter in Sidr and Aila respectively (Table 56). When they are asked about the reason of abstain from pre disaster initiatives and safe shelter, they argued that they could not leave their home abandoned and to sentinel their properties form thieves and dedicated themselves to their fate.

Case 5

Momena Begum, Female of Uttar Sauthkhali, Age 49

In 1991 cyclone, I have just given birth my second child and stayed my father home in Dakkhin Sāuthkhālī. In that very day there was raining all day with medium storm inconsistently. In afternoon when the pressure of wind increase my father sent us a nearby cyclone center with my younger brother and mother. In night when the storm blew its fury I found my father in cyclone center. In morning when the storm ended we went back our home and discovered some of our essential materials: a gunny bag of rice, television, oil container was lost. Those were stolen by some of ours neighbors. So, according to this experience, in time of Sidr my husband sent ours three children out of four to nearby school in that afternoon and we with our younger daughter stayed in our home. But after the evening when storm bit us with its strong fury the tin shade of our house was flown away in a moment though my husband fasten the tin shade with rope. Later a big storm surge captured our inhabitate. By this storm surge I lost my 10 years old daughter and my husband also. After two days later my husband came back alive. But my daughter was missing still now. The power of the cyclone was totally beyond our experience. In time of Aila, we with ours all family members spent all night in a nearby school roof. In very morning we came home and found a cow of ours was missing.

Response to Rescue lives

It was empirically found that 9.62 percent and 21.50 percent (total 10.50 percent, n=228 of 255) respondent of Rayenda helped the CPP volunteers and other volunteers in Sidr and Aila respectively. On the other hand 11.29 percent and 13.39 percent (total 89.50 percent, n=228 of 255) respondent of Uttar Sauthkhali helped CPP volunteers

and other volunteers in Sidr and Aila respectively. That means above three-fourth (89.50%, n=228 of 255) and above three-fourth (82.70%, n=228 of 255) respondent did not help volunteers in Sidr and Aila respectively (Table 57).

By those statistics it can be said, helping mentality to the volunteers of coastal people does not grow in satisfactory level after the heavy super cyclone Sidr. Helping mentality to the volunteers is increasing in 6.8 percent rate in Aila in contrast to Sidr. A satisfactory level of Uttar Sauthkhali respondents argued that they could not see any Government volunteers in and after the time of super cyclone Sidr as well as Aila.

Table 57
Help Volunteers to Rescue lives

Help Volunteers (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Participate	10	8.33	14	10.37	24	9.41	10.50
Do not Participate	94	78.33	110	81.48	204	80	89.50
Absent Community Responses	16	13.33	11	8.15	27	10.59	
Total	120	100	135	100	255	100	100
Help Volunteers (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Participate	23	19.17	15	11.11	38	14.90	17.30
Do not Participate	84	70.00	97	71.85	181	70.98	82.70
Absent Community Responses	13	10.83	23	17.04	36	14.12	
Total	120	100	135	100	255	100	100

Moreover, 4.30 percent and 10.50 percent respondents participated to save the lives of children in Sidr and Aila respectively. Though, this kind of participation was very insufficient in the time of Sidr. And at the time of Aila the inhabitants of Uttar Sauthkhali participated to save the lives of children and female not in significant ranges (10.50%, N=228) (Table 58).

Table 58
Participation to save lives (Especially Children)

Rescue lives (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Participate	6	5.00	4	2.96	10	3.92	4.30
Do not Participate	98	81.67	120	88.89	218	85.49	95.70
Absent Community Responses	16	13.33	11	8.15	27	10.59	
Total	120	100	135	100	255	100	100
Rescue lives (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Participate	7	5.83	16	11.85	23	9.02	10.50
Do not Participate	100	83.33	96	71.11	196	76.86	89.50
Absent Community Responses	13	10.83	23	17.04	36	14.12	
Total	120	100	135	100	255	100	100

Case 6***Sekendar Majhi, Male of Uttar Sauthkhali, Age 32***

I live in Khas Land of Bawleshwar with my wife and three sons. In time of Sidr I lost every thing: net, boat and my house. We are living far beyond cyclone shelter. At the afternoon in that very day of Sidr, we were staying in our house which was made by bamboo, mud and tin roof. We did not hear any announcement while our neighbors assured us for the Sidr. We thought Sidr would be a as usual tufan (cyclone) as we cope with every monsoon time. After the afternoon when the striking force of cyclone wind strong in every moment pass, not a single volunteer did not came to rescue us. After the evening the cyclone struck us with its full fury and our house blew away like a straw. Subsequently a heavy storm surge came and drifted us awaya form our house to embankment to Baleshwar. At that time I grabbed my younger son hand firmly and lifting him to a big tree and banded him by my towel. Then I was searching my wife and another two sons but did not find them. After some time I discovered my wife on a big tree log with my elder son. I went back to them and asked about another son. My wife replied he was saved by our neighbor. But I did not see my son. After a long time when the water low down I found my son with my neighbor on a tree log. I thanked Allah very much.

6.3.3 During Disaster Response**Help to Take Safe Shelter**

It was empirically found that respectively 11.54 percent (n=104 of 120) and 12.10 percent (total 11.80 percent, n=228 of 255) cyclone affected people of Rayenda and Uttar Sauthkhali helped their neighbors to take safe shelter during the Sidr. On the other hand, respectively 8.41 percent (n=107 of 120) and 11.61 percent (n=99 of 135) (total 10 percent, n=219 of 255) of Rayenda and Uttar Sauthkhali helped their neighbors to take safe shelter during the Aila. Therefore, above one-

fourth (88.20%, n=228 of 255) and above one-fourth (90%, n=219 of 255) cyclone affected people did not giving shelter during Sidr and Aila respectively (Table 59).

Table 59
Help cyclone affected to take safe shelter

Help to Take Safe Shelter (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Help	12		15		27	10.59	10.50
Do not Help	92		109		201	78.82	89.50
Absent Community Responses	16		11		27	10.59	
Total	120	100	135	100	255	100	100
Help to Take Safe Shelter (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Help	9		13		22	8.63	17.30
Do not Help	98		99		197	77.25	82.70
Absent Community Responses	13		23		36	14.12	
Total	120	100	135	100	255	100	100

Basically, the people of Uttar Sauthkhali helped their neighbors better than Rayenda both in Sidr and Aila. Because, the quantity of cyclone centers were very little than its density in Uttar Sauthkhali. So, the people of Uttar Sauthkhali used to make a guild together in such kind of disaster. But, in Sidr time they have been suffered most because of their vulnerability and ignoring manners. So, the coastal people

response to provide safe shelter to their neighbors was not so distinguishing. The reasons, as they argued, behind this were:

1. Economic vulnerability;
2. Environmental vulnerability;
3. Heavy destructiveness of cyclones;
4. Vulnerable infrastructures;
5. Consecutive and repeated disasters ;
6. Fragile mentality during cyclones/ disasters; and
7. Overall capability of coastal inhabitants.

Community Response to Immediate Aids

It was empirically found that respectively 12.50 percent and 7.26 percent (total 9.60%, n=228 of 255) respondents of Rayenda and Uttar Sauthkhali helped their neighboring community by providing immediate aids in time of Sidr. On the other hand respectively 23.36 percent and 11.61 percent (total 17.30%, n=219 of 255) respondents provided immediate aids to their community people during Aila. Therefore, above one-fourth (90.40%, n=228 of 255) and above one-fourth (82.70%, n=219 of 255) cyclone victims did not provide immediate aids during Sidr and Aila respectively. In contrast to Rayenda, the cyclone victims of Uttar Sauthkhali respond to immediate

aids during Sidr and Aila were low. Because the community of Uttar Sauthkhali were more vulnerable than Rayenda community (Table 60).

Table 60
Community Response to Immediate Aids

Immediate Aids (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Give Aids	13	10.83	9	6.67	22	8.63	9.60
Do not Give Aids	91	75.83	115	85.19	206	80.78	90.40
Absent Community Responses	16	13.33	11	8.15	27	10.59	
Total	120	100	135	100	255	100	100
Immediate Aids (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Give Aids	25	20.83	13	9.63	38	14.90	17.30
Do not Give Aids	82	68.33	99	73.33	181	70.98	82.70
Absent Community Responses	13	10.83	23	17.04	36	14.12	
Total	120	100	135	100	255	100	100

Nevertheless, the community of Uttar Sauthkhali were badly affected in both Sidr and Aila and lost their capability to response to provide immediate aids. Community is the first victim of a landfall cyclone and they also the first actor to provide responses especially immediate response to their affected community people. In time of cyclone, the affected people lost their shelter firstly and they become shelter less. So, during cyclone the homeless people rush to find safe shelter.

In that time, usually community is the first actor who comes to help their homeless one. During cyclone, the homeless people usually take shelter to those who are not homeless. Respectively 11.80 percent and 9.10 percent respondents came forward to help their homeless neighbors to provide shelter in Sidr and Aila. And above one-fourth (88.20%, n=228 of 255) and above one-fourth (90.90%, n=219 of 255) respondents could not provide shelter to their homeless neighbors (Table 61).

Table 61
Sheltering the Homeless Neighbors

Sheltering homeless (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Give Shelter	13	10.83	14	10.37	27	10.59	11.80
Do not Give Shelter	91	75.83	110	81.48	201	78.82	88.20
Absent Community Responses	16	13.33	11	8.15	27	10.59	
Total	120	100	135	100	255	100	100
Sheltering homeless (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Give Shelter	11	9.17	9	6.67	20	7.84	9.10
Do not Give Shelter	96	80.00	103	76.30	199	78.04	90.90
Absent Community Responses	13	10.83	23	17.04	36	14.12	
Total	120	100	135	100	255	100	100

Others Community Responses after Cyclones

After cyclone the community smashed thorough disaster. In time of Sidr the community of Rayenda and Uttar Sauthkhali were totally depressed by the massive destruction of Sidr and community were badly affected by the disaster after the Sidr. In time of Aila, the community of Rayenda and Uttar Sauthkhali are affected moderately by cyclone. But after Aila, the communities were suffered badly by scarcity of drinking water. However, the community people helped the cyclone affected by providing various kinds of immidiate aids until then major aids form GO and NGOs coming forward.

It was evident from the cyclone victims that nearly one-third (28.82%, N=79) and nearly one-third (32.10%, N=142) respondents helped cyclone affected community providing immediate foods, infant foods and safe water in Sidr and Aila respectively. And 7.65 percent and 7 percent respondents helped cyclone affected by providing medicine and medicare in Sidr and Aila respectively. Community people willingly helped the volunteers to clean the debris of cyclone on roads and high ways as well as buried the dead neighbors and livestock in Sidr (28.35 percent) and Aila (17.89 percent) (Table 62).

6.3.4 After Disaster Response

About long term responses, the communities of Rayenda and Uttar Sauthkhali were not so well mechanized. After Sidr respectively 15.38 percent, 11.53 percent (total 9.41%, n=79 of 255) and 29.83 percent, 12.90 percent (total 14.41%, n=142 of 255) people of Rayenda and Uttar Sauthkhali helped their cyclone affected neighbors to rebuild new houses and reconstruction of damaged houses for long term sheltering. But after Aila 16.15 percent and 12.45 percent community people helped their affected neighbors to reconstruct and rebuild damaged houses (Table 62).

Table 62
Community Responses after Cyclone

Criteria of community helps (Sidr)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent, N=79
Various foods and infant foods	29	24	53	10.27	15.58
Safe water and infant foods	24	21	45	8.72	13.24
Reconstruction of damaged houses	12	37	49	9.50	14.41
Buried dead and livestocks	9	29	38	7.36	11.18
Medicine and Saline water	12	14	26	5.04	7.65
Help to rebuild new houses	16	16	32	6.20	9.41
Help volunteers to clean cyclone debris	17	21	38	7.36	11.18
Clean roads and highways	23	36	59	11.43	17.35
Total Valid Total (Out of 79)	142	198	340	--	100
Don't get any helps (Out of 255)	65	84	149	58.43	--
Absent Community Response (Out of 255)	16	11	27	10.59	--
Total	120	135	255	100	--
Criteria of community helps (Aila)	Rayenda	Uttar Sauthkhali	N	Percent of N	Valid Percent, N=132
Various foods and infant foods	46	42	88	13.81	17.12
Safe water and infant foods	43	34	77	12.09	14.98
Reconstruction of damaged houses	31	52	83	13.03	16.15
Buried dead livestocks	7	12	19	2.98	3.69
Medicine and Saline water	19	17	36	5.65	7.00
Help to rebuild new houses	36	28	64	10.05	12.45
Help volunteers to clean cyclone debris	32	42	74	11.62	14.40
Clean roads and highways	36	37	73	11.46	14.20
Total Valid Total (Out of 132)	250	264	514	--	100
Don't get any helps (Out of 255)	40	56	96	37.65	--
Absent Community Response (Out of 255)	16	11	27	10.59	--
Total	120	135	255	100	--

*Multiple answers computed

After both cyclones (Sidr and Aila) aids were distributed huge in quantity. But communities of the both study villages were psychologically and economically not so capable to help themselves and their community members. Especially after Sidr the community of Uttar Sauthkhali was totally shocked and delicate. However, the community of Rayenda was living beside the *thana sadar* of Sharankhola Upazilla, they also smashed in Sidr and totally delicate. Most villagers' of both villages are agriculturalist and fishermen. Cyclone "Sidr" directly affected both. Firstly due to the wind and water surge many fishing boats were destroyed and fishing nets were lost. When cyclone "Sidr" attacked saline water and sand with the water surge came and damaged the agricultural fields. And they did not get the only crop of the year. Despite relief financial assets were damaged because of damage of houses, because they lost crop and had to buy foods to feed themselves, crop failure resulted in loss of investments made in the production process. Also physical assets were directly affected by the cyclone as loss of livestock, equipment such as: tractor, other infrastructures as damaged embankments and roads.

After Sidr most of the fishermen and peasants of the both villages started to take loans and *Karja* (lending) through mortgage their living lands, alived livestock and other properties. When they were trying their level best to cope with Sidr devastation then their predestination brought them to the jaws of death by facing another cyclone named

Aila in 2009. In Aila, water surge became another disaster due to saline water. Because of saline water, the fertility of land was decreased and the crop was not good. For this reason, they had no ability to back their lending with interest and lost fishing boats and cultivable lands. Nevertheless, those who were day laborer, they did not get any work due to scarcity of fishing net and boats as well as crop related works. Their social capital also damaged by this consecutive attack of cyclones. They became poor to poorer. For this reason the communities of both villages could not take proper initiatives for community oriented helps after disaster and respectively above two-fourth (58.43%, N=79) and above one-third (37.65%, N=142) of the respondents opined that they did not get any kinds of help from their cyclone dvasteded communities after the Sidr and Aila (Table 62).

6.4 The Extent of Organizational Response

Natural disasters, often seen as social disturbances apart from upsetting the status quo in economic and political terms, impact a large section of the population in a region at the same time and often have a profound and lasting impact on their well-being. The mainstream media's impressions of a disaster zone reflect the helplessness of victims and often promote the need for external help either in form of federal financial assistance or resource help from the state, local government as well as Non Government Agencies. The tendency to label disaster victims as disjointed individuals or

households in need of economic, social, and emotional support is overwhelming and impressions that such support can only be effectively organized by external actors or organization is quite prevalent in popular belief. Also, the fact that disasters tend to have differential impacts on communities of different race, ethnicities, and income level tends to underline the general helplessness and feeling of far-reaching inequities regarding disaster recovery.⁹⁷

The word organization can imply different things and does not necessarily reflect a formal structure, although such a perspective is common in the field of emergency response management. Organization is here referred to as a non-random arrangement of parts interconnected in a manner as to constitute a system indefinable as a unit (www.businessdictionary.com). An emergency response involves dynamic structures of interacting individuals that do not always harmonize with formal organizations. This thesis focuses on management in disaster consisting of several formal organizations that have to work together to meet various needs that emerge in an emergency response situation and also assumes that management is associated with individuals, their actions and interactions, and how these individuals harness complexity in a dynamic emergency response system to meet various needs.

⁹⁷ Robert C. Bolin and A. Bolton, *Race, Religion, and Ethnicity in Disaster Recovery*, (Florida: FMHI Publications, 1986), pp 53

6.4.1 Organizational Response for Adaptation (GO and NGO)

When an emergency situation occurs various societal resources become involved in the response. These resources can be found in an *emergency response system*. Thus, the emergency response system is constituted by numerous elements such as individuals, groups of individuals, formal organizations, communication devices, vehicles, hoses and stretchers, laws and regulations, knowledge, culture as well as their dynamical relations. Such constitutions logically have a complex character and grasping both detail and a complete wholeness in theoretical reasoning and empirical studies is reasonably very problematic.⁹⁸

It was evident from the cyclone victims that nearly two-third (65.38%, n=104 of 120) and above half of total (51.61%, n=124 of 135) respondents of Rayenda and Uttar Sauthkhali (total 57.90 percent) argued about Governmental agencies responses in Sidr. On the other hand, above two-third (71.03%, n=107 of 120) and half of total (56.25%, n=112 of 135) respondents of Rayenda and Uttar Sauthkhali (total 63.50 percent) opined about Governmental agencies responses in Aila. That means 42.10 percent and 36.50 percent respondents did not get any kind of governmental agencies responses in Sidr and Aila respectively (Table 63).

⁹⁸ Christian Uhr, *Multi-organizational Emergency Response Management- A Framework for Further Development*. (Laund: Laund University, 2009) p 14

Table 63

Organizational Response for Adaptation (GO)

Organizational Response_GO (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Yes	68	56.67	64	47.41	132	51.80	57.90
No	36	30.00	60	44.44	96	37.60	42.10
Absent GO Responses	16	13.33	11	8.15	27	10.60	
Total	120	100	135	100	255	100	100
Organizational Response_GO (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Yes	76	63.33	63	46.67	139	54.50	63.50
No	31	25.83	49	36.30	80	31.40	36.50
Absent GO Responses	13	10.83	23	17.04	36	14.10	
Total	120	100	135	100	255	100	100

It is not possible for the Government alone to be responsible for all aspects of disaster management. So various Non Governmental Organizations were coming forward and performing their duties to responding different phases of disasters. It was evident from the cyclone victims that respectively above four-fifth (83.65%, n=104 of 120) and nearly four-fifth (77.42%, n=124 of 135) (total 80.30%, n=228 of 255) respondents of Rayenda and Uttar Sauthkhali opined about NGOs response in Sidr as well as respectively above three-fourth (89.72%, n=107 of 120) and above three-fourth (95.54%, n=112 of 135)

(total 92.70 percent, n=219 of 255) of Rayenda and Uttar Sauthkhali opined about NGOs responses in Aila. That means respectively 19.70 percent and 7.30 percent respondents did not get any kind of NGOs response in Sidr and Aila (Table 64).

Table 64
Organizational Response for Adaptation (NGO)

Organizational Response_NGO (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Yes	87	72.50	96	71.11	183	71.80	80.30
No	17	14.17	28	20.74	45	17.60	19.70
Absent NGO Responses	16	13.33	11	8.15	27	10.60	
Total	120	100	135	100	255	100	100
Organizational Response_NGO (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Yes	96	80.00	107	79.26	203	79.60	92.70
No	11	9.17	5	3.70	16	6.30	7.30
Absent NGO Responses	13	10.83	23	17.04	36	14.10	
Total	120	100	135	100	255	100	100

6.4.2 Governmental Responses before Cyclone Sidr and Aila

Established NGOs have a fixed and rigid structure and continue to perform their regular tasks even after a disaster strikes. The duties such as damage control and restoring services are similar except at a larger scale. Especially disaster related organizations (DRO) continue

to perform same task but instead chose to alter their organization structure in order to perform their duties in an efficient and effective manner. Expanding DRO organizations maintain their original structure but are expected to fulfill additional duties, either on their own accord or upon being specifically asked to. Finally, DRO organizations arise post-disaster either to fulfill a short-term need or to form a collective and informal network of community organizations to direct long-term recovery efforts. Such organizations often fill in the gaps that are left by the other organizations and have the ability to start from scratch and define its tasks in accordance with the interests of the group members that have formed the organization in the first place.

It was reported from the cyclone victims that half of the total (50.96%, n=104 of 120) and nearly one-third (32.26%, n=124 of 135) respondents opined about Government agencies dissemination of warning and evacuation of affected people in Rayenda and Uttar Sauthkhali respectively (total 40.80%, n=228 of 255), but only 4.40 percent opined that Govt. agencies disseminated warning repeatedly before cyclone Sidr. Moreover, it was very much alarming that 12.70 percent respondents had not able to take any kinds of responses in Sidr. In Aila, it was reported from the cyclone victims that respectively above one-third (36.45%, n=107 of 120) and nearly one-third (26.17%, n=112 of 135) (total 31.50%, n=219 of 255) opined about Govt. agencies early warning and evacuation and nearly one-third (26.78%,

n=107 of 120) and nearly one-third (31.25%, n=112 of 135) (total 28.80%, n=219 of 255) affected people opined about repeated warning dissemination in Rayenda and Uttar Sauthkhali (Table 65).

In Aila a new criteria of GO response, saved lives and properties by proper evacuation, was added and 8.70 percent respondents were saved their lives and properties by responding this one in contrast to Sidr. These also alarming that 7.80 percent respondent were unable to take any kinds of responses in Aila. In Sidr the inhabitants of Uttar Sauthkhali got little Governmental responses in contrast to Rayenda. For this and other natural reasons it was sought that Govt. took special interest on Uttar Sauthkhali region to performing various responses before cyclone Aila. Nevertheless, respectively 42.10 and 23.30 percent cyclone affected people in both villages did not get any kinds of response in Sidr and Aila (Table 65).

Governmental Responses before Cyclone Sidr and Aila

Criteria of GO Responses (Sidr)	Study Villages						Valid % of N=228
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Early warning and Evacuation	53	44.17	40	29.63	93	36.47	40.80
Repeated dissemination of warnings	1	0.83	9	6.67	10	3.92	4.40
Don't get any responses	36	30.00	60	44.44	96	37.65	42.10
Unable to take any responses	14	11.67	15	11.11	29	11.37	12.70
Absent GO Responses	16	13.33	11	8.15	27	10.59	
Total	120	100	135	100	255	100	100
Criteria of GO Responses (Aila)	Study Villages						Valid % of N=219
	Rayenda		Uttar Sauthkhali		Total		
	n	%	N	%	n	%	
Early warning and Evacuation	39	32.50	30	22.22	69	27.06	31.50
Repeated dissemination of warnings	28	23.33	35	25.93	63	24.71	28.80
Proper evacuation for save lives and properties	7	5.83	12	8.89	19	7.45	8.70
Don't get any responses	24	20.00	27	20.00	51	20.00	23.30
Unable to take any responses	9	7.50	8	5.93	17	6.67	7.80
Absent GO Responses	13	10.83	23	17.04	36	14.12	
Total	120	100	135	100	255	100	100

*Multiple answers computed

6.4.3 Criteria of GO Responses during Cyclone

It was reported from the cyclone victims that 15.80 percent and 4.10 percent respondents of both villages got safe shelter and foods in cyclone Sidr and Aila respectively. While 16.70 percent, 21.90 percent

and 14.20 percent, 46.60 percent respondents got safe foods and water, and safe shelter in cyclone Sidr and Aila respectively. Data explored an extra variable—helps to carry belongings—at the time of cyclone Aila, and 2.70 percent respondents of Rayenda got the extra facilities in time of Aila (Table 66).

