LUND UNIVERSITY • CENTRE FOR EAST AND SOUTH-EAST ASIAN STUDIES

Cyclone Aila and the Southwestern Coastal Zone of Bangladesh:

In the Context of Vulnerability

Author: Israt Jahan
Supervisor: Sara Brogaard

Master's Programme in Asian Studies

Fall semester 2012

Preface:

This master thesis is the final part in my education as Master of Science in Asian Studies at Lund University (LU).

Many persons contribute to this thesis in a various ways. First of all, I would like to thank *Allah S.W.T.* for giving me the strength and good health to complete this thesis. Further, I would like to thank Sara Brogard for being my supervisor. It's really my pleasure to get her as my supervisor and I am grateful to her for her efficient supervision. Furthermore, I thank to her for giving me enough time to help and discuss about the problems that arise during the thesis. In addition, I would like to thank my family.

Finally, it is likely impossible to complete my thesis without the support of my husband Mohammad Alif Arman.

Israt Jahan
Lund, 28th of August 2012

Abstract

Bangladesh is located in a danger area of the World. The geographical location makes the country vulnerable for tropical cyclones and other hazards. An increasing number of natural disasters such as floods, storms, and tropical cyclones, always keep the coastal people in a worst condition. Bangladesh government is not always fully successful in recovering the situation and gives a sustainable livelihood to the coastal people. Therefore, the suffering of the coastal people is continued for longer period. There are so many reasons behind this. This thesis is tries to demonstrate these reasons.

Figure out the vulnerability of the southwestern coastal people and also investigate that till now why the people cannot get rid from this worst situation is the key purpose of this thesis. This thesis paper will gives a brief overview on the relief and reconstruction work after the cyclone Aila hit the southwestern coastal region of the country in 2009. The analysis recommends that the untimely strike of the cyclone Aila, lack of ready fund for emergency, and governance are the main reasons for the delay in the reconstruction work. This thesis paper is concluded by giving some suggestions such as, emergency relief facility, evaluating the necessary support not based on the scale of the disasters and the death toll but also on the local reality of primary, as well as possible secondary impacts.

Keywords: Vulnerable, Cyclone Aila, Relief and reconstruction work, Development Policies, Bangladesh.

Contents

List of Figures

List of Tables

Chapter 1

Introduction

This section provides the overview and perspectives of this research followed by research questions, research methodology, theoretical framework, ethical considerations and the background of Aila.

1.1. Overview and Perspectives

Bangladesh is a densely populated country in the world and the population density is 482 persons per square kilometer whereas the value is 1,012 for the inside of coastal area (Sarwar, 2005). The coastal zone of Bangladesh is recognized as an extremely vulnerable area. Bangladesh is covered with different types of natural disasters and thought to be one of the most vulnerable countries of the world to CCSLR (preventionweb.net, p-1). Mainly cyclones in 1970, 1985, 1991, 1997 and 2007 resulted lots of death. In latest on May 25, 2009 the cyclone Aila had hit the south-western part of Bangladesh and caused 325 deaths (Roy, *et. al,* 2009), affected the residents, homesteads, roads and embankments. In total, over 3.9 million people were affected (UN, 2010) and nearly 350,000 acres of crop land were destroyed. Fishing, agriculture, shrimp farming, salt farming and tourism are the main economic activities of this coastal area. Storm surge of cyclone Aila washed away all the houses, crops and agricultural land. The damage of the infrastructure is enormous, it also destroy the livelihoods of the people. Aila not only broke down the overall infrastructure but also drop the people into an insecure position of this area. Till now people are struggling to manage minimum basic needs like food, shelter, water and sanitation facilities. Aila have brought different kinds of diseases, injuries and other health problems. It has been observed that people lost everything and they lives in uncertainty, every moments they feels insecurity for their basic needs. Currently around 1 million people are

still living on embankments, inner ring roads and other high strips of land (JOINT POSITION PAPER ON, CYCLONE AILA). Women and children are in most inhuman situation as the main earning member of the family either died or migrated to manage their family needs and livelihoods. The main purpose of this study is to provide the present situation of the affected people and their current livelihood condition in the affected regions with the intension to focus the vulnerability of cyclone Aila, with a key focus on Satkhira and Khulna District. Till now Bangladesh Government trying to solve the situation by distributing safe drinking water, Vulnerable Group Feeding (VGF) card, each VGF card holder receives 10 kg rice per month (The Daily Star, November 6, 2011), reconstruct the damages of the embankments, provides shelter grants (Tk 20,000 per family) to reconstruct their home. Moreover Non-governmental organizations (NGOs) and other International organizations are still working to improve the running situation. But still their efforts are not more successful and so the people are still suffering after this disaster.

This research not only tries to introduce the vulnerability of Aila but also tries to find the causes behind the prolonged sufferings of the people. Moreover, this research tries to explore the factors behind the delayed reconstruction work in the disaster stricken districts and also tries to find out some suitable policy to recover the current situation within a short period of time. At last the paper tries to formulate some recover policy. It also pointed the weakness of the Governmental organizations (GO) and NGOs policies.

This paper will also analyzes the organizational process of and the remaining issues in the post reconstruction efforts among the line government offices, intergovernmental organizations, and local as well as foreign non-governmental organizations for the past 3 years. The research found that Bangladesh Government is operating several policies to improve the condition but those policies and projects are not covering all the affected people for the shortage of

fund. Moreover different international agencies and different branches of the government are operating some project separately and in separate areas.
The study analyzes that for the insufficient fund of GOB, also the shortage of international fund, some laggings behind the GOs, NGOs and other international agencies for post-disaster relief and reconstruction work and therefore, there is the delay in the post-disaster reconstruction work. The scale of Aila was smaller than Sidr and so the loss of human life was smaller. Though the extent of support is decided based on the toll of the dead and missing therefore the concern and support from the international society for reconstruction work is limited. Moreover a chain of damages had actually caused prolonged harm on the houses and the livelihood of a large number of the local people.

Bangladesh should take some proper policy to prevent the people from this condition. Therefore, collection of relevant information relating to the impact of Aila and its consequences on the coastal land masses and population are essential in formulating policies to recover from this worst situation and bring a secured livelihood in the coastal regions of Bangladesh. This requires the international society and developed countries particularly, to provide affected countries with far more effective support for post disaster relief and reconstruction work, along with enhancing the on-going support for disaster management. Proper policy making and its execution may prevent the people from insecurity.

1.2. History of Disaster in Bangladesh and why the coastal region of Bangladesh is most vulnerable for Cyclone

"The wetlands in Asia are being increasingly threatened by warmer climate in recent decades. The precipitation decline and droughts in most delta regions of Bangladesh have resulted in the drying up of wetlands and severe degradation of ecosystems" (IPCC Fourth Assessment Report (AR4), 2007). For rapid global warming brought fundamental changes to the world climate. Millions of people of Bangladesh are already suffering for this global warming. Severe floods, cyclones are taking place frequently which takes human lives as well as damage crops.

According to U.N. Disaster Risk Index, prepared by the U.N. International Strategy for Disaster Reduction (UNISDR) Bangladesh became the top risked countries in terms of natural disaster in the world (undp.org/cpr). Geographically Bangladesh is situated in a high vulnerable position. Bangladesh is one of the most densely populated countries of the world and Bangladesh is situated in the world's biggest delta, formed by the rivers Ganga, Brahmaputra and Meghna. Bangladesh is termed as a least-developed country (LDC) by the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and the Small Island Developing States (UNOHRLLS 2010). 63% of total populations are employed in the sectors of agriculture, forests and fisheries Bureau of South and Central Asian Affairs (BSCAA, 2010). Bangladesh has a coastal area of 47,211 sq. km., which is 32% of its entire land. The coast of Bangladesh is approximately 710 km. long which has a very low-laying flat land (WMU Sasakawa Fellows' Network Meeting In The South Asian Region, 2010). Almost 35 million people live in its coastal area, which is 28% of the total population (BBS, 2001). Coastal areas of Bangladesh will be submerged gradually due to the global warming and sea level rise. The scale and frequency of extreme climate events has been steadily increasing, making survival difficult and expensive (Government of Bangladesh, Ministry of Environment and Forest, 2005) and people are unable to cope with these events. The villages in this study are located in the coastal areas of Bangladesh. Coastal communities of Bangladeshi have been facing environmental challenges for centuries (Lein, 2000). Coastal peoples are regularly experience by cyclone, coastal floods, river erosion, saltwater intrusion and other natural calamities. In 2007, the southwestern coastal zone of Bangladesh was hit by a category 5 cyclone, Sidr and followed by a category 1 cyclone, Aila, in 2009. Cyclone Aila caused widespread deaths, large-scale destruction of livelihoods and property forcing villagers to migrate. The repeated exposure to such disasters reduces the asset base of households and it makes future recovery very hard.

The following sub-sections present the research questions, an explanation of the research methodology, and ethical considerations. Section 2 presents theoretical

framework and also describes the theoretical framework PAR in practice. Section 3 explores the results and discussion and section 5 gives a recommendations followed by conclusion.

1.3. Research Questions and Methodology

The overall objective of this paper is to figure out the vulnerability of the southwestern coastal people of Bangladesh after the attack of cyclone Aila. This paper also tries to investigate that till now why the people cannot get rid from this worst situation.

This research will also try to provide the answers of the following specific questions to explore the main research question.

a. What vulnerabilities in South-western coastal communities of Bangladesh resulted in the impacts of Aila?

b. What factors contributed to the delay in reconstruction post-Aila?

c. What makes the people of the study area vulnerable to disaster?

d. Weakness of Bangladesh Government, NGOs and other International organizations.

e. Why the efforts concerning post disaster management are not been more successful?