Table 66
Criteria of GO Responses during Cyclone

Criteria of GO Responses (Sidr)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent, N=228
Safe shelter and foods	16	20	36	14.10	15.80
Safe foods and water	23	15	38	14.90	16.70
Safe shelter	21	29	50	19.60	21.90
Don't get any responses	36	60	96	37.60	42.10
Unable to take any responses	8	0	8	3.10	3.50
Total Valid Total (228)	104	121	228	89.40	100
Absent GO Responses (Out of 255)	16	11	27	10.60	
Total	120	135	255	100	--
Criteria of GO Responses (Aila)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid Percent, N=219
Safe shelter and foods	3	6	9	3.50	4.10
Safe foods and water	15	16	31	12.20	14.20
Helps to carry belongings	6	0	6	2.40	2.70
Safe shelter	44	58	102	40.00	46.60
Don't get any responses	31	27	58	22.70	26.50
Unable to take any responses	8	5	13	5.10	5.90
Total Valid Total (219)	107	112	219	85.90	100
Absent GO Responses (Out of 255)	13	23	36	14.10	
Total	120	135	255	100	--

*Multiple answers computed

It was very much alarming that as usually nearly two-fourth (42.10%, n=228 of 255) and nearly one-third (26.50%, n=219 of 255), and 3.50 percent and 5.90 percent respondents of the both villages did not get any responses and unable to take responses in Sidr and Aila respectively. Significant differences did not exist between the two villages in terms of GO responses during cyclone Sidr and Aila except helped to carry belongings of cyclone affected people of Rayenda in time of Aila (Table 66).

6.4.5 Criteria of GO Responses after Cyclones

Search and rescue activities begin immediately after a cyclone landfall. However, there were trained volunteers at the time of Sidr but they did not play significant role in search and rescue cyclone affected people rather than affected family members who have lost their partners or members. Only 5.30 percent and 6.40 percent respondents opined about GO agencies search and rescue activities after the Sidr and Aila respectively (Table 67). The current study identifies some reasons for not performing search and rescue in wide range. Volunteers who can take initiative to search and rescue are also victimized by cyclone and affected badly. Nevertheless, the volunteers have limited logistic support to rescue and search affected people.

Table 67
Criteria of GO Responses after Cyclone

Criteria of GO Responses (Sidr)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Various foods and infant foods and water	19	7	26	10.20	11.40
Undertaking search and rescue	5	7	12	4.70	5.30
Infant foods and rebuild house	22	25	47	18.40	20.60
Assistance to reconstruct damaged houses	5	4	9	3.50	3.90
New house	5	5	10	3.90	4.40
Buried dead and livestock	5	5	10	3.90	4.40
Medicine and saline	6	12	18	7.10	7.90
Care infants and women	5	0	5	2.00	2.20
Financial assistance	10	12	22	8.60	9.60
Don't get any responses	16	36	52	20.40	22.70
Unable to take any responses	9	8	17	6.70	7.50
Total Valid Total (228)	104	121	228	89.40	100
Missing Value (Out of 255)	16	11	27	10.60	
Total	120	135	255	100	--
Criteria of GO Responses (Aila)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Various foods and infant foods and water	17	30	47	18.40	21.50
Undertaking search and rescue	5	9	14	5.50	6.40
Infant foods and reconstruct house	14	9	23	9.00	10.50
New house	0	11	11	4.30	5.00
Medicine and saline	17	6	23	9.00	10.50
Care infants and women	20	0	20	7.80	9.10
Don't get any responses	24	34	58	22.70	26.50
Unable to take any responses	13	10	23	9.00	10.50
Total Valid Total (219)	107	112	219	85.90	100
Missing Value (Out of 255)	13	23	36	14.10	
Total	120	135	255	100	--

*Multiple answers computed

After cyclone, GO agencies took special initiatives by providing immediate responses. For this reason, it was reported from the cyclone victims that 32 percent respondents in both villages got instant foods, baby foods, water and little aids to reconstruct damaged houses in time of Sidr and Aila. It was sought that after the two cyclones the health sector was severely affected. After Sidr a portion of the Sadar Thana Hospital was damaged roughly. So the GO agencies took some times to form Emergency Medicare System (EMS) for provide immediate medicare to injured. It was reported from the cyclone victims that 7.90 percent and 10.50 percent respondents opined that they got medical assistances after the cyclone Sidr and Aila respectively. And 4.40 percent respondents opined that they got helped from the GO agencies in terms of buried the dead bodies of human and livestock (Table 67).

In terms of long term assistances 3.90 percent and 10.50 percent respondents opined that they got financial assistance to reconstruct their damaged houses after cyclone Sidr and Aila respectively. After cyclone Sidr the Saudi Arabian Government sent some direct financial assistance to Bangladesh Government to build new house for the houseless people of Sidr. The Local Govt. agencies performed a survey and found some actual houseless people, and built house for them. It was saught that 4.40 percent respondents got new houses for living after 8 months the Sidr landfall. As usually it was very much alarming

that above one-fifth (22.70%, n=228 of 255) and above one-fourth (26.50%, n=219 of 255) respondents of the both villages did not get any kinds of responses after the cyclone Sidr and Aila respectively (Table 67).

Tropical cyclone is highly destructive event and is somewhat unpredictable in its behavior, 'yet there are many ways to minimize disasters, and the most effective ones involve heightened communication with first responders and communities at risk'. Emergency response operations are also more effective when the Government organizations from different sectors interact with one another prior to a disaster. Pre-disaster communication is a key aspect of truly effective community preparedness and response. Though Government has positive will to handle the emergency response operation but it will is interrupted by various factors. In emergency response situation a coordination authority is exist but it is frequently underfunded, poorly resourced and even ignored by the different Govt. agencies. Nevertheless, the Govt. agencies faced political pressure to perform emergency response operation. The politicians usually interrupted immediate and long term aids disbursement operations after a disaster and create repeated pressure to distribute emergency aids to their apprentices. Thus the actual victims are neglected and deprived. This political practice may name as disaster and it triggering the vulnerability and negative impacts of disasters.

Disaster prevention, mitigation and preparedness of disasters are a wide range of structural and non-structural measures. However, it is recognized that governments alone cannot achieve significant, sustainable hazard risk reduction and that greater emphasis must be placed upon local-level and community-based approaches and indigenous knowledge and coping strategies supported by NGOs. Indeed, NGOs appear to be well placed to play a significant role in this area. NGOs tend to work with poorer and more marginalized groups in society. Moreover, the participatory approach to development pursued by many NGOs offers them an opportunity to examine the nature of communities' vulnerability and, on the basis of this analysis, to incorporate appropriate emergency response measures into their work.

NGO involvements, in recent decades, are widely spread out behind the following reasons:

1. they have direct links with the grassroots and work with the most vulnerable;
2. they can easily identify potential threats and vulnerabilities;
3. they can support local coping strategies and mobilize people's capacities;
4. they are well placed to test, develop and disseminate innovations;
5. they have often broad-based approach to community development opens the way towards a more holistic approach to disasters than

that of many other influential actors who address the subject from a single scientific or technical angle (Benson Charlotte, J. Twigg and M. Myers: 2001).⁹⁹

6.4.6 Criteria of NGO Responses before Cyclones

It was evident from the cyclone victims that NGOs played very little role on emergency responses before cyclone Sidr. It was empirically found that 7.90 percent cyclone affected people opined about NGOs warning dissemination and evacuation and 4.40 percent opined that NGOs volunteers helped them to carry their valuable belongings and children to go safe places before the cyclone Sidr (table 68). None of the respondents opined about NGOs repeated dissemination of cyclone warnings while repeated warning dissemination could save lives. In Sidr the villagers of Uttar Sauthkhali were very much deprived form NGOs emergency responses before cyclone.

⁹⁹ Benson C. J. Twigg and M. Myers, “NGO Initiatives in Risk Reduction: An Overview”, *Disaster*, vol. 25, issue 3, p 204

Table 68
Non Governmental Responses before cyclone Sidr and Aila

Criteria of NGO Responses (Sidr)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Early warning and Evacuation	16	2	18	7.10	7.90
Proper evacuation for save lives and properties	7	3	10	3.90	4.40
Repeated dissemination of warnings	0	0	0	0	0
Unable to access responses	17	29	46	18.00	20.20
Don't get any responses	64	90	154	60.40	67.50
Total Valid Total (228)	104	124	228	89.40	100
Missing Value (Out of 255)	16	11	27	10.60	
Total	120	135	255	100	--
Criteria of NGO Responses (Aila)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Early warning and Evacuation	37	46	83	32.50	37.90
Repeated dissemination of warnings	9	2	11	4.30	5.0
Proper evacuation for save lives and properties	0	0	0	0	0
Unable to access responses	11	6	17	6.70	7.80
Don't get any responses	50	58	108	42.40	49.30
Total Valid Total (219)	107	112	219	85.90	100
Missing Value (Out of 255)	13	23	36	14.10	
Total	120	135	255	100	--

*Multiple answers computed

In Aila, above one-third (37.90%, n=219 of 255) cyclone affected people opined that more than five NGOs disseminated early warning and NGOs volunteers played vital role to evacuate them before cyclone. In Aila, NGOs disseminated early warnings repeatedly for that reason 5

percent respondents opined that they heard NGOs volunteers disseminated warnings several times before cyclone (Table 68).

But it was usually alarming that nearly two-third (61.54%, n=104 of 120) and above two-third (72.58%, n=124 of 135) (total 67.50%, n=228 of 255) and nearly half of the total (46.73%, n=107 of 120) and half of the total (51.79%, n=112 of 135) (total 49.30%, n=219 of 255) respondents in Rayenda and Uttar Sauthkhali did not get any kinds of NGOs emergency responses before cyclone Sidr and Aila respectively. Nevertheless, respectively 20.20 percent and 7.80 percent respondents did not able to respond in NGOs emergency responses in Sidr and Aila respectively (Table 68).

Case 7

Ahmed Sabur Khan, Official of Rupantar, Age 43

I live in Rayenda with my family. I have been working in Rupantar since 2000. Rupantar basically works with poor village women who want to change their life by self income generating activities. Rupantar provides micro credit to those women. But in 2005 Rupantar inaugurated a program related to local biodiversity funded by World Bank. Since that time Rupantar have been arranging various training and grooming sessions and providing training to women of different programs. When the danger signal claimed by the BMD in Sidr six members of my NGO headed by myself went out early in the morning in 15 November 2007. We disseminated warning through hand mic and mega phone to the inhabitants of *Jale Para* near the embankments of Balashwer giving the message of Sidr and requesting them to evacuate the area by going cyclone center near the Rayenda. Approximately 3 hours we disseminated warnings but due to heavy rain before the noon we postponed our micing. After lunch we went out again and disseminated warning in *Maddha Para* of Sauthkhali but due to heavy muddy road we were unable to go forward. We came back to NGO office and waiting here till evening.

Which NGOs were taking part in emergency responses before cyclone Sidr and Aila to this type question an official of *Thana NGO Coordination Bureau* told, "in Sidr an international NGO—Red Cross and a local NGO—Rupantar played vital role for disseminating warnings and evacuating affected people while in Aila nearly 7 or 8 International, National and Local NGOs played those roles."

6.4.7 Criteria of NGO Responses during Sidr and Aila

It was empirically found that respectively 9.60 percent, 28.90 percent and 7.90 percent cyclone affected people got NGOs' safe shelter and foods, safe water and foods, and safe shelter during cyclone Sidr. In contrast to the cyclone-affected people of Rayenda, the people of Uttar Sauthkhali got less emergency aids of NGOs. It was reported from the cyclone victims that nearly one-fifth (16.35%, n=104 of 120) and nearly half of the total (47.58%, n=124 of 135) respondents of Rayenda and Uttar Sauthkhali did not get NGO's response during the disaster of Sidr. Therefore, it was found that respectively nearly one-third (29.80%, n=228 of 255) and 7.90 percent cyclone victims did not get any kind of emergency help during the disaster of Sidr and Aila (Table 69). For this reason, cyclones created losses were higher in Uttar Sauthkhali than Rayenda.

For this consequence, in time of Aila the NGOs have been provided especial concern in emergency responses in Uttar Sauthkhali that was clarified by the cyclone victims of Uttar Sauthkhali. Respectively 12.80 percent, 56.20 percent, 5.90 percent and 5 percent cyclone affected

people opined about NGOs' safe shelter and foods, safe water and foods, clean debris of cyclone shelter and safe shelter during cyclone Aila. Significant difference exists among the NGOs' emergency response services in Aila to Sidr. In Aila, the NGOs took especial concern to provide safe foods and water among the cyclone-affected people and tried to meet up their emergency needs. However, it was empirically found that respectively 10.28 percent and 4.46 percent cyclone victims of Rayenda and Uttar Sauthkhali did not get NGO's response during the disaster of Aila. Moreover, it was very much alarming that respectively 10.10 percent and 7.30 percent cyclone victims opined that they were unable to take any kind of emergency responses provided by various NGOs during the disaster of Sidr and Aila (Table 69).

Table 69
Criteria of NGO Responses During Sidr and Aila

Criteria of NGO Responses (Sidr)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Safe shelter and foods	8	14	22	8.60	9.60
Safe foods and water	50	16	66	25.90	28.90
Extra care for children and aged	13	10	23	9.00	10.10
Safe shelter	10	8	18	7.10	7.90
Don't get any responses	17	59	76	29.80	33.40
Unable to access responses	6	17	23	9.10	10.10
Total Valid Total (228)	104	124	228	89.40	100
Missing Value (Out of 255)	16	11	27	10.60	
Total	120	135	255	100	--
Criteria of NGO Responses (Aila)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Safe shelter and foods	15	13	28	11.00	12.80
Safe foods and water	56	67	123	48.20	56.20
Extra care for children and aged	12	0	12	4.70	5.50
Clean cyclone center	6	7	13	5.10	5.90
Safe shelter	0	11	11	4.30	5.00
Don't get any responses	11	5	16	6.30	7.30
Unable to access responses	7	9	16	6.30	7.30
Total Valid Total (219)	107	112	219	85.90	100
Missing Value (Out of 255)	13	23	36	14.10	
Total	120	135	255	100	--

*Multiple answers computed

It was evident from the cyclone victims that were shown in a cross tabulation that stated the scenario of cyclone affected people staying during cyclone in Sidr and Aila reported that people preferred to stay in

self-home rather than to go cyclone center in time of Sidr. But in Aila the scenario of staying self home was totally changed and this time people preferred to go safe places—cyclone center and school building—rather than other options (Table 70). The tendency to stay in self-home was more likely to see in poor people rather than the rich. The current thesis found that middle class tendency to go safe places was different from the rich and poor people. They sent their female, aged and younger family members to safe places and some of their energetic family members stayed in home during cyclone to protect their properties from stealing. For this reason, the death tolls are higher in poor and middle class families rather than the rich one.

Table 70

Staying During Cyclone (Sidr) * Staying During Cyclone (Aila) Crosstabulation

Count		Staying During Cyclone (Aila)				Total
		stay in self home	stay in nearing school	stay in cyclone shelter	others	
Staying During Cyclone (Sidr)	stay in self home	31	53	73	4	161
	stay in nearing school	4	33			37
	stay in cyclone shelter	11	8	28	3	50
	others		6	1		7
Total		46	100	102	7	255

6.4.8 Criteria of NGO Responses after Sidr and Aila

After cyclone Sidr, various types of NGOs were coming forward with their various aids and distributing them by their own work force or by the help of local Govt. authorities. It was evident from the cyclone victims that respectively nearly one-third (22.80%, n=228 of 255) and nearly one-third (32.80%, n=219 of 255) cyclone-affected people got

NGOs' immediate response aids—various foods, safe water, infant foods and reconstruct damage houses—after the cyclone Sidr and Aila. In terms of medicare, it was sought NGOs provided more medicare facilities in time of Sidr (12.30 percent) than Aila (7.30 percent). In terms of long term responses, respectively 13.20 percent, 11.40 percent and 17.10 percent cyclone affected people opined about NGOs' providing financial assistance to reconstruct houses, new houses and financial assistance by cash in Sidr while 8.20 percent, 3.70 percent and 14.20 percent in Aila (Table 71).

It was empirically found that 13.46 percent (n=104 of 120) and 4.84 percent (n=124 of 135), and 6.54 percent (n=107 of 120) and 8.93 percent (n=112 of 135) cyclone victims of Rayenda and Uttar Sauthkhali did not get NGO's response during the disaster of Sidr and Aila respectively. Moreover, 8.30 percent (n=228 of 255) and 4.60 percent (n=219 of 255) cyclone victims opined that they were unable to take any kind of emergency responses provided by various NGOs after the disaster of Sidr and Aila respectively (Table 71).

About long term assistance: financial assistance to reconstruct houses, new houses and financial assistance by cash, it was empirically found that nearly half of the total (43.27%, n=104 of 120) and nearly half of the total (40.32%, n=124 of 135), and nearly one-third (31.77%, n=107 of 120) and one-fifth (20.54%, n=112 of 135) cyclone affected-people of Rayenda and Uttar Sauthkhali got long term assistances from the

various NGOs after the disaster of Sidr and Aila respectively (Table 71).

Table 71
Criteria of NGO Responses after Sidr and Aila

Criteria of NGO Responses (Sidr)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Various foods and infant foods and water	6	19	25	9.80	11.00
Infant foods and reconstruct house	15	12	27	10.60	11.80
Assistance to reconstruct damaged houses	14	16	30	11.80	13.20
New house	16	10	26	10.20	11.40
Medicine and saline	12	16	28	11.00	12.30
Care infants and women	8	6	14	5.50	6.10
Financial assistance	15	24	39	15.30	17.10
Don't get any responses	14	6	20	7.80	8.80
Unable to access responses	4	15	19	7.50	8.30
Total Valid Total (228)	104	124	228	89.40	100
Missing Value (Out of 255)	16	11	27	10.60	
Total	120	135	255	100	--
Criteria of NGO Responses (Aila)	Rayenda	Uttar Sauthkhali	N	percent of N	Valid percent
Various foods and infant foods and water	11	15	26	10.20	11.90
Infant foods and reconstruct house	11	37	48	18.80	21.90
Assistance to reconstruct damaged houses	4	14	18	7.10	8.20
New house	5	3	8	3.10	3.70
Medicine and saline	9	7	16	6.30	7.30
Care infants and women	13	14	27	10.60	12.30
Financial assistance	25	6	31	12.20	14.20
Help to clean damaged house	7	11	18	7.10	8.20
Don't get any responses	7	10	17	6.70	7.80
Unable to access responses	8	2	10	3.90	4.60
Total Valid Total (219)	107	112	219	85.90	100
Missing Value (Out of 255)	120	135	36	14.10	
Total	120	135	255	100	--

*Multiple answers computed

The reason behind the little long term assistances in Aila than Sidr was variation of damages between Sidr and Aila. In terms of damaging Sidr was more powerful and damaged totally but Aila did not instantly damaged people lives and properties like Sidr while its long term damaging was massive due to saline water. However, NGOs performed their emergency responses widely, 8.30 percent and 4.60 percent cyclone affected people could not access emergency responses after Sidr and Aila respectively while 8.80 percent and 7.80 percent did not get any kinds of NGO responses in Sidr and Aila respectively (Table 71).

The emergency responses done by the organization (GO & NGOs) in Aila were wider than Sidr. But it is much unexpected that the cyclone affected community did not respond in right time. For this reason it triggers damages twice the regular. In Sidr those people who heard the cyclone early warning repeatedly, most of them unconsciously stayed their houses and helped to increase death toll. Some of them did not rely on organization early warning, which has been discussed earlier.

It was empirically found that above one-third (34.10%, n=255) and above two-third (79.20%, n=255) cyclone affected people of Rayenda and Uttar Sauthkhali stayed in safe places during disaster of Sidr and Aila respectively. That means nearly two-third (65.90%, n=255) and one-fifth (20.80%, n=255) cyclone affected people of Rayenda and Uttar Sauthkhali stayed in their self-houses during Sidr and Aila (table 72). In this consequence, people accepted submissive death and injury in Sidr while there were no human deaths in Aila. Maximum deaths and injuries were occurred by hushed up of roof or broken trees log. Data showed significant correlation among death and injury to staying during self houses during cyclone Sidr (Table 72).

Table 72
Correlation between Staying During Sidr and Aila

Staying During Cyclone (Aila)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	stay in self home	46	18.0	18.0	18.0
	stay in nearing school	100	39.2	39.2	57.3
	stay in cyclone shelter	102	40.0	40.0	97.3
	others	7	2.7	2.7	100.0
	Total	255	100.0	100.0	

Staying During Cyclone (Sidr)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	stay in self home	161	63.1	63.1	63.1
	stay in nearing school	37	14.5	14.5	77.6
	stay in cyclone shelter	50	19.6	19.6	97.3
	others	7	2.7	2.7	100.0
	Total	255	100.0	100.0	

Correlations					
		Number of Death	Staying During Cyclone (Sidr)	Staying During Cyclone (Aila)	Injured
Number of Death	Pearson Correlation	1.000	.338**	-.075	
	Sig. (2-tailed)	.	.000	.233	
	N	255	255	255	
Staying During Cyclone (Sidr)	Pearson Correlation	.338**	1.000	.009	
	Sig. (2-tailed)	.000	.	.884	
	N	255	255	255	
Staying During Cyclone (Aila)	Pearson Correlation	-.075	.009	1.000	
	Sig. (2-tailed)	.233	.884	.	
	N	255	255	255	
Injured in Sidr	Pearson Correlation	-.100	-.048	.143*	
	Sig. (2-tailed)	.111	.450	.022	
	N	255	255	255	
Injured in Aila	Pearson Correlation	.080	-.100	-.117	
	Sig. (2-tailed)	.203	.111	.062	
	N	255	255	255	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

In any disaster what matters most is the time gap between the disaster event and the response that follows. Most of the damage to lives and

properties occur during the period of this gap. Therefore it is not a right idea to leave the responsibility of saving lives to the government agencies alone. The response to a disaster should start where the disaster strikes. If that response comes from an organized local group, then the loss of lives and assets can be minimized. While preparedness is vital in reducing the loss of lives, more important is changing the context of communities that make them vulnerable. The context in this case is their risky habitations, poor housing and sanitation conditions. They are in this context due to abject poverty, lack of health awareness and education. So it is not necessary to arise the question, "what should have been done in that tow very cyclones?" rather try to adopt a participatory approach to problem and solution identification can be strengthened the community bondage.