The research methodology of this study has been selected on the basis of the research questions. During the research, qualitative methodology was utilized. This methodology gives importance on the way individuals understand about their social situations (Bryman, 2008). Further qualitative methodology helps us to view events and the social world from the perspective of people being studied and it gives adequate room for explanations. Silverman (2001) points out that the data chosen in qualitative method does not necessarily have to be representative but rather, it is the kind of information from the data that needs to be representative.

The case study design was used in this study. A case study is concerned with the complexity and particular nature of the case in question (Bryman, 2004). The focus of this study design allowed for in-depth investigation of the problem under the study areas. The case studies are very suitable when focus is on a contemporary phenomenon within a real-life context as they help to answer the ‘’how’’ and ‘’why’’ questions (Yin, 2003). Indeed the study focuses on the 2009 cyclone Aila that took place in the South-western coastal zone of Bangladesh. I cannot go for the fieldwork in Bangladesh so the overall study is based on secondary sources. The target population is the inhabitants of two mostly affected districts, Khulna and Shatkhira. This research design helped to analyze the vulnerability of the people of the Aila affected areas.

The main source of information for this study is secondary data from the articles, both international and national NGOs, statistical data of the cyclones published by Ministry of Food and Disaster Management, semi-primary data from local newspapers and from some internet web sites. Especially, the article “Cyclone Aila: One Year on, Natural Disaster to Human Sufferings” (Uthpal Kumar et. al, 2010) provided useful data from the field by taking personal interview and site visiting. To find out the answers of the research questions I started searching published articles about cyclone Aila affected areas in Bangladesh from June 2009 to March 2012, from the Lund University online library “Summon”, newspaper articles also had been collected at the same time period. I have examined that Bangladesh government documents on the impacts of cyclone Aila together with UNICEF, UN, WaterAid and the situation in Bangladesh. Different daily newspaper reports and Bangladesh government statistical data had been used as primary sources. Literatures about disaster vulnerability is used to analyze the damage occurred by Aila. The paper analyzes the published daily newspaper articles and government statistical reports to represent exact figure of damages with places, their living conditions, risks and working conditions and I always chose the most recent version of the reports. By the qualitative method, effort was made to review the above literature.

One of the most challenging matters is that, recently the country has start to digitalized all their works and for this reason there were difficulties in collecting governmental reports because most of the governmental websites are still under construction but I have succeeded to manage the information I needed.

1.4. Ethical considerations

Being a student of Lund University, this thesis work has been done under the guidelines of the Swedish Research Council (ISBN: 91-7307-008-4). I was aware about ethics and related publications from international research network. It would be great me if I could take the interview by myself of the suffering people directly. Therefore, I have to analyze the data from other scholars work and from newspaper. I used published articles and newspapers by giving reference properly.

Chapter 2

Theoretical Framework

2.1. Vulnerability

Wisner. B et al defined Vulnerability as,

"Vulnerability is the characteristic of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard" (Wisner. B et. al, 2004).

Singh, A defined vulnerability as,

"*Vulnerability is a multidimensional concept. Although vulnerability is an intuitively simple notion, it is surprisingly difficult to define and even more difficult to quantify and apply in practice"* (Singh, A. et.al, 2003).

Lindsay points out that,

"Risk should not be confused with vulnerability, which refers to the resources and coping abilities…Vulnerability is a reflection of the community's coping resources and may vary within the smaller social and economic groups which form a large community." (Lindsay,1993)

To a more elaborated concept vulnerability has emerged from a notion of the everyday language. Vulnerability is context dependent and also subject-dependent. Anyone is vulnerable to something, in a given place and at a given time. There is a stake i.e. someone or something threatened, and a threat, i.e. a hazard, like a storm, an earthquake, etc. For instance, the people living in the Pacific coast in December 2004 were vulnerable to a tsunami, which caused the disaster. There were risks of tsunami disasters. Anyone can define risk as a probability of damages by one or several hazards. A disaster can be defined as a social disruption triggered by the impact or impacts of one or several hazards exceeding the capacities to cope of the affected society. Risk is a virtual phenomenon. Disaster is concrete, observable, and a sensible phenomenon. The

hazard alone is not able to transform the risk into a disaster. As an example, an earthquake is not necessarily disastrous, there must be some specific conditions of vulnerability, such as, the presence of populations or goods in hazardous areas, and some of their internal properties which render the damages possible. That is all the concept is covering.

Important conceptual model was developed in 1994 to give disaster managers a framework to analyze vulnerability to disaster and for reducing it (Blaikie *et al*.1994). The model was developed as part of the detailed study of human vulnerability to natural hazards by Blaikie *et al*. (1994). The prime basis of Pressure and Release (PAR) model is recognition that a disaster is the intersection of two opposite forces: the processes generating vulnerability on one side, and physical exposure to hazard on the other. To relieve the pressure, vulnerability has to be reduced.

2.2. Theoretical Framework

There are several theoretical approaches in literatures. Most of the approaches are focused onto the assessment of vulnerability. From my point of view, one of the key models that can bring out the factors that cause severe damage and how vulnerability could be reduced, and this model is the Pressure and Release model (PAR), see figure 7 in appendix for details. The PAR is a simple and easy tool that can be utilized to understand; (i) the impact of disasters increases when natural hazards affect to the vulnerable people; and (ii) how vulnerability is generated. The main conceptualization of PAR is to reduce impacts, for which vulnerability has to be reduced. The concept off PAR suggests not only focus onto the technical aspects of reducing impacts, but also try and achieve a result that is *safe*, *sustainable*, *renewed livelihoods*, and a *resilient* community (Wisner et al. 2004). The PAR gives the researcher a platform to understand the factors that need to be reduced the impacts of disaster and achieve a safe condition for a community. The concept of vulnerability and the ***PAR model*** to figure out the vulnerability is useful for this thesis to achieve a safe place for the coastal people.

The PAR model says that disasters occur at the effect between two opposite forces, the natural hazards and the processes that generate vulnerability. A disaster happens when these two forces coincide.

"An explanation of disaster requires us to trace a progression that connects the impact of a hazard on people through a series of levels of social factors that generate vulnerability" (Wisner. B et al., 2004).

Piers Blaikie and his colleagues approach there study of disaster from the risk and vulnerability perspective. They claim that social vulnerability and multifarious forms of risk are the root causes of disasters. The authors enforce a more sociological approach to disasters: **risk + vulnerability = disaster**. The authors argue that hazards, vulnerability, and risk are all uniquely intertwined in the development of death and destruction from disasters. These factors affect to a society's capacity to cope (social resilience). Vulnerability to hazards can be the part of one's normal existence in everyday life. Vulnerability to hazards manifests societal risk to disaster. Blaikie et al. point out various social factors that can lead to vulnerability. Economic imbalances, disparity in power among social groups, knowledge dissemination, and discrimination in welfare and social protection are the prime factors. The authors determine that people most often live in physical areas of hazard that is corresponding with their economic stability. The authors also argue that, some factors such as race, class, gender, and ethnicity all affect social susceptibility to hazards. Social groups on the lower end of a fixed economic level are typically more at risk to natural hazards such as earthquakes, landslides etc. Resources which are available for hazard prevention that is only accessible to those social groups capable of exerting more political and economic influence. The authors argue that the social, political, and economic factors contributing to vulnerability and risk are often difficult to address. Vulnerability to hazards and risk not only affect one's ability to cope with a disaster, but also affect a person's means for mitigation (pre-disaster event) and recovery (post-disaster event). The disaster risk is directly affected by the hazard produced and

the degree of hazard vulnerability experienced by exposed persons in a particular period of time and space.

The PAR model was used before for Post-Disaster Reconstruction after Tsunami for the Fishing Communities in Tamil Nadu Coast of India (Romasa Mohapatra, 2009). The Par model was also used to make the Drought Cycle Management model to increase the resilience and to strengthen the coping capacity of communities and households so as to reduce their vulnerability to the risks of disaster (Garissa et.al, 2009).

The PAR model divides vulnerability into three steps *root causes, dynamic pressures* and *unsafe conditions*. The PAR model identifies the *progression of vulnerability*, in which *root causes* are formed by a series of *dynamic pressures* and give rise to the *unsafe conditions.* These three forces are defined as follows:

The ***root causes*** are the structural elements in society, such as an economic system, power relations, demographic and political processes and the economy give rise to vulnerability (and reproduce vulnerability over time) and affect the allocation and distribution of resources between different groups of people.

The ***dynamic pressures*** that supported the root causes to produce the Unsafe Conditions for the community of the Aila affected areas. Dynamic pressures are the processes and activities that convert the effects of the *root causes* into vulnerability. Dynamic pressures are also includes for these area is the lack of training, appropriate skills and local conditions of markets and policies.

The above interaction leads to '***unsafe conductions***', where the communities are vulnerable to hazards. Unsafe conditions are the particular forms in which the vulnerability of a group of people manifests itself in time and space in conjunction with the hazard. Unsafe conditions are those that lead the risk to turn into a disaster. Unsafe conditions can be divided into four categories such as the

physical environment, the local economy, social relations, public actions and institutions.

I have used ***Pressure and Release (PAR) model*** to analyze the cyclone Aila affected areas. The theoretical framework of PAR first described in Wisner. B et al., 2004. By using the ***PAR model*** the causes of vulnerability can be traced.

The vulnerability of the South-western coastal region of Bangladesh is extreme after Aila's attack. Therefore with the PAR model this paper analyzes the vulnerability of south western zone of Bangladesh.

2.3. Critiques

PAR model is one of the only models of disaster risk and vulnerability which clearly distinguishes between the different causal levels. PAR model is allows a real social science's analysis. PAR theory is valuable for its holistic view of vulnerability. This model is very important for this thesis paper because this model gives a conceptual framework to look at the vulnerability of the disaster affected people and their livelihood. PAR model are mainly used to explain the vulnerability but not for measuring. It cannot be applied operationally without a huge amount of data collection and analysis. Furthermore, all the factors of PAR model, such as, *root causes*, *dynamic pressures* and *unsafe conditions* are always change over time, sometimes rapidly also. They can also be interacting with each other in a complex ways. Therefore, the outcome can be unpredictable.