6.5. Response variation Based on Class, Gender and Age

There is a general lack of research on class, gender and age differences in vulnerability to and impact of disasters. The limited information available from small scale studies suggests that there is a pattern of class and gender differentiation at all levels of the disaster process: exposure to risk, risk perception, preparedness, response, physical impact, psychological impact, recovery and reconstruction (ICRC

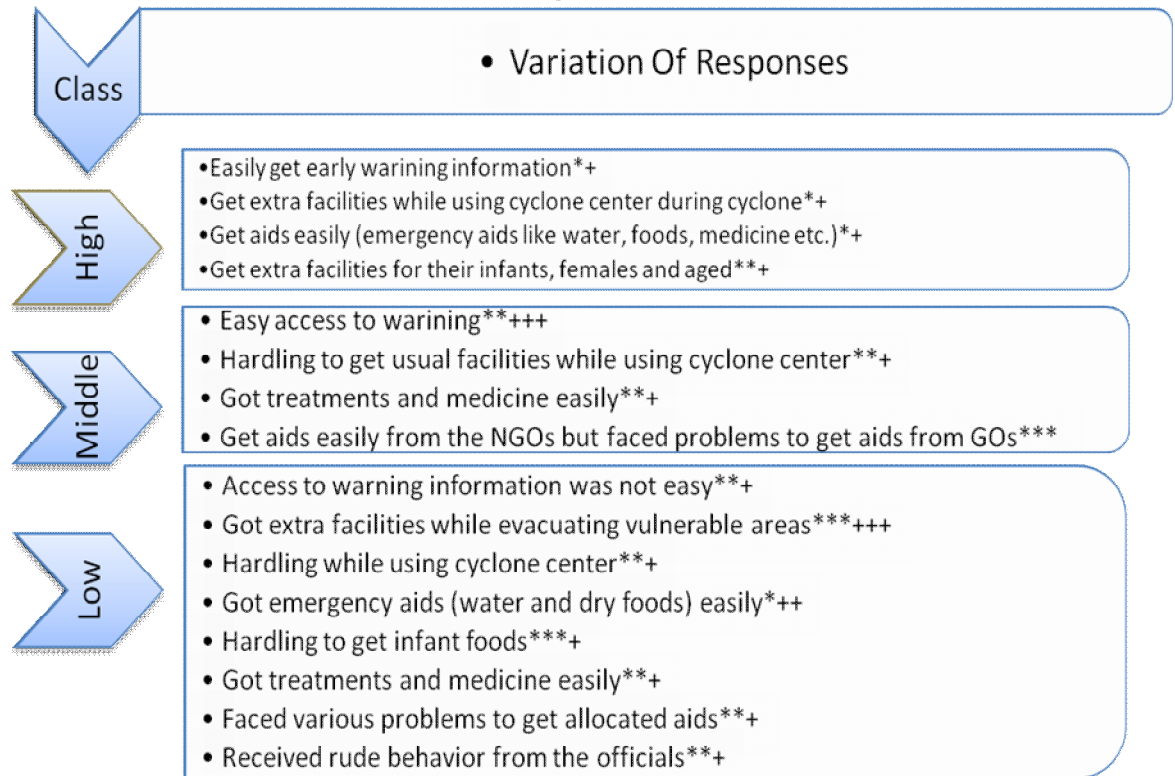
World Disaster Report 2000).¹⁰⁰ The current study discovered age based differentiation in emergency responses done by the community and organizations. When a community compounded by a disaster lower value ascribed to the young who belongs age group 16 to 40. Nevertheless, some societies comparatively show lower value to women or girls. And higher class ascribed better concern and value in terms of class differentiation.

In emergency response, current study discovers that class is an important variable for response differentiation among the emergency response actors. However, the respondents of this study are not solvent by economically but they belong difference class in their own society. The inhabitants of Rayenda village are economically solvent than the inhabitants of Uttar Sauthkhali but response differentiation in Uttar Sauthkhali is more than Rayenda. It was reported from the cyclone victims that higher class of Rayenda got easy access to early warning information before cyclone, got extra facilities using cyclone center during cyclone and got emergency aids easily rather than Uttar Sauthkhali. Lower class, on the one hand, got extra facilities in times of evacuation before cyclone and emergency aids and treatments, on the other hand, suffeeds very much to achieve emergency aids in contrast to high and middle class. In both villages, middle class had

¹⁰⁰ *World Disasters Report: Focus on Public Health -2000*, (IFRC: Geneva, 2000)

high satisfaction to get emergency responses before, during and after the cyclone disaster in Sidr and Aila times (figure 32).

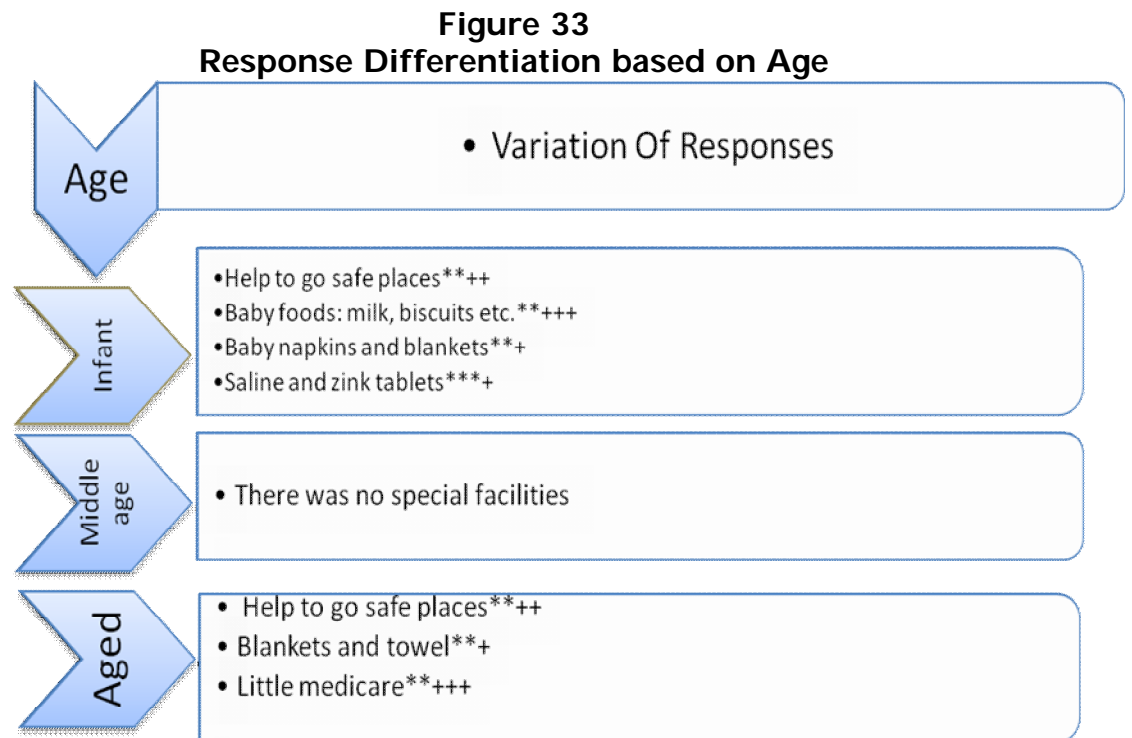
Figure 32
Differentiation of Responses Based on Class



- *Opinion of Cyclone affected people of Rayenda
- **Opinion of Cyclone affected people of both villages
- ***Opinion of cyclone affected of Uttar Sauthkhali
- +Organizational response
- ++Community response
- +++Both community and organizational response

Differentiation of responses based on age, it was observed that middle group age people of both villages in both disasters did not get any kind of special facilities. However, the infants and aged got especial concern by the community while evacuating vulnerable areas or go to safe places before cyclone Sidr and Aila. Otherwise, the infants and aged got average response before, during and after the Sidr and Aila. However, the infants of the both villages got extra

facilities during disaster but infants are dead significantly during Sidr (Figure 33). Infants of Uttar Sauthkhali were more vulnerable than Rayenda and infant death toll was higher in Uttar Sauthkhali (Figure 3).



*Opinion of Cyclone affected people of Rayenda
 **Opinion of Cyclone affected people of both villages
 ***Opinion of cyclone affected of Uttar Sauthkhali
 +Organizational response
 ++Community response
 +++Both community and organizational response

It was observed that men got general responses from the actors of emergency responses in Sidr and Aila time. However, the women had limited access to early warning information in times of Sidr and Aila. They were dependent for knowing the signals of early warnings to their husbands or father or their counter part elder/ younger brothers.

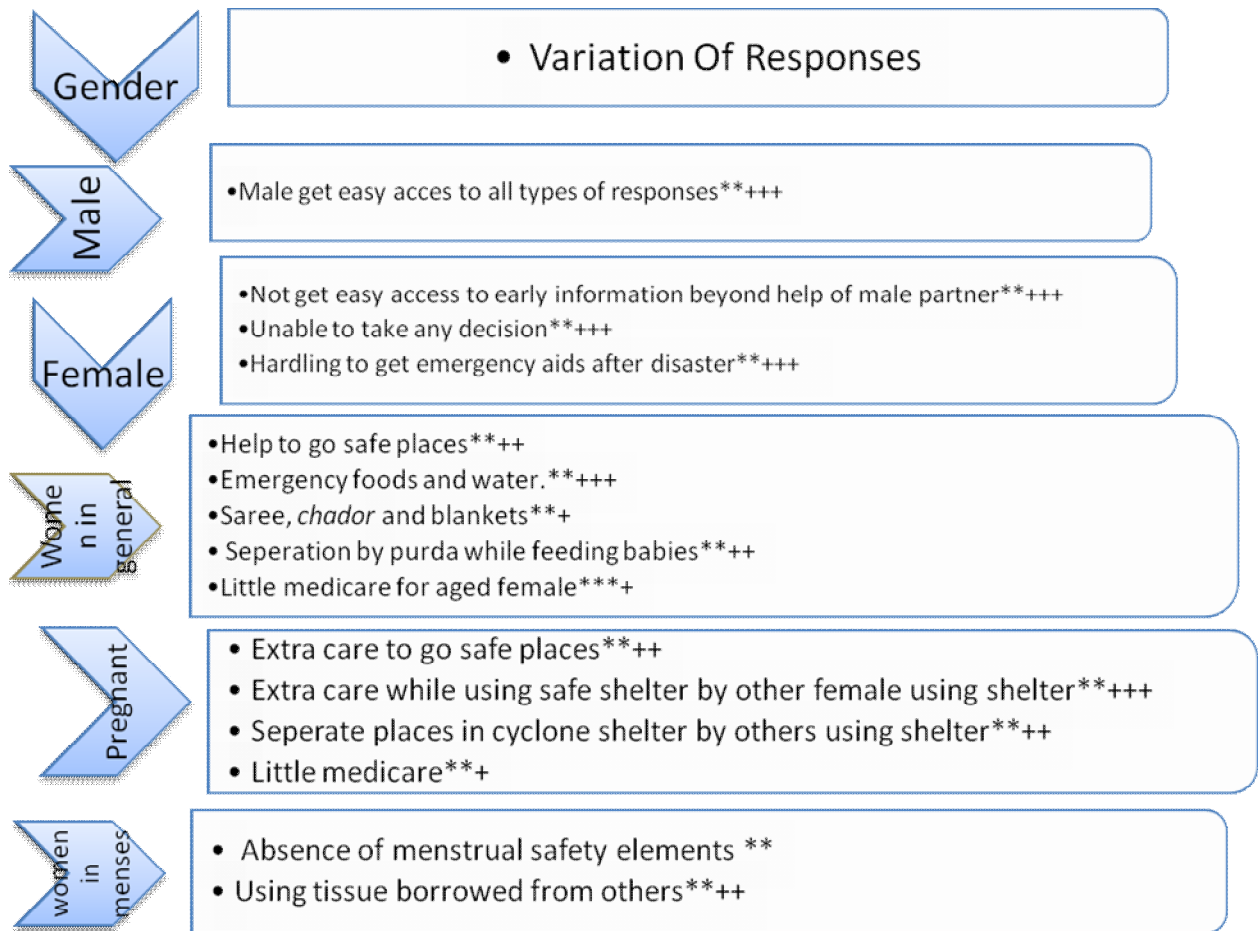
They did not have any power of decision making for leaving vulnerable houses and go to safe places while men ordered them to go safe places. Differences were also reported around post-disaster relief. Cultural norms have been found to inhibit women from visibly accessing relief centers, or they could not leave their homes to go to relief centers due to child care responsibilities. In addition, where women were forbidden to interact with male members of the community who are not their kin, they may have difficulties in accessing relief services from male relief workers. Further, where food distribution targets household heads, women may be systematically marginalized, as they would only be registered as household heads if no adult male was present (Figure 34).

Women in general and pregnant got extra facilities to go safe places by their community members. In disaster, pregnant faced several problems like early pregnancy loss, premature delivery, still births and delivery related complications. But it was reported that the pregnant got extra care by their families or neighbors during sharing cyclone shelter in times of Sidr and Aila. Some times they got separate place in shelter and got little middecare and treatments form the emergency response actors. Nevertheless, women and girls who were in menstrual cycle suffered tremendously. Because social taboos around menstruation of our society was not so liberal rather than restricted. Social norms about appropriate behavior for women and girls who

were in menstrual cycle were reported to contribute to health problems in young women in disaster situations (Figure 34).

In two cyclones—Sidr and Aila—the actors did not put especial concern by providing menstrual napkins or pads for the menses. They used unsafe cloths or tissues borrowed from their neighbor women who using shelter during or after the disaster. A woman reported perineal rashes and urinary tract infections after Sidr because they were not able to wash out menstrual rags properly in private, often had no place to hang the rags to dry, or access to clean water. They reported wearing the still damp cloths, as they did not have a place to dry them. Nevertheless, when they faced a serious trouble about whose life first—boy or girl—they helplessly provide priority to the boys.

Figure 34
Response Differentiation Based On Gender



- *Opinion of Cyclone affected people of Rayenda
- **Opinion of Cyclone affected people of both villages
- ***Opinion of cyclone affected of Uttar Southkhali
- +Organizational response
- ++Community response
- +++Both community and organizational response

Socially determined differentiations provide men extra facilities not only in general time but also in disaster time. Women’s vulnerability to the impact of disasters was also increased by socially determined differences in roles and responsibilities of women and men and inequalities between them in access to resources and decision-making power. The current study found, when injured women in times of Sidr

are asked about “Why they did not leave their house before disaster?”, many women of Rayenda and Uttar Sauthkhali perished with their children at home as they had to wait for their husbands to return and make an evacuation decision. By this consequence the death toll of women and infants is high than the male in Sidr time.

FGD 4 Place: Uttar Sauthkhali, Attending 12 women

Nehar Akter, age 26 is a mother of a son, reported that in time of Sidr, “I was cooking meals before the noon and hearing a cyclone may landfall on to night form our neighbor sister in law. After eating my meal I was waiting for my son’s father and seeking decision whether we went to cyclone center or not though the cyclone center was very near our house. After evening he came and told us to get ready to go cyclone center then we left our house to center. “ Narjina Begum, age 32, reported when she was in menstrual cycle using cyclone center in time of Aila but she did not have any napkin or pad to be used. She said, “I faced a miserable condition in that time and borrowed some tissue form other unknown girl and used this two times. Next days I used a part of my cloth but there was scarcity of water to clean that cloth. So helplessly I used that dirty and unsafe cloths several times.” Every woman said, “we were suffering to get GOs relief by maintaining queue with other male members and several times we fall down and injured.” Sakhina Khatun, age 28, said, “In time of Sidr when our house roof blew away and waves of water surge grasp us—me and ours son and daughter— I took shelter on a tree near our house with my son and daughter. But some times later a big waves came and helplessly unabled me to hold both of them and then I got a cruel decision (crying loudly) by releasing by daughter because our society think son has to carry on the family line.”

6.6. Emergency Response Variation among Actors (Community and Organization)

One of the most fundamental aspects of adaptation to cyclonic disasters and climate change is the capacity building of the people who mainly live in coastal areas of Bangladesh and used to face various disasters. The objective is to gain a better understanding of local knowledge and resources available for the adaptation of livelihoods. An assessment of the mismatch between information at the different levels can be made, and a method by which NGOs can assist in bridging that gap and highlighting the components of rural livelihoods that need increased support can be developed. A further key aspect of cyclonic disaster and climate change adaptation will be the resilience of standing structures of coastal inhabitants such as homes, schools and other public buildings to the increased hazard risk. It will provide the basis for matching local knowledge and needs assessment with national-level information and budget expectations. This will enable localities to identify the degree that local livelihoods (which are likely to be increasingly badly affected by coastal hazards) will or will not be able to permit the poor to improve their home structures to be wind and flood resistant, and the extent that local authorities will be able to protect schools and other public buildings.

Even though the NGO sector is in principle controlled by the GoB, and apparently NGOs and the GoB have similar development objectives, collaboration between them is not well developed, although there is a

growing recognition that the public, private and NGO sectors should make a concerted effort to improve collaboration. There exists a disconnect between, on the one hand, the widely declared need to start planning for adaptation at local, regional and national levels and, on the other hand, the knowledge base available at these levels to support such planning. This disconnection is based on two issues:

- The first is a lack of information at the local level about the potential risks of climate change and about national and international approaches and policies to reduce these risks.
- The second is a lack of information at the national and international level about local vulnerabilities, adaptation needs and development opportunities.

These two types of information deficit are not due to the non-existence of the relevant information. There is a wealth of information available, but for a variety of reasons relevant actors are either unaware of it, do not have access to it or cannot use it in the form in which it is made available. There is a mismatch between the information that is available, both at the local level and at the national and international level, and the information that is required at each level to engage successfully in adaptation to cyclone disasters and climate change, and its mainstreaming in development activities. To address these information deficits, it will be necessary to produce relevant information, raise awareness and build capacity, and develop mechanisms to ensure an effective exchange of information from

stakeholders' levels to national and international policymaking and vice versa through capacity building among the disastrous communities.

It was evident from the findings, cross tabulation of community emergency responses during Sidr and Aila, disclosed the fact that in Sidr community responses in Rayenda were very little. But in Aila it seemed to increase little. On the other hand, though the community bondage in Uttar Sauthkhali was stronger than Rayenda, the current study found community response in this village was same as Rayenda. But in Aila the situation was increasing and the same community people helped each other to survive (Table 73). In Uttar Sauthkhali, in Sidr time, the response or help to each other varied by homeless to homeless and homeless to non homeless. Those who were homeless, on the one hand, they did not pay attention to other homeless in fact and on the other hand, they helped each other to survive. Those who were non homeless, on the one hand, they came forward to help the homeless by giving shelter, and on the other hand, non homeless involved in stealing the valuable goods of the homeless. However, the homeless of Rayenda did not claim any incidents of stealing. Non homeless to non homeless—the current study found that they helped each other to send their young and woman members to go safe places basically cyclone shelter or nearby school building.

Table 73

Community Response in Sidr * Community Response in Aila in Raenda, Crosstabulation				
Count				
		Community Response in Aila		Total
		No	Yes	
Community Response in Sidr	No	33	26	59
	Yes	5	29	34
Total		38	55	93

Community Response in Sidr * Community Response in Aila in Uttar Sauthkhali, Crosstabulation				
Count				
		Community Response in Aila		Total
		No	Yes	
Community Response in Sidr	No	42	31	73
	Yes	12	17	29
Total		54	48	102

It was evident from the findings, cross tabulation of Govt. emergency response between Rayenda and Uttar Sauthkhali; found that Government agencies were very much interested to help Rayenda communities rather than Sauthkhali in Sidr time. In Aila, the situation developed and the Govt. agencies apparently helped Rayenda and Uttar Sauthkhali communities approximately in same way. It was shown that the Govt. agencies gave especial attention to the Uttar Sauthkhali inhabitants in Aila, though the expectation was higher than happenings (Table 74).

Table 74

Government Response in Sidr * Government Response in Aila in Raenda, Crosstabulation				
Count				
		Government Response in Aila		Total
		No	Yes	
Government Response in Sidr	No	18	15	33
	Yes	10	50	60
Total		28	65	93

Government Response in Sidr * Government Response in Aila in Uttar Sauthkhali, Crosstabulation				
Count				
		Government Response in Aila		Total
		No	Yes	
Government Response in Sidr	No	9	38	47
	Yes	40	15	55
Total		49	53	102

As Rayenda was the *Thana Sadar* of Sharankhola Upazilla, it was easily accessible to the Govt. agencies to allocate the emergency responses among the inhabitants of Rayenda than Uttar Sauthkhali. While NGOs’—international, national and local—responses were very little during in Sidr time in both Rayenda and Uttar Sauthkhali. But after the Sidr many NGOs were came forward to immediate and long term response. But in Aila NGOs took more emergency initiatives before, during and after the storm to the inhabitants of Rayenda and Uttar Sauthkhali (Table 75). However, the current study found, NGOs’ emergency response mechanisms before the disaster were too little to after the disaster. But INGOs have strong tools and mechanisms to

response before the disaster situation. They have trained volunteers to play important role to disseminate early warnings and evacuate people from vulnerable areas. However, the current study found that the INGOs did not enroll those mechanisms in full swings in time of Sidr than Aila. In Sidr only a local NGO enrolled their volunteers to disseminate early warnings while eight other NGOs were come forward to disseminate early warnings in Aila.

Table 75

NGO Response in Sidr * NGO Response in Aila in Raenda, Crosstabulation				
Count				
		NGO Response in Aila		Total
		No	Yes	
NGO Response in Sidr	No	17.00	87	104
	Yes	11	96	107
Total		28	183	211

NGO Response in Sidr * NGO Response in Aila, Uttar Sauthkhali Crosstabulation				
Count				
		NGO Response in Aila		Total
		No	Yes	
NGO Response in Sidr	No	28.00	96	124
	Yes	5	107	112
Total		33	203	236

Cross tabulation of community and organization response between Sidr and Aila found that there were significant differences on emergency responses between community and organization in Sidr time. Organizational responses were several times higher than

community responses in Sidr. On the other hand, there were same variations between community and organizational responses in Aila time (Table 76). That means the coastal communities of Bangladesh are not enough aware and resilient to adapt disaster situation as well as incapable to enhance their capacity to adopt knowledge regarding to cope with disasters.

Table 76

Community Response in Sidr * Organizational Response in Sidr Crosstabulation				
Count				
		Organizational Response		Total
		No	Yes	
Community Response in Sidr	No	42	106	148
	Yes	54	26	80
Total		96	132	228

Community Response in Aila * Organizational Response in Aila Crosstabulation				
Count				
		Organizational Response in Aila		Total
		No	Yes	
Community Response in Aila	No	40	56	96
	Yes	40	83	123
Total		80	139	219

For this reason, an international consortium consisting of the Stockholm Environment Institute, the Natural Resources Institute at the University of Greenwich, the International Institute for Environment and Development, the Potsdam Institute for Climate Impact Research, The World Conservation Union (IUCN), CARE

Bangladesh, and the Bangladesh Centre for Advanced Studies is currently developing a project which aims to support and advance adaptation to climate change and its mainstreaming into development activities in Bangladesh. It is envisaged that these goals will be achieved by enabling Organizations and stake holders (coastal communities) from the grassroots to the national level to work together in producing and sharing knowledge, insights and know-how; producing and disseminating comprehensive and updated information on disasters, climate change; and developing a long-term community based disaster management vision towards establishing an effective and efficient dialogue between the GoB and NGOs on adaptation and development.