Chapter 3

Results and Discussion

3.1. Impacts of Aila

Cyclone Aila took shape on 23rd May and hit the South-Western coastal zone of Bangladesh on 25th May 2009. The wind speed of the Aila was about 104.6-120.7 km/h (Roy, *et. al,* 2009). Almost 2.3 million people were affected by Aila and many people were stranded in flooded villages. The height of the tidal surge was about 10-13m and it washed away the enormous number of households, lives, livestock, crops and all other resources of the affected region. This whole incident happened within a very short period of time, and then people became homeless leaving their assets in the households. During the cyclonic event a very small percentage of the affected people could manage to take shelter in the nearby cyclone shelter and maximum people take shelter on roads and roofs of the schools, colleges, madrashas, mosques and Union Parisahd (local government) buildings.

Cyclone Aila hit during the full moon in May and this is the highest tide in a year, with five meters depth of the river water. Super cyclone Sidr hit the same area in 2007 during outgoing tide and the water level rose more than three meters (Care International). Cyclone Aila attacked less than two years after the cyclone Sidr and before the reconstruction work has been fully completed to recover from its damage. By tradition, cyclones routinely attack to Bangladesh, but not in such a short term period. The unexpected cyclone hit the unprepared people and as a result, The Aila furiously hit the Satkhira and Khulna Districts of Bangladesh, caused immediate death of about 325 people with massive infrastructure damages (Roy, *et. al,* 2009). Cyclone Aila affected a great deal of residents, homesteads, roads and embankments (see table 1 for details). More than 3.9 million people were affected (UN, 2010) and almost 350,000 acres of crop land were destroyed. Furthermore, the damage to embankments extended to an area of 1743 km

(NFPCSP, 2012), which is one of the main causes of a serious secondary disaster of widespread and prolonged post-cyclone inundation in the broken polders. For the above reasons and though the coastal region of Bangladesh is the most vulnerable country, the storm caused the following impacts.

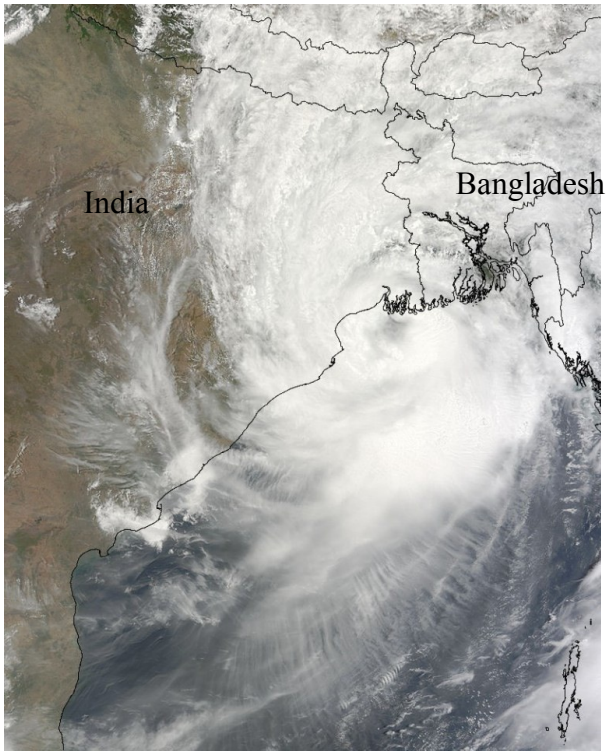

Figure 1: NASA's Terra satellite saw Aila on May 25 over India and Bangladesh, Image Credit: NASA/MODIS Rapid Response (Roy, *et. al,* 2009)

Cyclone Aila hit the south-western coastal region of Bangladesh and eastern part of the West Bengal province of India on May 25, 2009 (Roy, *et. al,* 2009).

Khulna and Satkhira District of southwest coastal zone of Bangladesh were hit the hardest by the cyclone Aila although other coastal districts Barisal, Bhola, Pirojpur, Patuakhali, Barguna, Jhalokathi, Bagerhat, Chittagong, Cox's Bazar, Feni, Laxmipur and Noakhali were also affected (Wash Cluste, WaterAid and Unicef, 2009).

Figure 2: Aila affected areas. The black marked areas were highly affected and other areas that are marked as blue on the figure were less affected (foodsecurityatlas.org).

Storm surge of Aila washed away all the houses, crops and agri-land and livestock and there by the area experienced with huge damages to lives and livelihoods. Aila broke down the overall social harmonization and resulted into a hectic situation in those areas. Number of affected people at Khulna is 296,196 and Satkhira is 158,622. Women and children are in worst situation and become more vulnerable because the male earning member of the family either died or migrated to manage their family needs and livelihoods.

Table 1: Khulna and Shatkhira District: Damage Summary (Wash Cluste, WaterAid and Unicef, 2009, and In-depth Recovery Needs Assessment of Cyclone Aila Affected Areas, Conducted by International agencies, 2009)

Number of affected population	**454,818**	296,196	158,622
No of house fully damaged	**94,609**	48,887	45,722
No. of house partially damaged	**48,097**	26,969	21,128
Crops fully damaged (acre)	**3,412**	2,182	1230
Shrimp gher fully damaged(acre)	**52,961**	20,300	32,661
Fully losses poultry (no.)	**48,675**	25,400	23,275
Fully losses livestock's (no.)	**2,107**	1,473	634
Fully damaged educational institutions	**32**	22	10
Partially damaged educational institutions	**377**	336	141
No of water sources damaged/not functioning			
Deep tube-well	**6483**	4,702	1,781
Drinking Water Pond	**1206**	345	861
No. of damaged latrine	**59,400**	108,797	30,634
Embankment Fully damaged (km)	**42**	22	20

The cyclone *Aila* effects badly on food security, livestock and poultry, shelter, roads and embankments, and other critical infrastructures. The district of Khulna and Satkhira were the worst affected areas in terms of WatSan facilities. *Department of Public Health Engineering* (DPHE) (immediately after the cyclone) defines that in Khulna, a total of 531 PSFs (Pond Sand Filters) were partially or fully damaged by the effect of the cyclone Aila and in Shatkhira 278 PSFs were damaged. Total 4,702 tube-wells were affected in Khulna while in Satkhira 1,781 tube-wells were damaged. Total of 531 PSFs were partially or fully damaged in Khulna and in Satkhira, a total of 278 PSFs were damaged Summary (Wash Cluste, WaterAid and Unicef, 2009). A significant number of drinking water ponds were also over flown by the tidal surge and in Khulna and Satkhira districts these numbers were 345 and 861 respectively (Wash Cluste, WaterAid and Unicef, 2009, and In-depth Recovery Needs Assessment of Cyclone Aila Affected Areas, Conducted by International agencies, 2009). See the table 1 for details.

Relating to sanitation infrastructure, Khulna was the worst affected area compared to the other districts. In Khulna 108,797 latrines were fully or partially destroyed after the cyclone and this put a vast number of people into health vulnerability. In

Satkhira districts also, a huge number of latrines were destroyed. The damage in terms of water and sanitation infrastructures caused a significant change in usage patterns of water and sanitation, by the people of the affected areas. WaterAid Bangladesh figures out the following changes in water and sanitation usage patterns in *Aila* affected areas as shown in table 2.

Table 2*: Change in water usage practices and sanitation practices*

Before Aila	**After Aila**
• Water from Pond Sand Filter (PSF) was the main source for drinking water and other household usages • People take bath regularly • Sanitation coverage was almost 80% • Mostly hygienic latrines were used	• PSFs and tube-wells malfunctioned, pond water became polluted • Taking bath became luxury. • Relief water is the only source for drinking water and other usages. • High incidence of water borne diseases i.e. diarrhoea and skin diseases. • All latrines (except the brick-built) are totally destroyed.

The drinkable water is a kind of scarce in the Aila affected areas. Shallow aquifer (in these areas) contains excessive arsenic and deep aquifer is often saline so in most of the cases, people depend on 'Pond Sand Filters (PSFs)' to get the drinkable water from fresh water ponds and also from rainwater. People use water from nearby ditches for their domestic purposes and to feed their cattle. All fresh water ponds got filled with salty water from sea and so the people simply lost the sources of drinkable water for the tidal surge of *Aila*. This study observed that the destruction of *Aila* had a great impact on the people in their water usage practices. Almost all PSFs and tube-wells malfunctioned; pond water became salty and polluted by the effect of *Aila*. Further pollution was caused by rotten fish that were died due to the salty water and dead animals, leaves etc. As a result, to fulfill

the needs of drinking water, people have to depend on the external sources (mostly relief) and bathing became a luxury for the people.

The sanitation coverage was more than 80 percent (Wash Cluste, WaterAid and Unicef, 2009) in those areas and that most of the people used to use hygienic latrines but the cyclone Aila destroyed all latrines, except those are made by brick. Brick-built latrines were also malfunctioned since they were submerged into tidal surge. Latrine facility was not available in the cyclone shelters where most of the Aila affected people take shelter for a considerable long period and this increased their health vulnerability.

Water borne diseases like diarrhea and skin allergy are spread out in the affected areas. Cyclone Aila has damaged almost 136690 households and 600km embankment in the affected areas. Due to the absent or damaged embankment of Aila affected areas flooding in the new areas is a common phenomenon. The total households damaged at Khulna and Shatkhira districts are to be found as 75856 and 66850 respectively. The cyclone damaged crops on about 3, 23 lakh acres of land, and destroyed 1.5 lakh livestock (The Daily Star, July 3, 2009) and 2.2 lakh hectares of agriculture land damaged (South Asia Disaster News 06 Aug, 2009). In the affected areas almost 73 thousand people became workless. Only 5,950 peoples of Shatkhira district got shelter in Cyclone shelter and 28000 people took shelter in the embankments (Wash Cluste, WaterAid and Unicef, 2009).