6.7. Conclusion

After the cyclones (Sidr and Aila), large volumes of emergency aids and vast array of actors come forward to help the cyclone affected communities of coastal Bangladesh. There is a general tendency of responding such type of disaster is to get affected people some aids like foods, water, medicine and some financial assistance. But coastal communities want to get a permanent solution by demanding to develop a self resilient communities with the help of organizations where the two actors—affected communities and organizations—play a vice versa role and community is the main actors for enforcing disaster related programs and operations.

Rehabilitation should look beyond reinstating the problems of the past and seek to address the root causes of vulnerability of coastal people and communities and to build their resilience to future threats and capacity to exploit opportunities. Rehabilitation of coastal livelihoods is not merely about giving people jobs and financial assistances; it requires addressing fundamental social, economic and environmental reforms that affect coastal communities and livelihoods. Achieving progress in this direction means those providing assistance must engage coastal communities in a dialogue about the future they envision, the steps needed to get there, and the lessons learned along the way. At the same time it requires engaging a much broader array of actors across government, civil society and the private sector to build both understanding of the reforms needed and the commitment to undertake them. As lessons are learned, from both successful and unsuccessful interventions, they need to be shared with others for use now and in the future.

CHAPTER 7

EXPECTED AND ACTUAL RESPONSES TO CYCLONE VICTIMS' NEEDS

The chapter deals with the expected responses to enormous needs of cyclone victims from various sources and actual responses from those sources received by the victim coastal people. Also it finds out how the community and organizations responded to their needs. The chapter is four-folded: firstly, cyclone victims' need assessment by analyzing SOD relating to national level institutional needs; secondly, expected and actual responses by the community to the cyclone victims' needs; thirdly, expected and actual responses by the organizations to the cyclone victims' needs; and lastly, comparison between effectiveness of community and organizational responses to those needs. The chapter depicts that the pre-cyclone and during cyclone needs of the coastal inhabitants are found same in Sidr and Aila, but the post cyclonic needs are varied by cyclone's intensity and range of destruction. So, the post cyclone disaster needs varied by Sidr and Aila are mentioned separately in this chapter.

The coastal communities depend highly on the natural resources for earning livelihoods as most of them are poor in their economic standing. Such high dependence on environment is the prime source of vulnerability of the coastal livelihood. The average level of poverty of the coastal district is higher than the national average by 3 percent. Around half of the extreme poor households live in the high to very

high risk cyclone inundation area. Homelessness, food insecurity and loss of other livelihood outcomes cause household to fall in credit trap. There is high variation of the consumption of food produced by the households themselves which is low at 3-4 months for moderate, high and very high cyclone risk areas. In contrast, households living in low cyclone risk area can afford to consume from own production around 11 months of the year. Thus households living in high risk zones are more vulnerable to natural disasters such as cyclone.¹⁰¹

The individual or household vulnerability and need are determined by access to resources and the diverse sources of income, as well as by social status of individuals or households within a community. The household vulnerability of coastal population arises out of the complete or partial destruction of their dwelling houses, capital assets and loss of income potential and also access to resources. So, coastal inhabitants' needs related to disaster are diversified as its usual motives and various tensions.

7.1 Coastal People Disaster Need Assessments

The assessments provide an overview of the damage, losses and needs at the time the assessment is conducted. Assessment teams must move beyond this 'snapshot' in time and, through analysis of baseline

¹⁰¹ Abul Barkat et al, *Guidelines to Reduce the Economic Risk of Coastal Livelihood due to Tsunami/Cyclone*. (Dhaka:Ministry of Food and Disaster Management, 2008) p11

and key information data, identify trends while instituting an indicator-based monitoring system for the risk management process. This work may provide future assessors a baseline from which to work. For many reasons, needs assessments in a disaster situation are far from straightforward, especially with respect to constructing the assessment instrument(s) and sampling approaches that minimize problems of bias and missing data, limit the number of assessments that people coping with crisis must face and facilitate relatively rapid and illuminating data collection.

The assessments are critical for effective pre-disaster warning, effective evacuation, reconstruction and recovery planning. An assessment should document the extent, nature and implications of damage that occurred as a result of a disaster outline the investments that are required to repair or replace damaged or lost assets, restore access to services and determine the significance of economic losses. Assessments need to articulate how to return vital assets and services to functional status based on the needs and priorities of affected populations. The assessment should lead to a recovery framework for recovering from disaster and improving pre-disaster conditions in order to advance long-term development goals and reduce the risks of future disasters.¹⁰²

¹⁰² Global Facility for Disaster Reduction and Recovery, *Post-Disaster Needs Assessments-volume A Guidelines*, (Kobe: International Recovery Platform, UNISDR, 2013) p18

The disaster need assessment of coastal people of Bangladesh is critically related their vulnerability, requires understanding the diversity of coastal people and communities, especially in relation to their livelihood strategies. Coastal people need assessment identifies the vulnerability of the economic sectors due to the cyclone and storm surges separately. Based on the identified sectoral vulnerability and the stakeholders' perception, coastal people disaster need assessment serves two primary purposes: first, it informs the coastal community's own response priorities and plans; second, it can support the coastal community's international appeal for outside assistance should the disaster be of such a magnitude that the coastal community cannot meet its humanitarian obligation within the limits of its own resources. It helps to increase resilience of the coastal livelihood to the adverse impact of hazards like cyclone and tidal surges.

7.1.1 Cyclone Affected People Need Assessments

Based on the coastal climate risk analysis, the Coastal Disaster Need Assessment (CDNA) intends to gather data related to coastal people various vulnerabilities: livelihood vulnerabilities, housing vulnerabilities, vulnerabilities of food security, access to information and knowledge, access to resources and vulnerabilities to meeting their needs. Individual (or household) vulnerability is determined by access to resources and the diversity of income sources, as well as by social status of individuals or households within a community. Vulnerability of the coastal population arises out of the complete or

partial destruction of their houses, capital assets, loss of income potential as well as disability to access fooding, knowledge and information and long term development assistances.

7.1.2 Nature of Needs

When cyclone strikes land, high winds, exceptional rainfall and storm surges cause relentless damages which induce multifaceted needs to the cyclone affected individuals. Cyclone affected people needs have usually been associated with many factors of environment and cultural fashion. Rogge (1991) grouped the factors behind the need into two categories: environmental factors and social factors. Flood, storm, earthquake, land slide and pest attack are regular environmental causes and the periodic environmental causes are tidal surge, cyclone, drought, riverbank erosion, war, arsenic mitigation etc. The social factors have been categorized by human oriented causes and institutional causes. The human oriented causes are as follows: ignorance, superstition, traditional fashion, fatalism, greed, scarcity of logistic support organizations and imprudent mentality. The institutional causes includes unequal access to information and resources, concentration of power and resources, indifferent and competing administration, corrupted norms, lack of ethics and under funding. These factors cause environmental and social hazards that

bring out the level of existing vulnerability of coastal people and marginalized coastal inhabitants of Bangladesh.¹⁰³

The cyclone affected people of Rayenda and Uttar Sauthkhali depend highly on the natural resources for earning livelihood. So, catastrophic attack of cyclone Sidr and Aila made them more vulnerable. They lost their shelter, lost their crops which made them food unsecured, lost their other tangible goods, boats and nets, lost their family members which broke their moral courage. As a result, they rendered and destitute. The high number of destroyed and damaged houses in Sidr and Aila indicated that shelters have been severely affected; and the affected households had adequate financial assistance and immediate basic needs assistance to rebuild their situation. When cyclone Sidr and Aila landfall on the study areas the following typical adverse situations were exhibited:

1. *Physical damage*—The infrastructures of the study villages are lost and damaged by wind force, flooding, and storm surge. It was empirically found that in Sidr, 96.47 percent cyclone affected people lost their shelter while this rate were cent percent in Uttar Sauthkhali, 41.96 percent cyclone affected people were injured, 33.33 percent cyclone affected people lost their crops while 45.59 percent crops lost was observed in Aila

¹⁰³ Md. Zulfiquar Ali Islam, “Environmental Adaptation and Survival Strategies of River Erosion Cyclone affected people in Bangladesh: A Study of Two Villages in Nawabganj District,” (PhD Dissertation, Rajshahi University, The Institute of Bangladesh Studies, 1995).

which was higher than Sidr because of logging saline water (Figure 2).

2. *Casualties and public health*—Generally there are relatively few fatalities but there may be numerous casualties requiring hospital treatment. Contamination of water supplies may lead to viral outbreaks and malaria. It was empirically found by the in-depth interview that after cyclone Sidr when drinking of tube-well water decreased by 42.35% the cyclone victims suffered from various water borne diseases (Table 14).

3. *Water supply*—Open wells and ground water may be contaminated by flood waters and storm surges. Normal water sources may be unavailable for several days. It was empirically found that nearly two-third (63.92%, N=255) cyclone victims of study villages used tube-well water before cyclone. But after cyclone the using rate was decreased by 42.35% (N=255) due damage of the sources of drinking water (Table 14).

4. *Crops and food supplies*— High winds and rain can ruin standing crops, tree plantations and food stocks. Plantation crops such as bananas and coconuts were extremely vulnerable. It was empirically found that after cyclones Sidr and Aila food balance situation of the cyclone victims of Rayenda and Uttar Sauthkhali was decreased 66.67 percent to 33.33 percent (Table 18).

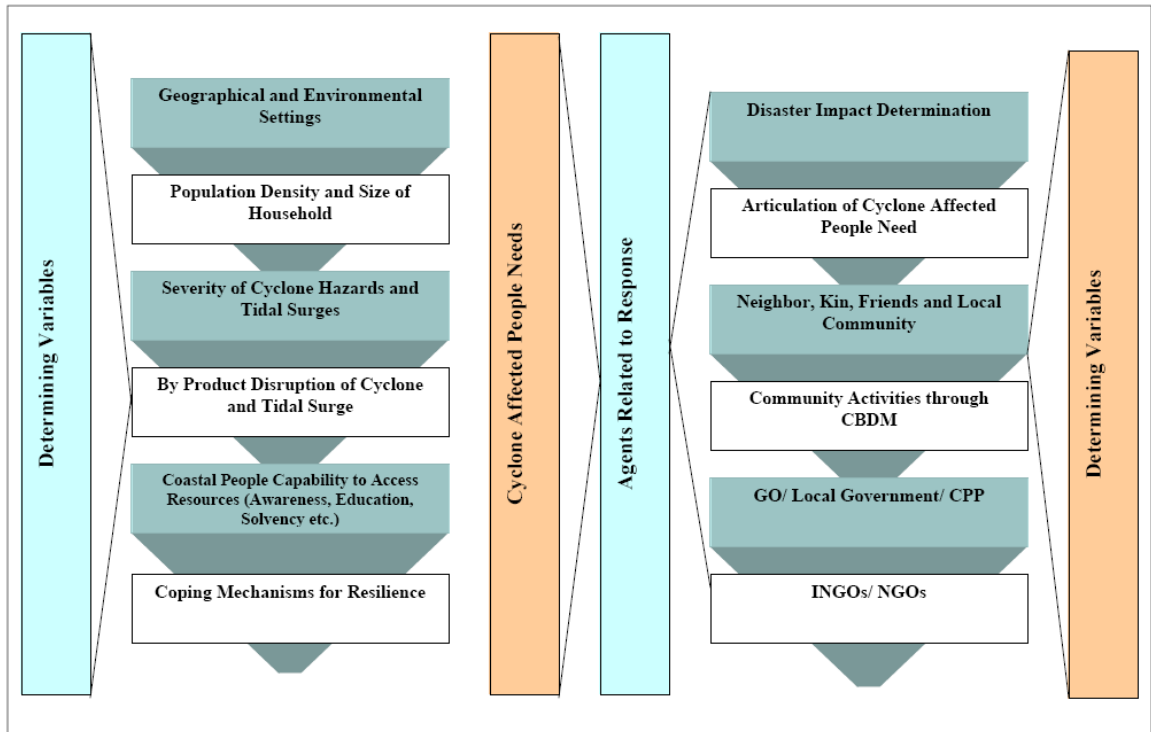
5. *Communication and logistics*— severe disruption is possible as wind brings down telephone lines, antennae and satellite disks.

Transport may be curtailed. By this reason, the cyclone victims of Rayenda and Uttar Sauthkhali did not use van or bicycle profusely to rush to the cyclone shelter. It was evident from the cyclone victims that due to muddy road only 4% cyclone victims used van to carry belongings to cyclone shelter (Table 38).

6. *Social impacts*—The cyclone affected people are socially marginalized which increased ethnic crises caused social violence and crime.

The needs of the cyclone affected people of Rayenda and Uttar Sauthkhali depend upon various variables like geographical settings, population density in coastal areas, severity of cyclone hazards, coastal population capability to face disasters and their traditional coping mechanisms (Figure 35). The current study found that the two villages were highly dense due to natural resources and typically coastal, nevertheless these areas were experienced sever cyclones and tidal surges since its born. For that reason, when Sidr and Aila landfall these areas were severely damaged and needs of the population were high due to severity of cyclones and incapability to access to resources to cope these situations. So, their local community and organization came forward at first to fulfill their immediate needs. In addition, they tried their level best to solve their problems by taking help of international aid and national aid.

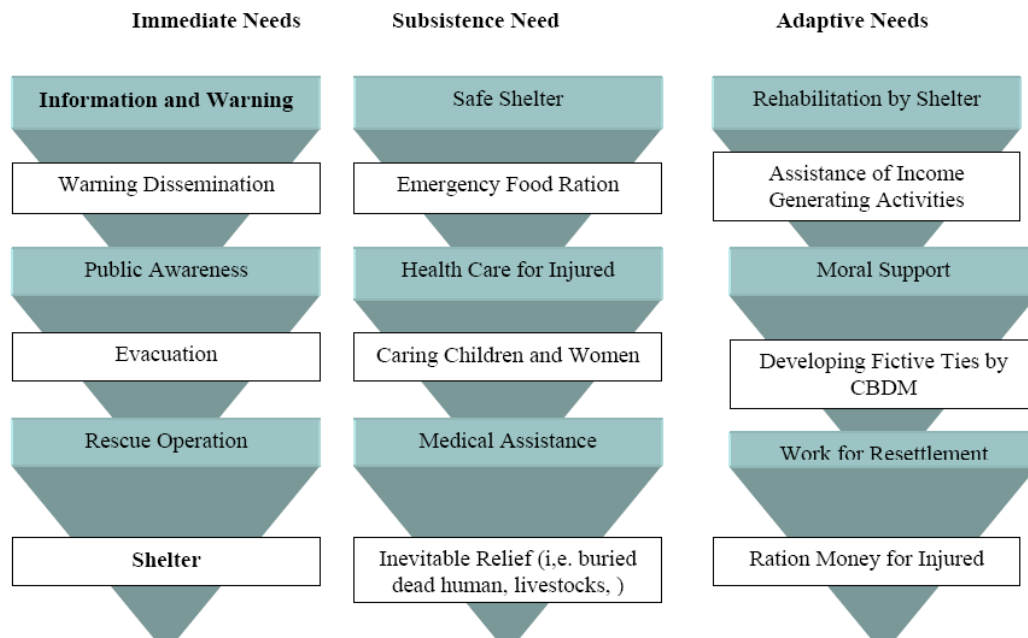
Figure 35
A Model of Determining Variables of Need and Actors Related to Response Mechanism



This study has identified eighteen major needs for the cyclone-affected people to cope adverse situation. These needs are mentioned here in three broad categories as the respondents of Rayenda and Uttar Sauthkhali argued (Figure 36).

Figure 36

Expected Needs of the Cyclone Affected People of Coastal Areas



7.1.3 Immediate Needs

When cyclone develops, the environment changes its typical nature and waits to welcome a catastrophe. Then coastal people needs are developed on their demand to cope with disaster situation. The need of information and warning was at the top of the hierarchy. It was evident from the cyclone victims that nearly half of the total (41.96%, n=107 Of 255) and more than half of the total (32.16%, n=82 of 255) respondents of both study villages expected that the local and national government should warn people about cyclone and provide cyclone information in right time in both Sidr and Aila respectively. The coastal people of Uttar Sauthkhali argued the Govt. warning system

was little in time of Sidr. However, they appreciated Govt. warning in time of Aila. Nevertheless, the people of Rayenda argued that Govt. warning was not more sufficient in time Sidr but in time of Aila it was sufficient. Naerly 35 percent (34.90%, n=89 of 255) and more than 27 percent (27.06%, n=69 of 255) respondents repeated local and national government as their expected source for warning dissemination in Sidr and in Aila respectively. However, in time of Sidr it was not sought as people of Rayenda and Uttar Sauthkhali argued rather than in Aila (Table 77).

Table 77
Immediate Needs Expected to be Responded Actors

Respondent Cyclone Victims			Immediate Needs					
			Information and Warning	Warning Disseminatio n	Resista nt Shelter	Evacuatio n	Public Awareness	Rescue Operation
Rayenda N=120	Sidr	n	48	49	21	49	21	33
		%	40	40.83	17.50	40.83	17.50	27.50
	Aila	n	35	39	44	30	32	7
		%	29.16	32.50	36.67	25.00	26.67	5.83
Uttar Sauthkha li N=135	Sidr	n	59	40	29	18	12	20
		%	43.70	29.63	21.48	13.33	8.89	14.81
	Aila	n	47	30	58	15	16	12
		%	34.81	22.22	42.96	11.11	11.85	8.89
Total N=255	Sidr	n	107	89	50	67	33	53
		%	41.96	34.90	19.61	26.27	12.94	20.78
	Aila	n	82	69	102	45	48	19
		%	32.16	27.06	40.00	17.65	18.82	7.45

*Multiple answers computed

More than 19 percent (19.61%, n=50 of 255) and 40 percent (n=102 of 255) respondents expected cyclone resistant shelter house made of RCC from local government. But it is quite impossible for the local authority to provide RCC building to all coastal people. It was evident from the cyclone victims expected their local authority (GO) in time of

Sidr and Aila to shelter them in safer places and rescue their family members in disaster time.

It was reported from the cyclone victims that more than 26 percent (26.27 %, n= 67 of 255) and more than 17 percent (17.65%, n=45 of 255) respondents expected to their local authority (GO) in time of Sidr and Aila to evacuate them to safe places and rescue their belongings and family members in disaster time (Table 77). The coastal people of Uttar Sauthkhali argued that in Sidr there was no evacuation operation by Go in that areas rather than Aila. In Aila the local authority (CPP) with the help of Red Crescent Society made some rescue and evacuation operation in Rayenda and Uttar Sauthkhali. At last more than nearly 13 percent (12.94%, n= 33 of 255) and nearly 19 percent (18.82 %, n=48 of 255) respondents expected various training programs and grooming sessions for their awareness to cyclone related disaster where the can express their experience and develop a suitable disaster coping mechanisms by the help of organizations.

7.1.4 Subsistence Needs

It was evident from the findings, during cyclone time, that nearly two-third (54.94%, n=72 of 120) and nearly half of the total (49.63%, n=67 of 135) cyclone affected people of Rayenda and Uttar Sauthkhali expected safe shelter for their subsistence due to their ill structured shelter during the disaster in Sidr and Aila respectively (table 78). It was noticed that, in time of Sidr, cyclone affected people of the both

villages expected safe shelter more in contrast to cyclone Aila. At the time of cyclone people were rushing here to there to protect themselves. For that reason they could not bring their foods. So, they expected food ration from their neighbours, kin and their local Government at the time taking safe shelter in neighbours and cyclone shelter.

It was evident from the findings, during cyclone time, that nearly half of the total (49.63%, n=67 of 120) and nearly one-third (21.48%, n=29 of 135) cyclone affected people of Rayenda and Uttar Sauthkhali expected food ration for their subsistence by using safe shelter due to their basic needs during the disaster in Sidr (table 78). Nearly one-third (27.45%, n=70 of 255) and nearly one-third (30.98%, n=79 of 255) cyclone victims expected especial care for their infants and women to their neighbours and Government volunteer in time of shelter taking in Sidr and Aila respectively. In time of cyclone, very few respondents of the both villages took shelter since the danger warning dissemination. Though, they were used to take shelter at the eleventh hour of cyclone when their houses were damaged. For that reason maximum aged male and female were injured.

So, more than 10.98 percent and 10.58 percent cyclone affected people expected especial care for the injured in Sidr and Aila respectively. It was evident from the findings that respectively around 17.25 percent

(n=44 of 255) and 23.14 percent (n=59 of 255) respondents expected emergency medicare for their family members to their neighbours and volunteer of organizations (Table 78).

Table 78
SUBSISTENCE NEEDS EXPECTED TO BE RESPONDED ACTORS¹⁰⁴

Respondent Cyclone Victims			Subsistence Needs					
			Safe Shelter	Food Ration	Medical Assistance	Especial Care for Women and Children	Caring Injured	Inevitable Help
Rayenda N=120	Sidr	n	72	44	18	30	16	23
		%	60.00	36.67	15.00	25.00	13.33	19.16
	Aila	n	66	52	36	47	20	15
		%	55.00	43.33	30.00	39.17	16.67	12.50
Uttar Sauthkhali N=135	Sidr	n	67	29	26	40	12	26
		%	49.63	21.48	19.26	29.63	8.89	19.26
	Aila	n	48	58	23	32	7	14
		%	35.56	425.96	17.03	23.70	5.18	10.37
Total N=255	Sidr	n	139	73	44	70	28	49
		%	54.51	28.63	17.25	27.45	10.98	19.21
	Aila	n	114	110	59	79	27	29
		%	44.70	43.14	23.14	30.98	10.58	11.37

*Multiple answers computed

During cyclone time around 19.21 percent and 11.37 percent cyclone affected people expected some inevitable helps to their community and organizations like: helps to carry their infants, women and aged to go safe shelter, helps to carry their belongings, expected baby foods, helps to protect the livestocks, helps to take healthy sanitation facilities in time shelter taking etc (table 78). Cyclone affected people of the both villages argued during cyclone time they were helpless and rushed to take safe shelter. But during cyclone time they did not face

¹⁰⁴ Here actors mean: cyclone victims own community people, neighbors, kin, and Government and NGO authorities.

Govt. volunteer activities rather their neighbours helped because everybody rushed to save their own lives. As no cyclone center had its own godown to safe people belongings, so cyclone affected people expected to their local government to make goods room in every cyclone center. As the sanitation facilities of cyclone center were insufficient due to density and water supply, they expected to their local authorities for multi purpose well designed cyclone center where people could enjoy every facilities for their subsistence.

7.1.5 Adaptive Needs

After cyclone the coastal inhabitants were also subjected to health hazards and the epidemic was its ultimate result. They were immediately attacked by various water born diseases, like: diarrhoea, dencentre, pneumonia etc. due to lack of drinking water and sanitation. After cyclone Sidr the inhabitants of Uttar Sauthkhali mentioned that their children suffered diarrhoea very much due to saline water and no body could help them. They also told after cyclone Sidr only one deep tube-well was survived which was located at frontier of the Sauthkhālī Union Parishad. So, people suffered very much. Only one medical team provided emergency medicare in that time. After some days the CARE Bangladesh and UNDP sent another two medical team to provide medicare for the injured and the epidemic affected people. After three months later the DPHE burrowed two automated filter machine in Uttar Sauthkhali and one machine in Rayenda which was funded by CARE USA for the elimination of cyclone affected people sufferings

form drinking water. But, it was a matter of sorrow, before Aila those two automated filter machine was abandoned due to proper maintenance though the filter machine of Rayenda was still working at the time of survey.

Between the two cyclones, the Sidr was super cyclone so that maximum coastal inhabitants of Rayenda and Uttar Sauthkhali lost their homestead. In the sense of adaptation, shelter is the basic and foremost priority to survive. For these circumstances, it was evident from the findings that nearly two-third (63.33%, n=76 of 120) and above one-third (34.17%, n=41 of 120), and nearly two-third (61.49%, n=83 of 135) and above one-third (35.56%, n=48 of 135) respondents of Rayenda and Uttar Sauthkhali expected shelter for their adaptation after the disaster of Sidr and Aila respectively (Table 79). They wanted assistances to their local authority and their community to repair their damaged houses for those who temporarily lost their shelters and wanted new shelter for those who totally lost their shelters.

After cyclone Sidr and Aila the inhabitants of Rayenda and Uttar Sauthkhali lost their income earning materials like: crops, boat, net etc. and made them helpless. So, more than 19 percent (n=50 of 255) and more than 16 percent (n=41 of 255) wanted to their local authority and NGOs made assistances related to their income earnings in Sidr and Aila respectively. Nevertheless, it was evident from the findings

that nearly one-third (31.37%, n=80 of 255) and nearly one-fifth (total 18.43%, n=47 of 255) respondents of Rayenda and Uttar Sauthkhali expected work for their resettlement and survival after the disaster of Sidr and Aila respectively (Table 79). Cyclone affected people of Rayenda and Uttar Sauthkhali who lost their family head and income earners, and turned into physically challenged by cyclone wanted smart ration money for each month.

Table 79
Adaptive Needs Expected to be Responded by Actors

Respondent Cyclone Victims			Subsistence Needs					
			Reconstruction / Rehabilitation of Shelter	Assistance for Income Earning	Achieve Adaptive Mechanism through Training	Resettlement by Work	Moral Support	Ration Mooney
Rayenda N=120	Sidr	n	76	16	0	32	43	23
		%	63.33	13.33	0	26.67	35.83	19.17
	Aila	n	41	15	6	26	47	18
		%	34.17	12.50	5.00	21.67	39.17	15.00
Uttar Sauthkhali N=135	Sidr	n	83	34	0	48	56	31
		%	61.49	25.18	0	35.56	41.48	22.96
	Aila	n	48	26	4	21	37	46
		%	35.56	19.26	2.96	15.56	27.41	34.07
Total N=255	Sidr	n	159	50	0	80	99	54
		%	62.35	19.61	0	31.37	38.82	21.18
	Aila	n	89	41	10	47	84	64
		%	34.90	16.08	3.92	18.43	32.94	25.10

*Multiple answers computed

A very few coastal inhabitants (1.29 percent) (total 3.92%, N=255) wanted to learn survival mechanisms through training to their local authority and NGOs. They also expected that through training they can shared their lot of experiences of survival and enabled to develop an overall survival mechanisms by mixing their indigenous fashion with

modern tools by the help of local authorities and NGOs where cyclone affected people were the key elements. Though the coastal inhabitants used to face super cyclone, they were totally dishearten by the severity of cyclone Sidr. They lost their houses, crops, livestocks, earning members, children for that reason they were mentally upset. For these circumstances, it was evident from the findings that nearly one-third (35.83%, n=43 of 120) and more than one-third (39.14, n=47 of 120), and nearly half of the total (41.48%, n=56 of 135) and nearly one-third (27.41%, n=37 of 135) respondents of Rayenda and Uttar Sauthkhali expected mental support and hope to their community people and local authority for overcome shock after the disaster of Sidr and Aila respectively (Table 79). They want motivational training programs from their local authority by which they can achieve mental strength to cope with cyclones disaster.

7.2 Community Versus Cyclone Affected People Needs

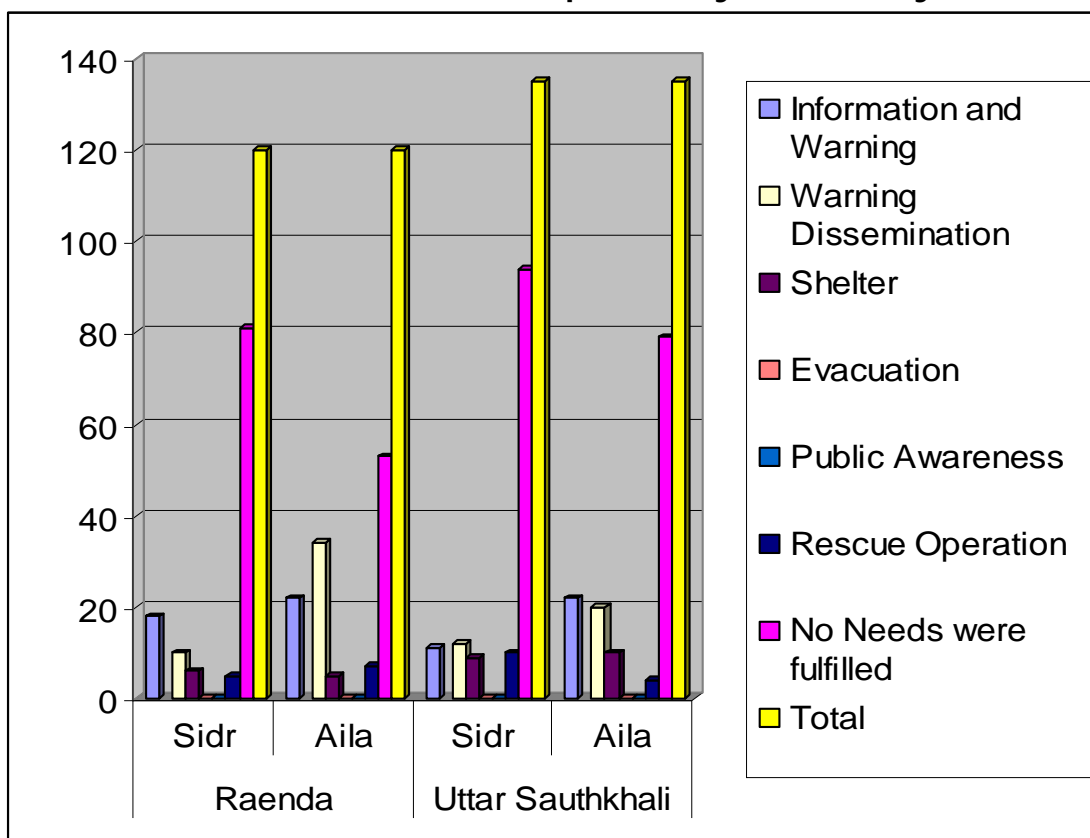
In any disaster community is the key response agent that responds first and affects first. As the inhabitants of Rayenda and Uttar Sauthkhali were not so capable in respect of education, awareness, wealth and so on to respond to cyclone disaster, in time of Sidr their tolerance level and coping mechanisms were totally damaged which also damaged their moral courage. As the severity of cyclone Aila was lower than the severity of cyclone Sidr, the inhabitants of Rayenda and Uttar Sauthkhali were fight to cope with the disaster created by Aila. But the grievous catastrophe of Aila turned them to feel long term

disaster. As a result cyclone affected people expected needs to their own community faced critical challenge.

It was reported from the cyclone victims that respectively above two-third (67.5%, N=120) and two-third (69.63%, N=135) respondents of Rayenda and Uttar Sauthkhali argued that community did not fulfill their immediate expected needs in cyclone Sidr as well as nearly half of total (44.17%, N=120) and above half of total (58.52%, N=135) in Aila (Figure 37). Nevertheless, the community totally failed to fulfill two immediate needs out of six: public awareness and evacuation before cyclone disaster.

Rest four expected needs were fulfilled very little in proportion by the community. However, the warning dissemination campaign was sought greater in proportion in time of Aila than cyclone Sidr. It was evident from the findings that above one-fifth (23.33%, N=255) and nearly one-fifth (17.03%, N=255) cyclone victims of Rayenda and Uttar Sauthkhali argued that cyclone warning needs were fulfilled by the community in cyclone Aila and Sidr respectively which were the first immediate needs of the cyclone affected community (Figure 37).

Figure 37
Immediate Needs Accomplished by Community

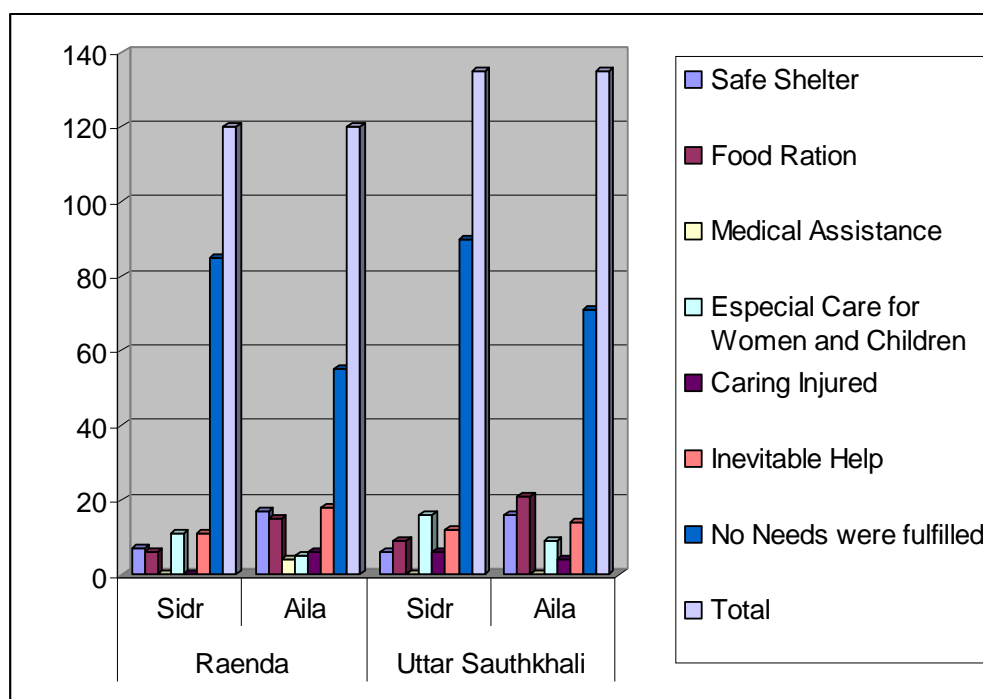


It was evident from the findings that nearly one-third (29.17%, N=120) and above one-third (33.33%, N=135) cyclone affected people of Rayenda and Uttar Southkhali while nearly half of the total (45.83%, N=120) and above half of the total (52.59%, N=135) argued community has been fulfilled their subsistence needs in cyclone Sidr and Aila respectively. That means community was failed to fulfill above two-thirds (68.63%, N=255) and half of the total (49.41%, N=255) cyclone affected people expected subsistence needs in Sidr and Aila respectively (Figure 38). Out of six subsistence needs, the fulfillment proportion of medical assistance and caring injured were very little,

respectively 1.57 percent and 6.27 percent. Out of that, the community could not provide any medical assistance in time of Sidr.

During the cyclone time all respondents' especial importance on two substance needs: safe shelter and inevitable needs i.e. help to carry belongings to safe place, help to carry children and women in safe place, help to protect shelter from disaster etc. However, it was, very much shocking, evident from the findings that community fulfilled 5.83 percent and 4.44 percent shelter needs in Rayenda and Uttar Sauthkhali, and 14.17 percent and 11.85 percent in Rayenda and Uttar Sauthkhali in Sidr and Aila respectively (Figure 38).

Figure 38
Subsistence Needs Accomplished by Community

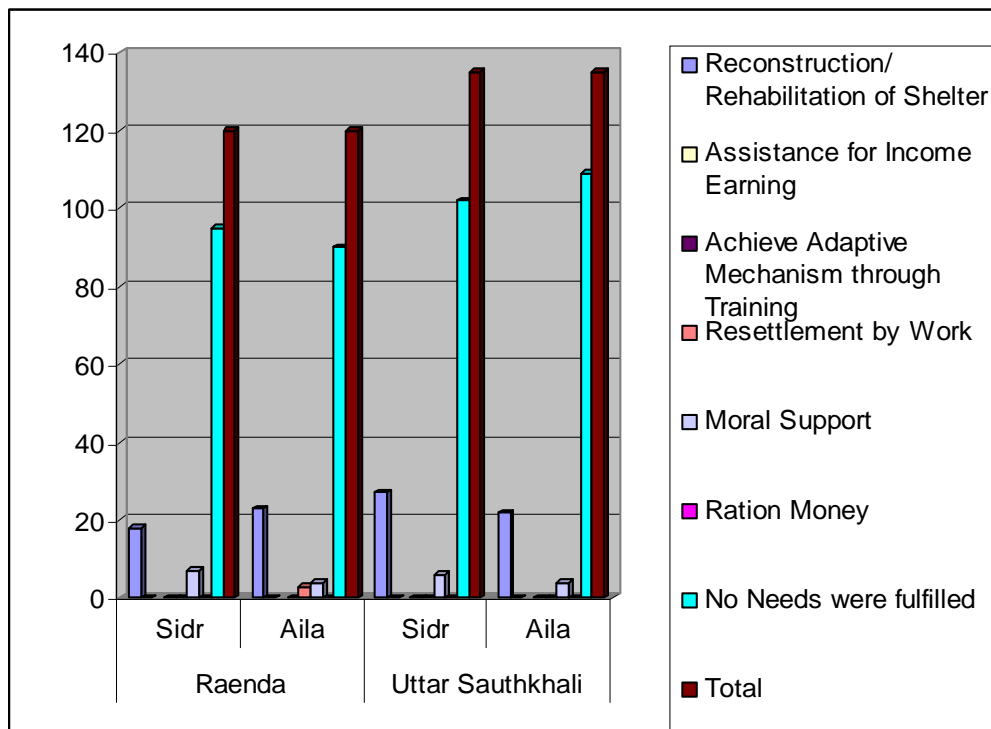


Nevertheless, the community people tried to give dry foods to their shelties (5.88 percent in Sidr and 12.94 percent in Aila). Though the community of Uttar Sauthkhali was poor in wealth and severely

attacked by cyclone Sidr, they tried to give food ration to their shelties than Rayenda community. Not only that the community of Uttar Sauthkhali showed more care to women and children than the community of Rayenda (Figure 38).

It was empirically found that out of six expected adaptive needs of the cyclone affected people the community of Rayenda and Uttar Sauthkhali totally failed to fulfill three of them. Nevertheless, the community could fulfill very little proportion of people resettlement need by work after Aila (1.57 percent). After cyclone Sidr respectively, 15 percent and 20 percent and 19.16 percent and 16.29 percent community people of Rayenda and Uttar Sauthkhali helped each other for rebuild/ or reconstruction their damaged shelter (Figure 39). In addition, it was sought that the people of Uttar Sauthkhali was more active in this helping tendency to rebuild damaged shelter than the community of Rayenda. After cyclone the community people tried to give moral support to the survivors and tried to enrich their moral courage for their resettlement.

**Figure 39
Adaptive Needs Accomplished by Community**



Despite of immediate needs, another two needs are significantly correlated among community help in Sidr (Table 80). The expected subsistence needs of the cyclone affected people of Rayenda and Uttar Southkhali was negatively correlated with community help taking in Sidr while adaptive needs of the cyclone affected people shows strongly positive correlation. While the community help in Aila and three needs are strongly correlated. Table shows that immediate and adaptive needs are negatively correlated with community helps taken in Aila while subsistence needs in Aila shows strongly positive correlation (Table 80).

Table 80
Correlation between Community Helps and Various Needs

Correlations					
		Community Help in Sidr	Immidiate Needs in Cyclone Sidr	Subsistence Needs in Cyclone Sidr	Adaptive Needs in Cyclone Sidr
Spearman's rho: Community Help in Sidr	Correlation Coefficient	1.000	-.105	-.231**	-.180**
	Sig. (2-tailed)	.	.112	.000	.007
	N	228	228	228	228
Immidiate Needs in Cyclone Sidr	Correlation Coefficient	-.105	1.000	.119	-.072
	Sig. (2-tailed)	.112	.	.072	.276
	N	228	228	228	228
Subsistence Needs in Cyclone Sidr	Correlation Coefficient	-.231**	.119	1.000	.417**
	Sig. (2-tailed)	.000	.072	.	.000
	N	228	228	228	228
Adaptive Needs in Cyclone Sidr	Correlation Coefficient	-.180**	-.072	.417**	1.000
	Sig. (2-tailed)	.007	.276	.000	.
	N	228	228	228	228

**.Correlation is significant at the .01 level (2-tailed).

Correlations					
		Community Help in Aila	Immidiate Needs in Cyclone Aila	Subsistence Needs in Cyclone Aila	Adaptive Needs in Cyclone Aila
Spearman's rho: Community Help in Aila	Correlation Coefficient	1.000	-.134*	-.098	.010
	Sig. (2-tailed)	.	.048	.146	.881
	N	219	219	219	219
Immidiate Needs in Cyclone Aila	Correlation Coefficient	-.134*	1.000	-.117	-.159*
	Sig. (2-tailed)	.048	.	.084	.018
	N	219	219	219	219
Subsistence Needs in Cyclone Aila	Correlation Coefficient	-.098	-.117	1.000	.217*
	Sig. (2-tailed)	.146	.084	.	.001
	N	219	219	219	219
Adaptive Needs in Cyclone Aila	Correlation Coefficient	.010	-.159*	.217**	1.000
	Sig. (2-tailed)	.881	.018	.001	.
	N	219	219	219	219

*.Correlation is significant at the .05 level (2-tailed).
**.Correlation is significant at the .01 level (2-tailed).

***Multiple answers computed**

7.3 Organization VS Cyclone Affected People Needs

After any disaster the affected people become vulnerable due to their miseries caused by nature. As the individual and community help do

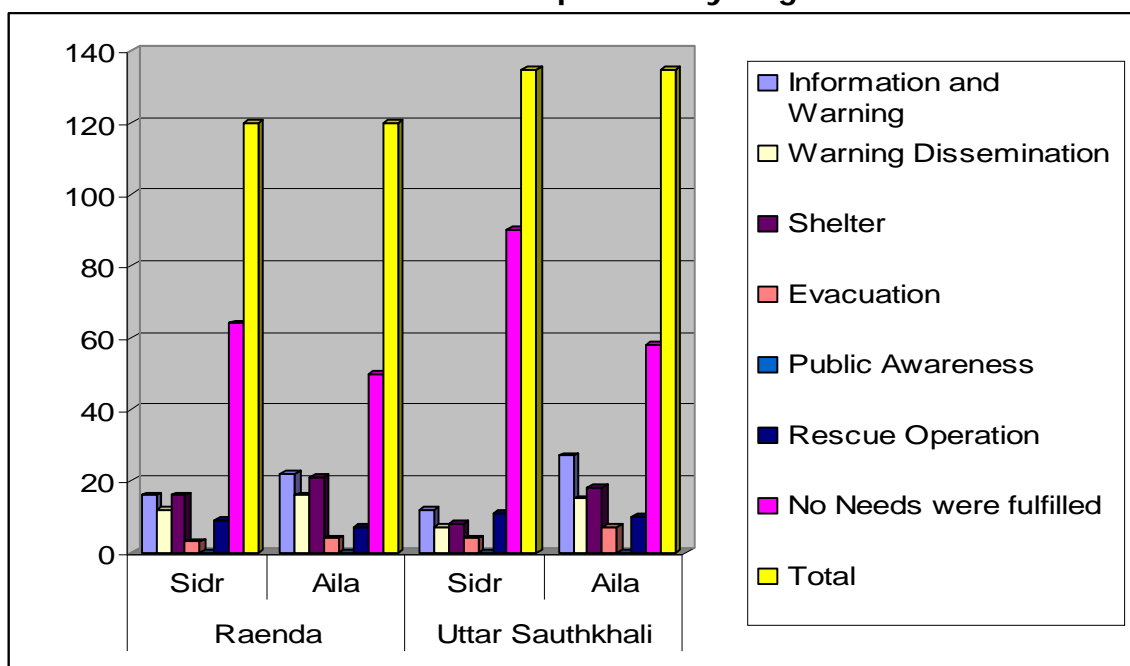
not fulfill their expected needs in contrast to their loss, the affected people make them dependent to their local government authorities and various types of NGOs and think the organizations may fulfill their expected needs. The cyclone affected people of Rayenda and Uttar Sauthkhali were not different as a whole. When individual and community response failed to fulfill their expected needs, the cyclone affected people of Rayenda and Uttar Sauthkhali were responded by the local authorities and NGOs. As the community could not fulfill their expectation indeed, the cyclone affected people of coastal Bangladesh wider their all expectations and make them dependent to organizational aids. However, it was true that cyclone affected people mentality and allover situation made the coastal people more dependent to the organization. But some questions was arising: was the organization can fulfill their expected needs?, only aids can fulfill the total needs? etc. the current study may try to give answer to those question.

It was empirically found that organizations have been fulfilled nearly half of the total (46.47%, N=255) and above half of the total (57.65%, N=255) immediate expected needs of the cyclone affected people of Rayenda and Uttar Sauthkhali in Sidr and Aila respectively. Of them in both cyclones, the expected needs of Uttar Sauthkhali people were fulfilled in lower proportion in contrast to the people of Rayenda. Out of six expected needs the organization could not fulfilled totally one expected needs: grow public awareness. In contrast to community the

organization can fulfilled warning and information needs respectively 18.43 percent and 31.37 percent in Sidr and Aila respectively. That means warning information and dissemination mechanisms of organization was more effective while warning dissemination in cyclone Sidr time was too little in proportion in contrast to Aila (Figure 40).

We know that before cyclone individuals rush to find a shelter where they can protect themselves and their family members from the catastrophe of cyclone. In that sense the organization fulfilled individuals' expectations in proportion to 9.41 percent and 15.29 percent in Sidr and Aila respectively. The shelter-taking tendency of cyclone affected people of Rayenda and Uttar Sauthkhali was more in Aila because of organizational warning dissemination and Sidr disaster (Figure 40).