The majority of the population of Shatkhira is engaged with agriculture and fisheries, about 64.98% households depend on agriculture including 38.16% on cropping, livestock, forestry and fishery, and 26.82% on selling agricultural labor (BBS, 2001). All the agricultural and related livelihood activities were spoiled through damaging all agricultural settings in this region after Aila's attack.

In Satkhira district total 194 ha of crop land was fully damaged which worth an estimated cost of 2.4 million BDT. Moreover, Aila incurred loss of about 550 million BDT in shrimp sector.

The embankment with broken at many points, was already overloading with the people who take shelter on there. Table 3 depicts total loss in monetary value received.

Table 3: Impact on agriculture, livestock and fisheries in Satkhira District (Uthpal Kumar et. al, 2010)

	Crops (ha)	Cattle (no.)	Poultry (No.)	Shrimp farm (ha)
	194	634	23278	32661.7
Approximate Damage in BDT	2368000	2368000	3491000.25	552396000

Table 4: Summary of the damaged infrastructure in Satkhira District (Uthpal Kumar et. al, 2010)

	Edu. Ins. and temples (no.)	Road (km)	Bridge/culvert (no.)	Embankment (km)
Total	734	329.25	41	292.42

Table 5: Impact on agriculture, livestock and fisheries in Khulna District (Uthpal Kumar et. al, 2010)

	Damaged Livestock		Damaged agriculture (acre)	Damaged fisheries	
	Cattle Shrimp	Poultry	Full	Pond (no)	farm (acre)
Total	662	12000	502.7	1026	20300

Table 6: Summary of the damaged infrastructure in Khulna District (Uthpal Kumar et. al, 2010)

	Edu. Ins. and temples (no.)	Road (km)	Bridge/culvert (no.)	Embankment (km)	Households
Total	271	265	41	151	42440

The cyclone Aila destroyed almost everything such as agricultural field, infrastructure, and households in the study areas and this caused the prolonged suffering for the Aila affected people. The running situation of Aila affected people is so miserable, and the overall current conditions are described below.

3.2. The vulnerability of the South-western coastal people of Bangladesh after the attack of cyclone Aila

The situation of the South-western coastal people of Bangladesh has not yet recovered from the damages caused by Cyclone Aila. This section presents the running situation of the Aila affected areas.

After three year of Aila's attack, the condition of the Aila affected areas is still not fully improved. Till now the people are struggling to get their basic needs such as food, pure drinking water and shelter. Majority of the affected people are still staying on the embankments in makeshift tents as their living places are still under water (UNB Connect, May 24, 2011). Some of the agricultural land is still under water or have become infertile for the salty water intrusion from sea. Sanitation and health care facilities have become scarce. A number of schools or other educational institutions are still closed and the dropout rate is alarmingly on the rise. Thus the people in these affected areas have been passing an inhuman situation without having a minimum life sustaining arrangements. The woman and children are the most vulnerable under this inhuman situation.

In this sub-section, I have tried to describe the present condition by focus onto the livelihood condition of the Aila affected people.

3.2.1. Livelihood

The livelihood practiced in the coastal areas is almost all based on natural resources, exhibiting great vulnerability to the cyclone. The majority households depend on the climate-sensitive sector of agriculture as the main source of livelihood (Bangladesh Bureau of Statistics 2001a, b). Shrimp farming is almost 50% of the total professions in Aila affected region. Rest of the occupations is small holding agriculture 20% and wage labor activities 30%. Almost 90% of the livelihood sources were destroyed for the cyclone Aila and till now maximum affected people is not able to improve their condition. Almost 75% people are struggling to maintain just a survival living (Bishawjit Mallick et. al, 2011). The

most affected sector of the livelihood is agriculture. According to the report of the Department of Agriculture Extension, only a minor portion of total cropland was possible to bring under cultivation after Aila. After Aila, the salinity rate in the soil increased and wide areas of cropland are still being under flood water for the broken embankments. These situations stop the peoples to cultivate rice. Department of Fisheries and FAO indicate that shrimp production was reduced from normal year's 2,350.14 kg/h to 470.03 kg/h (UN, 2010).

Almost 60 percent of the affected people in Satkira and Khulna districts have slowly recovered by getting support from GoB, UN and/or NGOs but the rest of the people, have not recovered due to the loss of their livelihoods and productive assets like houses, crops, livestock, poultry, fishes/shrimps, fishing boats/nets, etc. One fourth of this 40% of the affected people were still living on embankments and seriously in need of food and drinking water. During the rainy season, the monsoon hampers the people's daily activity because of the rising water with high salinity level comes into the breached embankments. The repaired parts of the embankments have already been damaged by high tides (UN, 2010). The Aila hit mangrove forest of Sundarban it also added to the loss of livelihood of the local people. In these areas, the people used to go deep into the forest and collect resources such as leaves, honey, timber, fish and crab both for their own use and for selling, but after Cyclone Sidr in 2007, the GoB decided to restrict their entrance to the forest only during March to May with a prior permission from the GoB (UN, 2010). For this reason, people of working ages either migrated to the other region in search of job or struggle to survive locally after cyclone Aila. Three years has already passed since Aila hit the areas but till now a large number of people are still suffering from loss of livelihoods and decreases in income. Poor households reduce their food purchases and compromise their food consumption habit by having fewer meals per day, less quantity of food per meal and less nutrient-rich food items (UN, 2010). Almost 80% workers lost their jobs, 40% bound to change their profession, and at least one person of a family members was hunting for relief aid and rehabilitation supports either from the government