Figure 40
Immediate Needs Accomplished by Organization



However the rescue and evacuation operation was too little in community response. Because the community inhabitants capability was too little to direct evacuation and rescue operation. So that, the volunteers of organization came forward to respond individuals expected needs of evacuation and rescue. For these circumstances, it was reported that 10.59 percent and 10.98 percent cyclone victims argued organization fulfilled their rescue and evacuation needs before the cyclone Sidr and Aila respectively. That means in Sidr time the people expected needs before a cyclone disaster fulfilled below than 50 percent and around 60 percent in Aila cyclone (Figure 40).

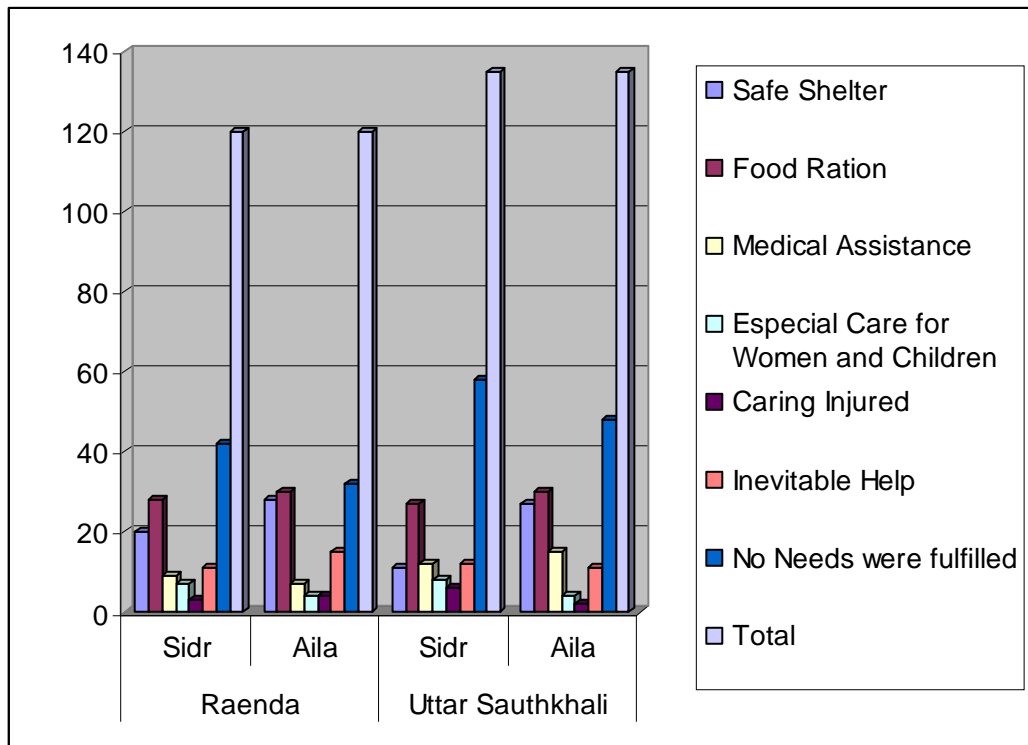
For this reason, it may be said that our local authority and NGOs were not well equipped to operate a rescue and evacuation activities. Not only that they had not trained manpower to do such types of activities. For these reasons, the expected needs of Rayenda and Uttar Sauthkhali people to their local authority and NGOs could not fulfilled as cyclone affected people expectation in Sidr and Aila.

During cyclone, the affected people of Rayenda and Uttar Sauthkhali expected six aids in general to the local organizations (Government authorities and various NGOs). But, it was reported by the cyclone victims of Rayenda and Uttar Sauthkhali that the organizations fulfilled nearly two-third (60.78%, n=255) and above two-third (68.63%,

n=255) cyclone affected people needs in cyclone Sidr and Aila respectively. During cyclone the first and foremost needs of the cyclone affected people was safe shelter. But 12.16 percent and 21.57 percent cyclone affected people of Rayenda and Uttar Sauthkhali opined that they took shelter in various organizations' cyclone centre and offices during cyclone Sidr and Aila respectively. So, it was very much alarming that respectively above three-fourth (87.84%, n=255) and above three-fourth (78.43%, n=255) respondents expected subsistence needs—safe shelter during cyclone—have not been fulfilled by the organizations in Sidr and Aila (Figure 41).

However, at the time investigation in Rayenda and Uttar Sauthkhali it was seen that the two villages had 23 cyclone shelters though of them 17 were poorly structured could provide 41 percent of total population of two villages jointly. So, in that sense around 25 percent affected people were not interested to take shelter in cyclone centre during cyclone Sidr and Aila due to various causes (Figure 41).

Figure 41
Subsistence Needs Accomplished by Organization



It was evident from the findings that nearly one-fourth (21.57%, n=255) and nearly one-fourth (23.53%, n=255) percent cyclone affected people were provided food ration by the organization during cyclone Sidr and Aila respectively. It was shown that 8.24 percent and 8.67 percent affected people were provided some medical assistance during Sidr and Aila respectively. That means the injured took little assistances in time cyclone while they were taking shelter in cyclone centre. During Sidr and Aila the volunteers and other shelter taking people took especial care for the vulnerable: injured and aged women and children in proportion of 9.41 percent 5.49 percent. It was reported by the cyclone victims that nearly two-fourth (42.96%, n=135) and nearly one-fourth (18.82%, n=135) cyclone affected people of Uttar Sauthkhali were totally abandoned to get their subsistence needs in

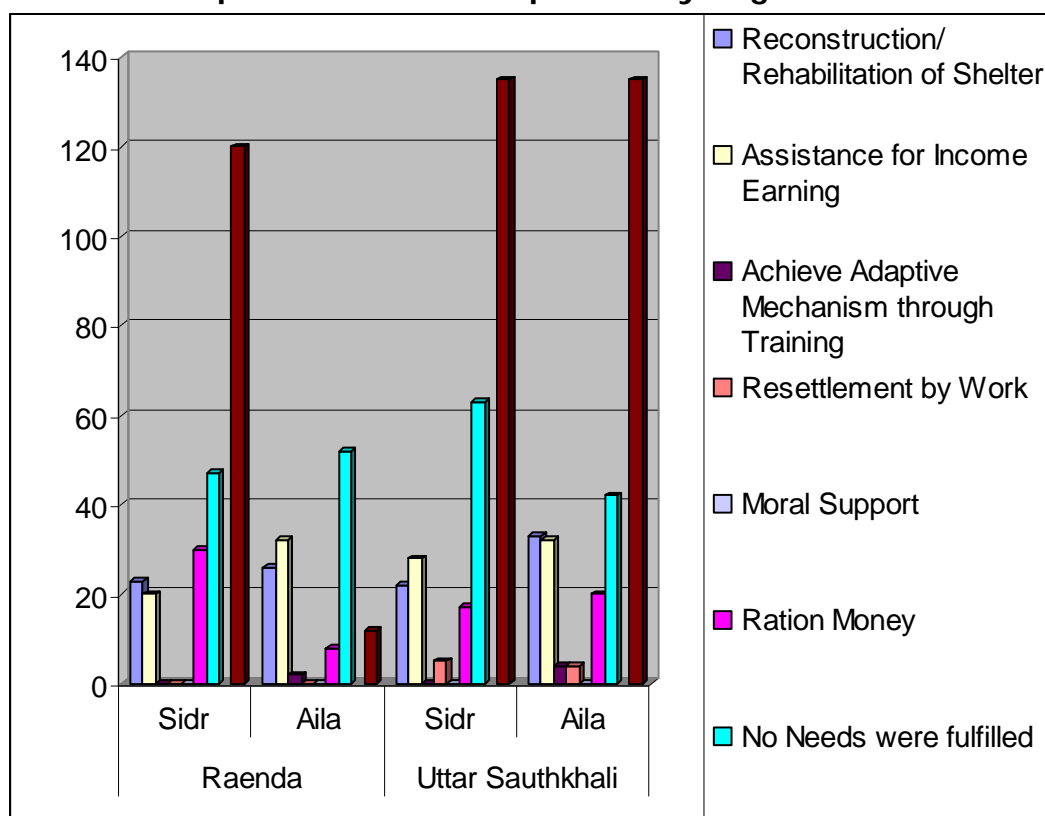
cyclone Sidr and Aila respectively while above one-third (35%, n=120) and nearly one-third (26.67%, n=120) cyclone victims in Rayenda (Figure 41).

After any disaster, the affected areas and people need various helps and aid to survive. As the super cyclone Sidr and Aila damaged the research areas: Rayenda and Uttar Sauthkhali badly, the affected people of those very villages were totally vulnerable and helpless and they lost their last hope to survive. In the mean time the various organizations both government and NGOs came forward to help the affected people. It was evident from the findings that the organizations gave more interests/priorities to fulfill affected people needs of rehabilitation/ reconstruction of damaged shelter, assistance for income earning and money assistance. It was reported by the cyclone victims that nearly one-fifth (17.65%, n=255) and above one-fifth (23.14%, n=255) cyclone affected people of Rayenda and Uttar Sauthkhali were fulfilled their adaptive needs of reconstruction and rehabilitation of shelter in Sidr and Aila respectively (Figure 42).

It was evident from the cyclone victims that nearly one-fifth (118.83%, n=255) and above one-fifth (25.09%, n=255) expected adaptive needs of assistance for income earning for the cyclone affected people of Rayenda and Uttar Sauthkhali in Sidr and Aila have been fulfilled by the organizations respectively. The organization provided 14.90

percent and 14.51 percent ration money for the vulnerable people in Sidr and Aila respectively (Figure 42).

Figure 42
Adaptive Needs Accomplished by Organization



The later three adaptive expected needs of the cyclone affected people were fulfilled by the organization very little. The people of coastal areas opined that the organization was totally failed to give them moral support after the both cyclones. Only 2.35 percent opined that the organization provided disaster training and adaptive mechanisms of their culture friendly initiatives after cyclone Aila. In addition, 3.53 percent opined that organization provided them work for resettlement after cyclone Aila. So, it was evident from the findings that nearly two-fourth (43.14%, n=255) and above one-third (36.86%, n=255) cyclone

affected people expected adaptive needs were not fulfilled by the organizations in Sidr and Aila respectively. Nevertheless, the adaptive needs of Uttar Sauthkhali's cyclone affected people were fulfilled little in proportion in contrast to Rayenda's cyclone affected population (Figure 42).

It was evident from the findings that correlation among organization help, immediate needs, subsistence needs and adaptive needs showed significant inter-relations. Organization help of the cyclone-affected people in Sidr was strongly positively correlated with cyclone affected people's immediate and adaptive needs, while subsistence needs showed negative correlation with Organizational help in Sidr. In addition, aids taken by the affected people of Rayenda and Uttar Sauthkhali in Sidr was strongly correlated with adaptive needs and negatively correlated with immediate needs. Nevertheless, aids taken by the affected people of Rayenda and Uttar Sauthkhali in Aila showed negative correlations between adaptive needs and subsistence needs of the cyclone victims (Table 81).

Table 81
Correlation between Organization Help and Various Needs

Correlations						
			Aids Taken in Sidr	Immidiate Needs in Cyclone Sidr	Subsistence Needs in Cyclone Sidr	Adaptive Needs in Cyclone Sidr
Spearman's r	Organization Help Sidr	Correlation Coeff	1.000	-.209*	.109	.371*
		Sig. (2-tailed)	.	.002	.100	.000
		N	228	228	228	228
	Immidiate Needs in Cyclone Sidr	Correlation Coeff	-.209*	1.000	.119	-.072
		Sig. (2-tailed)	.002	.	.072	.276
		N	228	228	228	228
	Subsistence Need: Cyclone Sidr	Correlation Coeff	.109	.119	1.000	.417*
		Sig. (2-tailed)	.100	.072	.	.000
		N	228	228	228	228
	Adaptive Needs in Cyclone Sidr	Correlation Coeff	.371*	-.072	.417*	1.000
		Sig. (2-tailed)	.000	.276	.000	.
		N	228	228	228	228

**.Correlation is significant at the .01 level (2-tailed).

Correlations						
			Aids Taken in Aila	Immidiate Needs in Cyclone Aila	Subsistence Needs in Cyclone Aila	Adaptive Needs in Cyclone Aila
Spearman's r	Organizaion Help Aila	Correlation Coeff	1.000	.034	-.365**	-.154*
		Sig. (2-tailed)	.	.614	.000	.023
		N	219	219	219	219
	Immidiate Needs in Cyclone Aila	Correlation Coeff	.034	1.000	-.117	-.159*
		Sig. (2-tailed)	.614	.	.084	.018
		N	219	219	219	219
	Subsistence Need in Cyclone Aila	Correlation Coeff	-.365**	-.117	1.000	.217*
		Sig. (2-tailed)	.000	.084	.	.001
		N	219	219	219	219
	Adaptive Needs in Cyclone Aila	Correlation Coeff	-.154*	-.159*	.217**	1.000
		Sig. (2-tailed)	.023	.018	.001	.
		N	219	219	219	219

**.Correlation is significant at the .01 level (2-tailed).

*.Correlation is significant at the .05 level (2-tailed).

***Multiple answers computed**

It was evident from the findings that correlation among immediate needs in Sidr and Aila were strongly correlated among several variables: aids taken Sidr, aids taken in Aila, education, occupation, loss in Sidr, loss in Aila. It was evident from the findings that immediate needs of cyclone Sidr was strongly correlated positively with aids taken by the cyclone affected people of Sidr with and occupation of respondents and negatively correlated with education and income. Immediate needs taken by the cyclone affected people in time of Aila were strongly correlated with loss in Aila. Nevertheless, immediate needs taken by the affected people showed strongly positive correlation among education, occupation and income of the cyclone affected people of Rayenda and Uttar Sauthkhali (Table 82).

Table 82
Correlation with Immediate Needs and other Variables

Correlations

		Education	Occupation	Income	Aids Taken in Sidr	Aids Taken in Aila	Loss in Sidr	Loss in Aila
Spearman's rho	Education	1.000	.232**	.212**	.014	-.200**	-.023	.039
	N	255	255	255	228	219	255	255
	Occupation	.232**	1.000	-.319**	.122	-.233**	-.001	-.192**
	N	255	255	255	228	219	255	255
	Income	.212**	-.319**	1.000	-.120	.092	.102	.161*
	N	255	255	255	228	219	255	255
	Aids Taken in Sidr	.014	.122	-.120	1.000	-.135	.	.047
	N	228	228	228	228	195	228	228
	Aids Taken in Aila	-.200**	-.233**	.092	-.135	1.000	.014	.
	N	219	219	219	195	219	219	219
	Loss in Sidr	-.023	-.001	.102	.	.014	1.000	-.030
	N	255	255	255	228	219	255	255
	Loss in Aila	.039	-.192**	.161*	.047	.	-.030	1.000
	N	255	255	255	228	219	255	255
	Immediate Needs in Cyclone Sidr	-.177**	.139*	-.155*	.574**	-.033	.	-.008
	N	228	228	228	228	195	228	228
	Immediate Needs in Cyclone Aila	.228**	.142*	.236**	-.269**	.034	.215**	.
	N	219	219	219	195	219	219	219

** . Correlation is significant at the .01 level (2-tailed).

* . Correlation is significant at the .05 level (2-tailed).

***Multiple answers computed**

It was evident from the findings that correlation among subsistence needs in Sidr and Aila were strongly correlated among several variables: aids taken Sidr, aids taken in Aila, education, occupation, loss in Sidr, loss in Aila. It was observed that subsistence needs in cyclone Sidr showed negative correlation between aids taken in Sidr and needs in cyclone Aila showed negative correlation between aids taken in Aila (Table 83). On the other hand adaptive needs of the cyclone affected people in Sidr and Aila showed positive correlation

with aids taken in Sidr and Aila. And adaptive needs of cyclone Sidr was positively correlated with income (Table 84).

Table 83
Correlation with Subsistence Needs and other Variables

Correlations

			Education	Occupation	Income	Aids Taken in Sidr	Aids Taken in Aila	Loss in Sidr	Loss in Aila	Subsistence Needs in Cyclone Sidr	Subsistence Needs in Cyclone Aila
Spearman's rho	Education	Correlation Coefficient	1.000	.232**	.212**	.014	-.200**	-.023	.039	-.075	-.065
		Sig. (2-tailed)	.	.000	.001	.828	.003	.718	.533	.258	.337
		N	255	255	255	228	219	255	255	228	219
Occupation		Correlation Coefficient	.232**	1.000	-.319**	.122	-.233**	-.001	-.192**	.054	.116
		Sig. (2-tailed)	.000	.	.000	.067	.001	.983	.002	.416	.086
		N	255	255	255	228	219	255	255	228	219
Income		Correlation Coefficient	.212**	-.319**	1.000	-.120	.092	.102	.161*	.061	-.114
		Sig. (2-tailed)	.001	.000	.	.070	.174	.106	.010	.362	.091
		N	255	255	255	228	219	255	255	228	219
Aids Taken in Sidr		Correlation Coefficient	.014	.122	-.120	1.000	-.135	.	.047	-.273**	.217*
		Sig. (2-tailed)	.828	.067	.070	.	.061	.	.484	.000	.002
		N	228	228	228	228	195	228	228	228	195
Aids Taken in Aila		Correlation Coefficient	-.200**	-.233**	.092	-.135	1.000	.014	.	-.076	-.365**
		Sig. (2-tailed)	.003	.001	.174	.061	.	.839	.	.290	.000
		N	219	219	219	195	219	219	219	195	219
Loss in Sidr		Correlation Coefficient	-.023	-.001	.102	.	.014	1.000	-.030	.	.008
		Sig. (2-tailed)	.718	.983	.106	.	.839	.	.637	.	.901
		N	255	255	255	228	219	255	255	228	219
Loss in Aila		Correlation Coefficient	.039	-.192**	.161*	.047	.	-.030	1.000	.035	.
		Sig. (2-tailed)	.533	.002	.010	.484	.	.637	.	.601	.
		N	255	255	255	228	219	255	255	228	219
Subsistence Needs in Cyclone Sidr		Correlation Coefficient	-.075	.054	.061	-.273**	-.076	.	.035	1.000	.268**
		Sig. (2-tailed)	.258	.416	.362	.000	.290	.	.601	.	.000
		N	228	228	228	228	195	228	228	228	195
Subsistence Needs in Cyclone Aila		Correlation Coefficient	-.065	.116	-.114	.217**	-.365**	.008	.	.268**	1.000
		Sig. (2-tailed)	.337	.086	.091	.002	.000	.901	.	.000	.
		N	219	219	219	195	219	219	219	195	219

**Correlation is significant at the .01 level (2-tailed).

*Correlation is significant at the .05 level (2-tailed).

***Multiple answers computed**

Table 84
Correlation with Adaptive Needs and other Variables

Correlations

			Education	Occupation	Income	Aids Taken in Sidr	Aids Taken in Aila	Loss in Sidr	Loss in Aila	Adaptive Needs in Cyclone Sidr	Adaptive Needs in Cyclone Aila
Spearman's rho	Education	Correlation Coefficient	1.000	.232**	.212**	.014	-.200**	-.023	.039	-.045	-.021
		Sig. (2-tailed)	.	.000	.001	.828	.003	.718	.533	.502	.756
		N	255	255	255	228	219	255	255	228	219
	Occupation	Correlation Coefficient	.232**	1.000	-.319**	.122	-.233**	-.001	-.192**	.009	.124
		Sig. (2-tailed)	.000	.	.000	.067	.001	.983	.002	.894	.067
		N	255	255	255	228	219	255	255	228	219
	Income	Correlation Coefficient	.212**	-.319**	1.000	-.120	.092	.102	.161*	.159*	-.113
		Sig. (2-tailed)	.001	.000	.	.070	.174	.106	.010	.016	.096
		N	255	255	255	228	219	255	255	228	219
	Aids Taken in Sidr	Correlation Coefficient	.014	.122	-.120	1.000	-.135	.	.047	-.370**	.183*
		Sig. (2-tailed)	.828	.067	.070	.	.061	.	.484	.000	.010
		N	228	228	228	228	195	228	228	228	195
Aids Taken in Aila	Correlation Coefficient	-.200**	-.233**	.092	-.135	1.000	.014	.	.011	-.154*	
	Sig. (2-tailed)	.003	.001	.174	.061	.	.839	.	.880	.023	
	N	219	219	219	195	219	219	219	195	219	
Loss in Sidr	Correlation Coefficient	-.023	-.001	.102	.	.014	1.000	-.030	.	-.085	
	Sig. (2-tailed)	.718	.983	.106	.	.839	.	.637	.	.211	
	N	255	255	255	228	219	255	255	228	219	
Loss in Aila	Correlation Coefficient	.039	-.192**	.161*	.047	.	-.030	1.000	-.014	.	
	Sig. (2-tailed)	.533	.002	.010	.484	.	.637	.	.835	.	
	N	255	255	255	228	219	255	255	228	219	
Adaptive Needs in Cyclone Sidr	Correlation Coefficient	-.045	.009	.159*	-.370**	.011	.	-.014	1.000	.012	
	Sig. (2-tailed)	.502	.894	.016	.000	.880	.	.835	.	.870	
	N	228	228	228	228	195	228	228	228	195	
Adaptive Needs in Cyclone Aila	Correlation Coefficient	-.021	.124	-.113	.183*	-.154*	-.085	.	.012	1.000	
	Sig. (2-tailed)	.756	.067	.096	.010	.023	.211	.	.870	.	
	N	219	219	219	195	219	219	219	195	219	

** . Correlation is significant at the .01 level (2-tailed).

* . Correlation is significant at the .05 level (2-tailed).

***Multiple answers computed**

It was evident by the cross tabulation with various responses between Government and NGOs showed that GO responses higher in proportion in immediate response especially in warning dissemination and information in contrast NGOs immediate response. On the other hand, NGOs provided evacuation and rescue operation better than GO. In subsistence response, NGOs provided safe foods and water high in proportion in contrast to GO. However, GO provided safe shelter more than NGOs. In adaptive response, NGOs provided more aids in sense of quantity and quality in contrast to GO response. Especially NGOs gave new shelter to 10.19 percent affected people who lost their shelter in Sidr and Aila. And NGOs medicine assistance and medicare activities were more effective in contrast to GO. NGOs provided more financial assistance for the injured and shelter lost people and NGOs also gave income generating aids to the cyclone affected people while GO provided short in proportion (Table 85). If do not create any separation in organization in two sects: GO and NGO rather think organization in general whole, then we see the organizations try do better thinks for the cyclone affected community.

Table 85
Cross Tabulation among Various Responses between Government and NGOs

Criteria of GO's Immediate Responses * Criteria of NGOs Immediate Responses Crosstabulation							
Count		Criteria of NGOs Immediate Responses				Total	
		early warning and evacuation	Proper evacuation for save life and propertise	Unable to take any Responses	Don,t get any response		
Criteria of GO's Immediate Responses	early warning and evacuation	7	3	27	56	93	
	repeated dessimination of warning	1		3	6	10	
	Don't get any Responses	9	7	1	79	96	
	Unable to take any response	1		15	13	29	
Total		18	10	46	154	228	

Criteria of GO's Subsistence Responses * Criteria of NGOs Subsistence Responses Crosstabulation								
Count		Criteria of NGOs Subsistence Responses					Total	
		safe shelter & foods	safe foods and water	extra care for children and aged	Don't get any Responses	Unable to take any responses		Safe shelter
Criteria of GO's Subsistence Responses	safe shelter & foods	4	3	2	12	6	9	36
	safe foods and water	8	7	17	2		4	38
	Don't get any Responses	8	45		21	17	5	96
	Unable to take any responses		7		1			8
	Safe shelter	2	4	4	40			50
Total		22	66	23	76	23	18	228

Criteria of GO's Adaptive Responses * Criteria of NGOs Adaptive Responses Crosstabulation											
Count		Criteria of NGOs Adaptive Responses								Total	
		various foods and water	infant foods and rebuilt house	new house for shelter	medicine and saline	extra care for pregnant and progenitress	Financial assistance and giving income earning equipment	Unable to access Responses	Don,t get an response		Assistance to reconstruct houses
Criteria of GO's Adaptive Responses	various foods and water	2	4	1	1	2	4		1	11	26
	infant foods and rebuilt house	5	4	6	8	1	1	7	6	9	47
	clean our damaged house	3	2	1		3					9
	new house for shelter	1			1	2		4	2		10
	burried dead human and livestock	1	3	2		2		1	1		10
	medicine and salary and care for pregnant			4	3			5	1	5	18
	extra care for pregnant and progenitress									5	5
	Financial assistance and giving income earning equipment		2			2	16	2			22
	Don't get any Responses	9	6	11	15	1	16		6		64
	Unable to take any response	4	6	1		1	2		3		17
Total		25	27	26	28	14	39	19	20	30	228

*Multiple answers computed

FGD 5

Place: Sāuthkhālī *Union Paorishad*, Attending 4 women from Utar Sāuthkhālī and 7 men from Rayenda

Eskendar Majhi, age 52, man of Rayenda, reported that in time of Sidr he lost his engine boat and net and turned into street bagger. He said, "After losing my boat and net I became helpless. Some NGOs officials came to my house and noted my name into their book and after six months later they gave me a little net." Provati Rani Mistry, age 30, woman of Uttar Sauthkhali, told, "At the time of Sidr her fisherman husband lost his boat and one leg but they did not get any boat or net from the organization. She complained some biggans who also lost their boat made some deal with the officials of organizations and got boat though they were enabled to buy boat or net." Sirajul Islam, age 42, man of Rayenda, said, "after Sidr and Aila I lost my shelter and crops. After Sidr no organizations came to us for give us shelter at that time our neighbors came to us and helped me to reconstruct my damaged shelter. But at the time of Aila when I lost my paddy no GO or NGO gave me a single aid though I tried to get aids from the organizations." Monsur Ahmed, age 36, a school master, said, "No actors or agents were fulfilled our losses that caused by Sidr and Aila. I did not see any type of rescue operations made by organizations in Rayenda during Sidr but during Aila some volunteers performed some evacuation activities. Though the aids of various organizations helped us to survive after disaster, but our neighbors did right work to help us to survive and rescued our family members and wealth in time of disaster. So, I think the Government should form a disaster committee in every coastal village headed by the community members with the technical helps of organizations who may take steps to enhance coastal people moral courage and make capable to enhance their coping mechanisms."

7.4 Conclusion

The expected need of the cyclone affected people of coastal region of Bangladesh to its community and organizations was very high in magnitude. However, the real situation was different due to lack of resources and stake holders' positive mentality. Some times the organizations did right things to its coastal inhabitants but the coastal inhabitants did not make response to such kinds of initiatives rather deny their warnings and initiatives. Some times coastal inhabitants made themselves dependents to their own communities and organizations and expected they could protect themselves from the ruthlessness of cyclone but the actors or agents could not make them survive. As a result, it created a reciprocal disbelieving situation. But the coastal inhabitants of Bangladesh wanted a permanent solution by enhancing mutual understanding which is vice-versa to develop a resilient coastal community. For these circumstances, today every coastal development projects giving especial interest to the experience of coastal communities and put them in central to accomplish their expected needs.

CHAPTER 8

SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

This research has emphasized to focus on the responses and initiatives done by the community and organizations in different phases of cyclonic disaster formulated and undertaken for the cyclone affected people of Rayenda and Uttar Sauthkhali in coastal Bangladesh. It fervently explores the vulnerabilities of coastal people of Bangladesh to cyclone disasters by examining their warning processes, plans and strategies for reducing cyclonic disaster risks, and their own indigenous coping mechanisms.

8.1 Summary

The community and organizational responses at the different phases of super cyclone Sidr and Aila are pinpointed in the present study, and how and to what extent these responses satisfy their enormous needs of the affected coastal people to cope with their devastated coastal habitat. It also justifies the inadequacies of such responses in this context. It is found that the responding ways and mechanisms were significantly affected by the indigenous beliefs and practices of Rayenda and Uttar Sauthkhali communities that increased their impoverishment and sufferings in the end.

This study explores disaster never occurs in isolation; rather it occurs in the context of everyday life and act to compound problems to the point of exhausting individual and community resources. This usually has disproportionate impact upon the poor and marginal population of society that lack assets and resources to recover from the impacts of hazard events. Because of the pervasiveness of poverty in Rayenda and Uttar Sauthkhali, the inhabitants were often viewed as part of the physical landscape, passively accepted and condoned. Historically past, these areas of coastal Bangladesh were used to face different powerful cyclones in several times. However, the cyclone of Sidr and Aila were different with their own catastrophic characteristics and uniqueness of events. As the inhabitants of Rayenda and Uttar Sauthkhali were historically vulnerable with their poverty and economic incapability to environmental hazards, these two cyclones have been done great impacts on its inhabitants.

Bangladesh is currently ranked as one of the world's most disaster-prone countries, with 97.1 percent of its total area and 97.7 percent of the total population at risk of multiple hazards, including cyclones.¹⁰⁵ In every year, severe cyclones with wind speeds causing extensive loss

¹⁰⁵ Alam, Edris and Andrew Collins, "Cyclone disaster vulnerability and response experiences in coastal Bangladesh", *Disasters*. (Blackwell Publishing Ltd: 2010), vol. 34, p932. <http://dx.doi.org/10.1111/j.1467-7717.2010.01176.x>[accessed 14 May 2012]

of lives and destruction of properties of the cyclone victims of Rayenda and Uttar Sauthkhali. In addition, storm surge, an unusual rise of seawater associated with a tropical cyclone originating in the Bay of Bengal, has also caused major devastation in the coastal region.

On 15 November 2007, about 93 percent households of Rayend and 98 percent households of Uttar Sauthkhali were directly affected by super cyclone Sidr and the rests were suffered by its default casualties. On 25 May 2009, Cyclone Aila struck the coastal region killing more than 175 people. Over 5,400 people were injured and nearly 842,000 were forced to take refuge on rooftops and rafts. The embankments of Bawleshar River broke and it caused widespread inland flooding. An estimated 58,950 animals were killed by the storm and more than 61,000 houses collapsed and more than 132,000 houses were partially damaged. About 82 percent households of Rayenda and 90 percent households of Uttar Sauthlhali were affected directly by Aila and it's by default sea surge. It caused extensive damage to rice and other crops, and fisheries in Rayenda and Uttar Sauthkhali. Maximum paddy and greens were damaged in Uttar Sauthkhaliby salt-water logging due to sea surge. The shrimp cultivation (*chingri gher*) was totally damaged due to sea surge in both villages.

The physical isolation of Rayenda and Uttar Sauthkhali communities make them highly natural resource-dependent and consequently it reduces their access to alternative livelihoods; this can make them especially vulnerable to any disruptions. Yet even physical isolation can be mitigated through appropriate improvements to infrastructure, health and education services and improved their access to information and markets as well. Some aspects of household vulnerability vary with the seasons. While occupational diversification allows households to maintain a level of income throughout the year, there may be periods of high income (as when crops were harvested or fishing was good) and low income (as when fishing was poor or not possible due to storms). During the slack seasons of their agricultural productions, they were forced to depend on the availability of other sources of income: informal loans from moneylenders or traders, and systems of mutual support at the community level, etc.

Other root causes of vulnerability in Rayenda and Uttar Sauthkhali communities were social and economic power imbalances, lack of participation in decision-making, limited asset ownership, highly resource dependency, and laws and regulations that influence people's ability to use assets. Once the root causes of vulnerability were recognized, interventions can be put in place to address them and to increase the resilience of the community to shocks, seasonal factors, and human and natural changes.

Nevertheless, the vulnerabilities of respondents of both the study villages to cyclonic disasters were triggered by their lower educational status and insolvent and poor economic standing. Around 78.38 percent respondents of both villages were illiterate. Around 90 percent respondents of both villages were impelled to continue their survival below the poverty line. It was evident from the findings that the annual per-head income of 60 percent and 61.48 percent respondent households of Rayenda and Uttar Sauthkhali respectively is lower than that of the total population of Bangladesh. It is to be noted that the 89 percent respondents of both study villages were savings disoriented. It was observed that nearly one-quarters (24.47%, n=120) and more than three-quarters (75.53%, n=135) cyclone victims were landless in Rayenda and Uttar Sauthkhali respectively. Not only that the housing pattern of 65 percent respondents of both study villages was non-concrete (*cutcha*), but also their annual food deficit proportion was 66 percent. Due to their experience and beliefs, the coastal inhabitants were not reluctant to receive the organizational responses during the devastating cyclone Sidr. However, they made a good response during another cyclonic disaster Aila. They were not found fatalistic in dealing with the adverse situation caused by two cyclones. Their lower level of required knowledge and skills, and economic incapability increased their vulnerabilities to cyclonic disasters of Sidr and Aila.

The proper warning system is very much important for cyclone disaster risk reduction in coastal habitats. The respondent communities of Rayenda and Uttar Sauthkhali had no meteorological equipment to understand the cyclone formation in the Bay of Bengal. However, both the communities took part in disseminating the organizational cyclone warning system. In Sidr time, a very few villagers of both the villages willingly took part in warning dissemination. But the participatory method of warning dissemination by the stakeholders was more effective rather than informal dissemination. As a result, after Sidr the CPP increased the number of its volunteers in Rayenda and Uttar Sauthkhali. They gave them training on warning and rescue methods during the cyclonic disasters. For these circumstances, the inhabitants of Rayenda and Uttar Sauthkhali were more conscious in responding warning and rescue programs directed by CPP. However, the communities of two villages performed a significant and successful role in rescue operation rather than CPP volunteers.

After Sidr's aftermath, the organizations were more conscious in disseminating cyclone warning. Bangladesh Meteorological Department (BMD) was the main concern for issuing warning and disseminating it properly. In recent years, the BMD enhanced its regular power by establishing Doppler Rader System. Recently the BMD took a project to develop easiest warning system for the stakeholders. For this reason,

it creates three categories warning system and the signals were divided by ten easy warning signals up to 1 to 10. Recently the Government of Bangladesh has taken some programs for enhancing stakeholder responses to warning system with the collaboration of NGOs. The NGOs played a vital role by giving financial supports to the GOs for giving stakeholders skill orientation training in achieving capabilities to make them a resilient community.

The respondents of Rayenda and Uttar Sauthkhali had no planning to reduce risks of cyclone disasters at the community level. As the communities of study villages, they were not well conscious about Community Based Disaster Management (CBDM), and it causes their vulnerability to cyclonic disasters. Before cyclone Sidr, there were no village disaster management committees in both the villages. After Aila, the local authorities, and CPP with the collaboration of NGOs formed several committees of both the villages that members have to discuss in a general meeting in every month and have to share their experiences of indigenous disaster management. The committee becomes active and effective in time of distribution of aids and assistances. It was observed that there was no activities of VDMC organized by CPP rather than after disaster and it was opined by 79.18 percent and 98.31 percent cyclone victims of Rayenda and Uttar Sauthkhali respectively. In Sharonkhola, the Sauthkhali Union Parishad formed a Union Disaster Management Committee (UDMC) chaired by

Chairman of UP to co-ordinate, review and implement the disaster management activities of the union. But the respondents of Rayenda and Uttar Sauthkhali reported that the activities of UDMC of Sauthkhali were not operated for preparedness during the pre-cyclone period; these were just operated after the cyclonic disasters. After Sidr they played a vital role by giving suggestions for distributing rehabilitation aids among the cyclone affected people.

The Standing Orders for Cyclone (SOC) proclaimed by the Government of Bangladesh (GOB) as of November 1985 and updated in 2009 thereafter constitute the basic plan for coping with cyclone disasters. SOC laid down the guidelines for action at various stages of disaster by all government agencies with the collaboration of various national and international NGOs to cope with situation arising out of cyclone aftermath. Within the framework of SOC, the concerned authorities are required to deal with unforeseen and complex situations swiftly using initiative and imagination. The local authorities are required to take necessary action to prevent and/or reduce loss or damage to life and property by making maximum use of local resources instead of waiting for external assistance. According to standing order on cyclone the responsibilities of Bangladesh Meteorological Department as pointed out in National Plan for Disaster Management 2010 -2015 is divided into three stages: normal time that contains contingency plan for disaster management, alert stage that contains issuing alert signals

36 hours ahead of depression formation, warning stage that contains publicity of warning signals.

8.2 Conclusion

The understanding community-coping methods was essential for building resilient communities. This study tries to introduce the coping method that the people of Rayenda and Uttar Sauthkhali have developed to build their social and economic safety nets to manage coastal hazards. As the respondent coastal communities perceived, that the shelter and livelihood, water supply, and health-related coping methods for the cyclones, tidal surges, and riverbank erosion were adopted by the coastal communities at the study villages, The indigenous techniques were used by the inhabitants of Rayenda and Uttar Sauthkhali during cyclones in the early years of their settlements and afterwards, and it is noticeable that the communication and transportation systems were not suitable and adequate, and relief did not appear long after the cyclone hit. These types of indigenous practices were regarded as 'old-fashioned' and being superseded by newer scientific system in other coastal *chars* of Bangladesh too. But the validity of their weather predicting knowledge and strategies was evident in their everyday living in a place where cyclone hits are so common for many centuries.

Like many other coastal communities, the inhabitants of the study villages also undertook various coping methods using their abilities, resources, and knowledge. For instance, for cyclone Sidr, almost one third of the people take shelter at cyclone centers and one-third of the people apply their indigenous knowledge such as using strong rope or wire to tie four sides of their house to large trees in a secure and balanced way and to do tree plantation around houses and during Aila almost half of the inhabitants of Rayenda and Uttar Sauthkhali used cyclone centers and government buildings. During tidal surges, people mostly took shelter on elevated places like embankments or highways. For more safeguards, the respondents have elevated beds and wooden boxes with long legs to keep their valuables. As a common practice, they made the same type of boxes to keep their poultry during the tidal surges. Sometimes they build extra ceilings underneath the main ones in order to store crops, food, and fuel to protect from inundation.

When an emergency situation occurs various societal resources become involved in the response. Thus, the emergency response system was constituted by numerous elements such as individuals, groups of individuals, formal organizations, communication devices, vehicles, hoses and stretchers, laws and regulations, knowledge, culture as well as their dynamical relations. Such constitutions logically have a complex character and grasping both detail and a

complete wholeness in theoretical reasoning and empirical studies was reasonably very problematic. After Sidr and Aila, the communities of Rayenda and Uttar Sauthkhali faced an emergency and responded various actors' in coping with such devastated situation.

The pre-cyclone response mechanisms include various aspects such as warning, rescue, evacuation and generally mitigation of disaster. This study found warning mechanisms presented widely in time of Sidr and Aila rather than rescue and evacuation. In the period of Sidr, the organizations (GOs and NGOs) disseminated cyclone warning in Rayenda widely but dissemination in Uttar Sauthkhali was limited. The community people of Rayenda and Uttar Sauthkhali were not involved in warning dissemination at the first hours of warning dissemination rather at the last minute. Moreover, the majority of them were disbelieving in warning that organizations disseminated. It is found that the majority of community people of Uttar Sauthkhali were not responding in organizational warning rather than the community of Rayenda though the communities of both villages opined that the organization warning dissemination was limited in time of Sidr. Nevertheless, in time of Aila, the community people of Rayenda and Uttar Sauthkhali willingly participated in warning dissemination. But the community people willingly participated to rescue their neighbors and their children in Sidr and Aila though they opined that they did

not see any type of organizational rescue operation in Sidr rather than a little organizational rescue operation in Aila.

In regard to cyclone time response, the communities of Rayenda and Uttar Sauthkhali participated in rescue operation in both Sidr and Aila at the last minute. They took shelter in their neighbors' houses when their dwelling houses were totally damaged in Sidr as well as they also sheltered their neighbors. As (both of the villages) more than 80 percent housing infrastructures of them were poor, for the reason their reciprocal shelter sharing did not show enough effectiveness indeed. In Sidr time, one-third population of the both villages took shelter in organization's cyclone centers. They opined the living environment of majority cyclone centers was not sound but suffocated. In shelter sharing at cyclone center, the organization could not provide them foods sufficiently though they sharing their own foods with their neighbors and/or relatives. They opined that their women and girls were sufferings from very miserable condition in time of shelter sharing at cyclone center due to lack of separate female toilet facilities.

After cyclone disaster, the communities of Rayenda and Uttar Sauthkhali were much disrupted and found incapable to recover their losses. Hence, they gave shelter to those neighbors who lost their

dwelling houses. Nevertheless, they gave protection to their (shelter lost) women, girls and aged after cyclone disruption. The communities helped to reconstruct their damaged houses, and to clean debris, broken trees etc. by physical labor. Thereafter, the community's best-practiced feature of assistance to others was 'moral support'. They gave moral supports to their mentally helpless neighbors and kins which was very much essential for their resilience. During Aila, many of them sheltered in cyclone center in Uttar Sauthkhali expressed that they did not find there valuable belongings which they stored in a cave on the yard. They suspected that someone who did not lost their dwelling house looted their goods.

After cyclone Sidr, the local government agencies distributed dry foods, saline and drinking water among the cyclone affected people of Rayenda and Uttar Sauthkhali. However, the half of the respondents of Rayenda and Uttar Sauthkhali reported that they found humanitarian aids after two to three days later. They also opined that NGO volunteers first distributed dry foods and drinking water among them. However, the cyclone-affected communities of Rayenda opined that the local authorities distributed various aids at the first hour after disaster in both Sidr and Aila. The study found that many of the actual cyclone victims did not found any rehabilitating aids from the organizations. Therefore, the rehabilitating aids that many foreign nations aids for the cyclone affected people of Rayenda and Uttar

Sauthkhali were distributed with the collaboration of local government authorities and some selected national NGOs. The organizational responses after both the cyclones did not give any aids to the cyclone affected people for increasing their sustainable economic livelihood.

The sufficient amount of relief material came into the locality from various government and non-government organizations. But there were faults and inadequacies in the distribution processes. It was observed that all the rehabilitation programs were launched to help the extreme poor but other cyclone victims were out of focus. It was evident from the findings that the cyclone victims of both villages who lost more opined that they were not provided with relief, cash money, and housing materials as well but some of them who lost little got much of relief materials.

The immediate, subsistence and adaptive needs for the survival of the cyclone victims of Rayenda and Uttar Sauthkhali were not fulfilled moderately rather than partially. The need of information and warning was at the top of the hierarchy. More than 24 percent cyclone affected people expected that the local and national government should warn people about cyclone and provide cyclone information in right time. The coastal people of Uttar Sauthkhali argued the government warning system was little in the time of Sidr. But they appreciated government

warning in time of Aila. The fact was empirically found that argued the community did not fulfill their immediate expected needs in cyclone Sidr (67.5% and 69.63% respondents of Rayenda and Uttar Sauthkhali respectively) and in Aila (44.17% and 58.52% respondents of Rayenda and Uttar Sauthkhali respectively) as well. The community failed to fulfill and cyclone affected expected subsistence needs in Sidr (68.63%) and also in Aila (49.41%). But it was very much shocking that community fulfilled adaptive needs of only 5.83 percent and 4.44 percent cyclone victims of Rayenda and Uttar Sauthkhali respectively.

It was evident from the findings that the organization fulfilled immediate needs of 46.47 percent and 57.65 percent cyclone affected people in Sidr and Aila respectively. During cyclone, the affected people of Rayenda and Uttar Sauthkhali expected six aids in general to the local organizations (government authorities and various NGOs). But the organizations fulfilled the subsistence needs of 60.78 percent and 68.63 percent cyclone affected people in cyclone Sidr and Aila respectively. Nevertheless, 42.96 percent and 18.82 percent cyclone affected people of Uttar Sauthkhali were totally abandoned in providing their subsistence needs in cyclone Sidr and Aila respectively while 35 percent and 26.67 percent in Raeynda. The adaptive needs of reconstruction and rehabilitation of 17.65 percent and 23.14 percent cyclone affected people of Raeynda and Uttar Sauthkhali were fulfilled in Sidr and Aila respectively. The organization fulfilled the expected

adaptive needs of assistance for income earning of 18.83 percent and 25.09 percent cyclone affected people of Rayenda and Uttar Sauthkhali in Sidr and Aila respectively. The organization provided 14.90 percent and 14.51 percent of the cyclone victims with ration and money in Sidr and Aila respectively.

8.3 Policy Recommendations

This study identifies eight major vulnerabilities of communities of Rayenda and Uttar Sauthkhali: acute poverty, extreme events like cyclone, delta basin, high dependency on environment, limited access to institutional resources, lack of awareness, saline water intrusion and erosion, and changes in coastal morphology. It is forecasted that these vulnerabilities would be acute due to the combined effects of climate changes, sea level rise, subsidence, and change of upstream river drainage, cyclones, and coastal embankments. Recognizing these acute impacts, both governmental and non-governmental organizations with the financial and technical supports of donors and international bodies have undertaken diversified programs and projects. On the basis of the findings of this research, the following policy recommendations made by the respondents of Rayenda and Uttar Sauthkhali for undertaking structural and non-structural measures, which can be utilized to increase a good response mechanisms:

Restriction of the Human Settlement in Coastal Habitat: The coastal areas are inherently exposed and dangerous. Despite this, people are attracted to the coast for economic and other reasons. National and local development policies may need to be changed or enforced to avoid the settlement of large numbers of poor people in fragile areas. These policies will necessarily affect coastal livelihoods and disaster response mechanisms.

Reducing Vulnerability to Natural Hazards: The coastal people must be protected with thick and long green belt along with the coast of the Bay of Bengal. They should be provided with cyclone-resistant dwelling house. The coast should protect with embankment of adequate height.

Empowering Coastal Communities: The economic and political marginalization of coastal communities has led to poverty and resource degradation as well as incapable to respond properly to their different disaster needs. The empowerment process must be balanced so that it reduces social stratification, rather than simply redistribute power to local elites. Moreover, it is inevitable to put them in center of the response mechanisms for their adaptation to regular disaster.

Rebuilding Community Organizations: Disasters often weaken and/or destroyed social structures and processes of the community, but

rehabilitation efforts provide an opportunity to reinforce the positive strengths of existing social structures. Community and Organizations facilitate participation in decision-making over rehabilitation efforts are essential for institutional sustainability. Community and organizations must have the legal right to exist and make arrangements related to their needs. They must be recognized as legitimate and credible by the community and be transparent and accountable to their members. Community and organizations can be networked to further strengthen their ability to serve and represent their members.

Integrating Coastal Communities into National Economic Development: The livelihood development in coastal communities needs to be linked to national economic development plans and to current and future employment needs in the country. Rural coastal communities should be identified for private sector investment in jobs, both in and out of the fisheries sector. Education and skills training interventions can be targeted at residents of coastal communities to meet current and projected national employment needs. Access to telephones and internet can open a world of communication and knowledge to coastal communities and serve to expand livelihood options.

Investing in Education and Training: The coastal resource users possess a great deal of indigenous knowledge. However, most of the coastal people of Rayenda and Uttar Sauthkhali are illiterate and this increases their vulnerability and limits to their livelihood options. Training in disaster preparedness and management, such as safety at sea, can be linked with environmental education to improve the conservation and management of coastal resources. Local authorities may arrange a regular training programs and grooming sessions for the coastal people to build their awareness level and to mitigate disaster by using their local resources. The key to effective disaster response is community-based preparedness so that communities can learn to help themselves.

Forecasting and Warning System: One of the most effective counter measures for enhancing response mechanisms to cyclonic disasters is the establishment of early warning system. The warning system based on forecast should be disseminated in a local language that can be easily understood by the coastal people of Bangladesh.

Cyclone Shelters: To prevent or mitigate the loss of human lives and probably livestock and poultry, the cyclone shelters can play the most vital role probably more than any other means. The existing cyclone shelters are not sufficient in number and are not properly designed and located (although nowadays situation is improving). But many people could not use these shelters because the access roads were

flooded. In the study area along with usual cyclone centers many other buildings (e.g. schools, clinics, mosques) and private brick built homes served to shelter people during the cyclone. Therefore, well designed cyclone center will construct the study locale for enhancing response mechanisms.

Drinking Water and Sanitation: After the cyclone, they have become vulnerable to diarrhea and other water borne diseases. A large number of casualties occur from the post cyclone water borne diseases. To mitigate the post cyclone sufferings and loss of lives, the water and sanitation sector should be given proper care. The tube-well and latrine installation should be made in such a elevated place so that these will not go underwater during the cyclone and can be recovered immediately after the cyclone. A provision should be made to store the drinking water on the basis of early cyclone forecasting and warning for use during *post* cyclone period. Ponds should be protected by raising the embankment of the ponds at the level of storm surge.

Relief and Rehabilitation: Bangladesh needs a better plan to incorporate all the sufferers from cyclones under a well managed relief and rehabilitation programme. And the higher officials should take into account two more facts in relief distribution and programming: (a) when there is lot to give through relief to the

sufferers it has to be properly monitored as it was found that local GO authorities and NGOs were accused of taking bribes in distributing relief products especially in case of house construction because the houses were of around 50-60 thousand Taka. They took some money in return of sanctioning the houses; (b) the other this which need to be taken into account is that all the communities have their traditional cultural heritage. So to keep protecting the cultural tradition of the coastal inhabitants the government needs to take proper initiatives.

Integration Between Scientific and Indigenous Disaster Mitigation

System: The maximum coastal inhabitants are illiterate due to their social and economic incapability. But they are very much experienced to cope with disaster by using their indigenous knowledge. So, policy makers should give more concern in their indigenous knowledge to formulate any disaster related planning. They should make a synthesis approach by integrating local and scientific knowledge for developing a strong and resilient mitigation policy.

Reference Citation

M. Alam, A. Hossain and Sultana Shfee. "Frequency of Bay of Bengal Cyclonic Storms and Depressions Crossing Different Coastal Zones," *International Journal of Climatology*, 2003. Vol. 23, pp. 1119-1125.

Alam, Edris and Andrew Collins, "Cyclone disaster vulnerability and response experiences in coastal Bangladesh", *Disasters*. Blackwell Publishing Ltd: 2010, vol. 34, pp 931-954. <http://dx.doi.org/10.1111/j.1467-7717.2010.01176.x> [accessed 14 May 2012].

Allami, Abul Fazal, *The Ain-I Akbari*. Trans. Translated by H. S. Jarret. New Delhi: Crown Publication, 1988.

Asian Disaster Reduction Center, *Total Disaster Risk Management- Good Practices-2005*. ADRC: 2005.

Asian Disaster Reduction Center, *Total Disaster Risk Management- Good Practices-2007*. ADRC: 2007.

Bangladesh Climate Change Strategy and Action Plan 2008, Dhaka: Ministry of Environments and Forests, 2008. pp 1-54

Bangladesh Climate Change Strategy and Action Plan 2009, Dhaka: Ministry of Environments and Forests, 2009. pp 1-98

Bangladesh Meteorological Department, "Early Warning System, Telecommunication and ongoing activities in Bangladesh Meteorological Department", The 4th Conference on "Management of Meteorological and Hydrological Services in Regional Association II (Asia), Islamabad, Pakistan", 5-9 February 2007, pp1-32

Bangladesh Meteorological Department, "Role of Bangladesh Meteorological Department in Disaster Risk Reduction in Bangladesh", The 4th Conference on "Management of Meteorological and Hydrological Services in Regional Association II (Asia), Islamabad, Pakistan", 5-9 February 2007, pp 1-69

Bangladesh Red Crescent Society, "Cyclone Preparedness Program." BDRCS:2013.<http://bdracs.org/programs-and-projects/cyclone-preparedness-program>, [accessed 11 November 2013]

Bangladesh Bureau of Statistics. *Bangladesh Economic Review 2006*. Dhaka: Ministry of Finance, 2006.

Bangladesh Bureau of Statistics. *Bangladesh Economic Review 2007*. Dhaka: Ministry of Finance, 2007.

Bangladesh Bureau of Statistics. *Bangladesh Economic Review 2009 (Partial)*. Dhaka: Ministry of Finance, 2009.

Bangladesh Bureau of Statistics. *Bangladesh Economic Review 2008*. Dhaka: Ministry of Finance, 2008.

- Bangladesh Bureau of Statistics. *Bangladesh Household Income and Expenditure Survey 2005*. Dhaka: Ministry of Finance, 2005.
- Barkat, A. S. Zaman, N. Mahmud, and M. S. Hossain. *Guidelines to Reduce the Economic Risk of Coastal livelihood due to tsunami/cyclone*. Dhaka: Comprehensive Disaster Management Programme, Ministry of Food and Disaster Management, 2008.
- Barry, G. and R. Chorley. *Atmosphere, Weather and Climate*. New York: Routledge, 2003.
- Benson C. J. Twigg and M. Myers. "NGO Initiatives in Risk Reduction: An Overview", *Disaster*. vol. 25, issue 3, pp 199-215.
- Benson, C. and Edward Clay. *Bangladesh: Disasters and Public Finance*. Washington, DC: The World Bank, 2002.
- Benson, L. and Bugg. *Child-led Disaster Risk Reduction: A Practical Guide*. Southern Lyte: Save The Children, 2006.
- Berry, J. Linda "Community Vulnerability to Tropical Cyclone: Cairns 1996–2000." *Natural Hazards*. vol. 23, 2003. pp 209-232
- Bolin, Robert C. and Bolton. *Race, Religion, and Ethnicity in Disaster Recovery*. Florida: FMHI Publications, 1986.
- Brown, Katrina et al. *Global Environment Outlook 3*. London: UNEP, 2003.
- Chowdhury et al. "Cyclone Aftermath: Research and Direction for The Future." *From Crisis to Development—Coping With Disasters in Bangladesh*. Edited by Hossain, Dodge and F. H. Abed. Dhaka: University Press Limited, 1992.
- Chowdhury, M. Yusuf Chowdhury, Abbas Bhuyia, K. Islam, Z. Hossain, O. Rhaman, R. Glass and M. Bennish. "Cyclone Aftermath: Research and Directions for the Future." *From Crisis to Development—Coping With Disasters in Bangladesh*. Edited by Hossain, Dodge and F. H. Abed. Dhaka: University Press Limited, 1992. Pp101-132

- Chowdhury, M. H. Cyclone. In Shirajul Islam (ed.), *Banglapedia – National Encyclopedia of Bangladesh*, Dhaka: Asiatic Society of Bangladesh, 2003.
- Chowdhury, Raihan M. "Financing the Natural Disaster." *The Financial Express*. Dhaka: Topkhana, [Dated-15 July] 2009.
- Comprehensive Disaster Management Programme, "Cyclonic Storm-Aila- Situation Report". Dhaka: Ministry of Food and Disaster Management, 2009. on May 25 2009
- Comprehensive Disaster Management Programme, "Cyclonic Storm-Aila- Situation Report". Dhaka: Ministry of Food and Disaster Management, 2009. on May 27 2009
- Comprehensive Disaster Management Programme, "Cyclonic Storm-Sidr- Situation Report". Dhaka: Ministry of Food and Disaster Management, 2007. on 12 December 2007
- Comprehensive Disaster Management Programme, "Cyclonic Storm-Sidr- Situation Report". Dhaka: Ministry of Food and Disaster Management, 2007. on 17 December 2007
- Dasgupta s. Mainul Huq, Zahirul Huq Khan, Manjur Murshed Zahid Ahmed, Nandan Mukherjee, Malik Fida Khan, Kiran Pandey. "Vulnerability of Bangladesh to Cyclones in Changing climate: Potential Damages and Adaptation Cost." Policy Research Working Paper. Environment and Emergency Team. The World Bank. April 2010.
- Disaster Management Bureau. *National Plan for Disaster Management 2010-2015*. Dhaka: DMB, DMRD, 2010
- Disaster Mitigation Strategies in Bangladesh 1995*. Government of the People's Republic of Bangladesh. Ministry of Food and Disaster Management [Formerly, The Relief and Rehabilitation Division] [at present Ministry of Disaster Management and Relief]. Dhaka, 1995.

- Edwards, Jonathan. *Tropical Cyclone Formation*. New York: Storm Banner Co, 2007.
- Filho, W. L. "Introduction". In W. L. Filho (ed.), *Climate Change and Disaster Risk Management*, pp. III-VIII. Berlin: Springer, 2013.
- Foster, Bob. "IPCC's Third Assessment Report: Too Much 'Imagination Block'", Geneva: IPCC, 2001.
- Global Facility for Disaster Reduction and Recovery. *Post-Disaster Needs Assessments-volume A Guidelines*. Kobe: International Recovery Platform, UNISDR, 2013.
- Global Survey of Early Warning System*, New York: United Nations, 2006, pp 6-56
- Government of the People's Republic of Bangladesh. "Disaster Management Act," *Bangladesh Gazette*. Dhaka: Bangladesh National Parliament, 2012.
- Habib, A. Md. Shahidullah and Dilder Ahmed, "The Bangladesh Cyclone Preparedness Program. A Vital Component of the Nation's Multi-Hazard Early Warning System." *Institutional Partnerships in Multi-Hazard Early Warning System: A Completion of Seven National Good Practices and Guiding Principles*. Edited by Maryam Golnarghi. Geneva: WMO, 2012. Pp 29-61.
- Haider, R. *Cyclone '91 Revisited: A Follow-up Study*. Dhaka: Bangladesh Centre for Advanced Studies, 1992.
- Haque C. E. and Muhammad Q. Zaman, "Human responses to riverine hazards in Bangladesh: a proposal for sustainable floodplain development", *World Development*. Pergamon: 1993, vol 21, pp93-107
- Haque, C. Emdad and Burton. "Adaptation Options Strategies for Hazards and Vulnerability Mitigation: An International Perspective." *Journal of Mitigation and Adaptation Strategies for Global Change*. No. 10, Springer, 2003. Pp 1-6

- Haque, C. Emdad, "Atmospheric Hazards Preparedness in Bangladesh: A Study of Warning, Adjustments and Recovery from the April 1991 Cyclone", *Natural Hazards*. Springer: 1997, vol.16, p181-202.
- Hasegawa, Kazuyoshi. "Features of Super Cyclone Sidr to Hit Bangladesh in November, 07 and Measures for Disaster." *The Journal of River & Watershed Environment Management*. No. 2, Tokyo: 2007.
- Helsloot and A. Ruitenberg, "Citizen Response to Disasters:a Survey of Literature and Some Practical Implications", *journal of contingencies and crisis management*. London: Blackwell Publishing, 2004. vol. 12, pp98-111
- Hossain, Mahbub. "Development policy, Growth Process and Coping with Natural Disaster." *From Crisis to Development—Coping With Disasters in Bangladesh*. Edited by Hossain, Dodge and F. H. Abed. Dhaka: University Press Limited, 1992. pp137-163
- Howell, P. "Indigenous Early Warning Indicators of Cyclone: Potential Application in Coastal Bangladesh." Paper presented in the summit of BHRC. London: Benfiled Hazard Research Centre, 2003.
- Hunt S., "Organization of Sociology" In George Ritzer (ed.), *Blackwell Encyclopedia of Sociology*, (London: Blackwell Publishing, 2007), p 1111, http://www.blackwellreference.com/public/book.html?id=g9781405124331_9781405124331[accessed November 16 2009]
- Ibarraran. M. Matthias Ruth, Sanjana Ahmad, Marisa London. "Climate change and natural disaster: macroeconomic performance and distributional impacts", *Environ Dev Sustain*. New York: Springer, 2007, pp 1-21
- Independent Evaluation Group. *Hazards of Nature, Risks to Development*. Washington, DC: The World Bank, 2006.
- Inter Governmental Panel on Climate Change, *Working Group II: Impacts, Adaptation and Vulnerability*. Geneva: IPCC, 2001.

- Inter Governmental Panel on Climate Change. *Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. (Geneva: IPCC, 2007).
- Islam, Md. Zulfiquar Ali. 1995 Environmental Adaptation and Survival Strategies of River Erosion Cyclone affected people in Bangladesh: A Study of Two Villages in Nawabganj District. PhD Dissertation. Rajshahi: Institute of Bangladesh Studies, University of Rajshahi.
- Kanta S. and Murshed, *Community-Based Disaster Risk Management for Local Authorities*. Thailand: ADPC, 2004.
- Karen O'Brien, Linda Sygna, Robin Leichenko, W. Neil Adger, Jon Barnett, Tom Mitchell, Lisa Schipper, Thomas Tanner, Coleen Vogel, Colette Mortreux. *Disaster Risk Reduction, Climate Change Adaptation and Human Security*. Oslo: University of Oslo, 2008.
- Karim, Nehal. "Cyclonic Storms in the Coastal Areas of Bangladesh: Socio-Economic Impact." *The Journal of Monash University*. Australia: Monash University, 2005.
- Karim, Nehal. "Options for Cyclonic Protection: Bangladesh Context." Paper presented at the First International Conference on Post-natural Disaster Reconstruction in Developing Countries. Montreal: University of Montreal, 2002.
- Khan. M and M. Rahman, "Partnership Approach to Disaster Management in Bangladesh: A Critical Policy Assessment." *Nat Hazards*. 2007. vol. 41pp 359-378
- King, D., "Organization in Disaster," *Nat Hazards*. 2006. p p657-665
Kitamoto, Masayuki, ed. *Total Disaster Risk Management—Good Practices*. Japan: Asian Disaster Reduction Centre, 2005.
- Krishna, N. H. "Approaches in Disaster Risk reduction—Experiences Present status and future requirements." Paper presented in the Annual Meeting of Oxfam [July 1999]. London: Oxfam, 1999.

M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden and C.E. Hanson (eds). Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007. Cambridge University Press, Cambridge, United Kingdom and New York, USA. http://www.ipcc.ch/publications_and_data/ar4/wg2/en/contents.html. [accessed January 16, 2009].

Management Information and Monitoring Division, <http://www.ddm.gov.bd/site/page/67786590-f690-4696-8ecf-65b7c71923a/> [accessed November 12, 2008]

Miah A. H., "Integrated Coastal Zone Management Plan project," Paper presented in Technical Discussion on Coastal Zone Landing in WPO31, Dhaka: Ministry of Water Resource, 2004.

Mustafa, M. M, 'Towards an Understanding of Indigenous Knowledge,' in P. Sillitoe (ed.) *Indigenous Knowledge Development in Bangladesh: Present and Future*. Dhaka: The University Press Limited, 2000. pp27-31.

Nasreen, Mahbuba. "Disaster Research: Exploring Sociological Approach to Disaster in Bangladesh." *Bangladesh e-Journal of Sociology*. Dhaka: Dhaka University, 2004, pp 1-6.

National Plan for Disaster Management 2008–2015. Disaster Management Bureau. Government of the People's Republic of Bangladesh. Ministry of Food and Disaster Management [at present Ministry of Disaster Management and Relief]. Dhaka, 2008.

National Plan for Disaster Policy 2008. Disaster Management Bureau. Government of the People's Republic of Bangladesh. Ministry of Food and Disaster Management [at present Ministry of Disaster Management and Relief]. Dhaka, 2008.

Nelson, Stephen A. "Natural Disasters & Assessing Hazards and Risk." *The journal of Tulane University*. Tulane, 2007.

- Nicholls, R. J., Mimura, N. and Topping, J. C. "Climate Change in South and South-east Asia: Some Implications for Coastal Areas." *Journal of Global Environmental Engineering*. Quezon City, 1995.
- O'Hare, G. "Cyclone in the Indian Ocean: Facts and Figure", *The GeoFigureical Journal*. London: Royal GeoFigureical Society:2008, p 1-6.
- O'Hare, G. "Hurricane 07b in the Godavari Delta, Andhra Pradesh, India: vulnerability, mitigation and the spatial impact." *The GeoFigureical Journal*. New York: Springer, 2001, No167, pp23–38.
- Rao A.D, Babu and Dube. "Impact of a Tropical Cyclone on Coastal Upwelling Process," *Natural Hazard*. (Netherland: 2004) pp415-435
- Re, Munich. *The Small Island Habit*. UN-DESA, 2004.
- Reid H. and Mayers. "Climate Change and Development Consultation on Key Researchable Issues," *Journal of International Institute of Environment and Development*. London: IIED, 2005. pp 1-9
- Reid, Hannah, *Community-based Adaptaion to Climate Change*. London: IIED, 2009.
- Roy, K., Kumar, U., Mehedi, H., Sultana, T. and Ershad, D. M. *Initial Damage Assessment Report of Cyclone AILA with focus on Khulna District*. Khulna: Unnayan Onneshan -Humanity Watch, 2009.
- Sahw, Rajib and N. Uy. "Shaped by Wind and Typhoon: The Indigenous Knowledge of the *Ivatans* in the Batanes Island, Philippines." Rajib Shaw, Noralene and J. Baumwoll (ed). *Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from the Asia-Pacific Region*. New York: ISDR, 2008.
- Sahw, Rajib, N. Uy and J. Baumwoll, ed. *Indigenous Knowledge for Disaster Risk Reduction: Good Practices and Lessons Learned from the Asia-Pacific Region*. New York: ISDR, 2008.

Shah Rajib and Okajaki Kenji, *Sustainable Community-based Disaster Management Practices in Asia: A User's Guide*. Kobe: UNCRD 2004.

Shoheb, A. Z. M. and Moniruzzaman. "NGOs' Role in Flood Disaster Management in Bangladesh: A Case Study." *The Journal of Geo-Environment*. Rajshahi University: GeoFigurey and Environmental Studies, vol. 7, 2008.

SK Paul and JK Routray, "An analysis of the causes of non-responses to cyclone warnings and the use of indigenous knowledge for cyclone forecasting in Bangladesh", *Climate Change and Disaster Risk Management*. 2013. Pp15-39

Stephen Hunt, "Organization of Sociology" In George Ritzer (ed.), *Blackwell Encyclopedia of Sociology*, London: Blackwell Publishing, 2007.p111,http://www.blackwellreference.com/public/book.html?id=g9781405124331_9781405124331[accessed 16 november 2009]

*The Standing Order for Cyclone*1985. Government of the People's Republic of Bangladesh. Ministry of Food and Disaster Management [Formerly, The Relief and Rehabilitation Division] [at present Ministry of Disaster Management and Relief]. Dhaka, 1985.

*The Standing Order for Flood*1984. Government of the People's Republic of Bangladesh. Ministry of Food and Disaster Management [Formerly, The Relief and Rehabilitation Division] [at present Ministry of Disaster Management and Relief]. Dhaka, 1984.

Thomalla, F. Cruz, R.V. Espaldon, V.O. Hilario, F. Klein, R.J.T. Lansigan, F. Lasco, R. Magcale-Macandog, D.B. Mallion, F.K. Zoleta-Nantes, D.B. Perez, R.T. Pulhin, F. Pulhin, J. Ranola Jr. R. "A Comparative Analysis of Vulnerabilities, Responses and Adaptation Strategies to Tropical Cyclones in Asia: Defining the Philippines Country Study."Paper

- Presented in the Coastal Zone Asia Pacific Conference in Brisbane, Australia: CZAP, 2004, pp 647-653.
- Uhr, C. *Multi-organizational Emergency Response Management – A Framework for Further Development*. Laund: Laund University, 2009.
- UNISDR, “Develop Early Warning System- A Check List”, Third International Conference on Early Warning, *ISDR Platform for the Promotion of Early Warning*. Bonn: UNISDR, 2006.
- UNISDR, “Hyogo Framework for Action 2005-2015.” The UN Hyogo Framework 2005- Kobe, Japan, New York: UNISDR, 2005.
- UNISDR, *Living with risk: a global review of disaster reduction initiatives*. New York: UNISDR, 2004.
- UNISDR. “Sendai Framework for Disaster Risk Reduction 2015-2030”, *Sendai Declaration*. (New York: UNISDR, 2015.
- UNISDR. Disaster Risk Reduction: 2007 Global Review. New York: UNISDR, 2007. part 2
- Vittachi, V.T. “A Land Which Hopes and Copes. *From Crisis to Development*, edited by Hossain et al. Dhaka: University Press Limited, 1992.
- World Disasters Report: Focus on Public Health -2000*. IFRC: Geneva, 2000
- World Meteorological Organization, *Review of the Tropical Cyclone Operational Plan*. Thailand: WMO/ESCAP Panel on Tropical Cyclones, 2010. pp 1-106
- World Meteorological Organization. *Technical Document on Tropical Cyclone Operational Plan for The Bay of Bengal and The Arabian Sea*. Geneva: The Secretariat of The World Meteorological Organization, 2008.
- Yodmani S. “Disaster Risk Management and Vulnerability Reduction: Protecting the Poor,” paper presented at the “Social Protect

Workshop 6: Protecting Communities – Social Funds and Disaster Management." Manila, 2002, pp1-36

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