or from development organizations (Bishawjit Mallick et. al, 2011). Some of the peoples are now engaged with wage labor activities offered by different GO's and NGO's to repair the roads and embankments. The middle class family always feels shy to take relief from the organizations. They cannot start day labor activities for their social status and also for the psychological barrier. Therefore, it increases their vulnerabilities. The embankment-cum-roads remain damaged and cutoff in many points; consequently, the local people have to depend on the boats to collect drinking water/food and other necessity.

Figure 3: Devastating of Aila

Maximum of the agriculture land was under water and, hence, the farmers became workless. It was happened only due to the broken embankment. The embankments are wracked because of the pressure of the tidal surge with height of about 10–13 m. The salty water comes through the broken embankment to the shrimp farm and to the agricultural land. In my study areas nearly 90% of the agriculture land and 70% of the homestead gardens were swamped. It is impossible to produce vegetables in the salinity polluted land before two years. To produce fruit species people have to wait for 6 years (Uthpal Kumar et. al, 2010). Farmers are looking forward to produce 30 to 50 percent of Boro rice as compared to a normal year production but this will only happen if the floodwater recedes substantially from the crop fields by January and February 2012. Farmers may not be able to invest in pulse and other winter crop cultivation for their financial constraints. To produce Boro rice the majority of the farmers have to take loan from banks and/or moneylenders to purchase seeds and other necessary agricultural inputs and this will generate further financial burden on them unless

they can produce a substantial amount of rice which can be sold at a profitable price, which is unlikely to happen. In Khulna division more than 50% of the day laborers are now landless. Now a day, an agricultural wage laborer's average income is 130 Taka per day. The female agricultural laborers are receiving only 60 to 100 Taka per day. In a normal harvest season the income of the laborer is almost 3,500 to 4,000 Taka, but currently their monthly income is around 1,560 Taka. The 50% to 60% reduction in monthly income is mainly for the shortage of employment opportunities in the Cyclone Aila affected area (FAO and Shushilan, 2011).

3.2.2. Housing and Food

Housing is on the highest demand among the affected people. Because of Cyclone Aila and for water logging situation, infrastructural problems have been collapsed almost all the shelters including safe sanitation system and this raised the vulnerability for people's livelihood. It was mainly occurred because of insufficient institutional and infrastructural supports for them. It changes their income opportunities. Almost 18,421 households, out of the affected 42,250 households, were able to construct their houses with the support of NGOs, or through their own means. 23,829 families have only temporary structures, plastic sheeting, or their damaged house. The government provides shelter grants (Tk 20,000 per family) to some 47,800 affected families has not been implemented, but only 510 families who have received this grant. Unfortunately, not all families were able to return their home, approximately 10,906 households (54,530 individuals) still living on the embankment and outside of the ring embankment (Priyo Internet life, 2011). A significant shortage of public shelters has left many people having to manage small shelters on roads and living in a state of extreme vulnerability. Thus, day by day, the embankments are facing degradation. Even after three years of Aila dissipation, many people are not yet able to return to their homes, and those who were able to return, they do not have sufficient income to allow them to have three meals per day. Over 200,000 people are still in serious difficulties, almost 50,000 still have to return to their homes (AP) (Agenzia Fides,

2011). About 20kg rice is provided per family per month under governmental support program and 30kg rice, and 5kg pulses and 3kg vegetable oil are monthly provided under WFP assisted Country Program (UN, 2010). On the other hand, the relocated houses are mostly for temporary use and made of plastic sheets and bamboo which is indicating their financial and structural inability to reconstruct the strong brick built or wooden houses. These houses are at risk of further structural damage. Majority of the Aila affected people in were forced to relocate their houses in embankments or raised land due to abolition of their houses by tidal surge and subsequent water logging. Unfortunately, even after two years of Aila hit, thousands of people still living in the coastal belt of Khulna and Satkhira district in makeshift tents and had only just returned to their homes and this was due to delayed reconstruction of damaged embankments, parts of which were broken during cyclone Aila (Oxfam in Bangladesh, 2012). Though the electricity is not in service, the residents have been making clay pots to cook rice. For the damaged houses and kitchens and the loss of kitchen tools were the major obstacles in resuming normal cooking practice. The unavailability of fuel was another crisis because the price of fire wood has increased. Now the collection of fire wood is not possible because many areas are still under water.

3.2.3. Pure Drinking Water Supply and Sanitation

The highest amounts of people are still now sufferings from drinking water shortage and destruction of sanitation facilities after Aila's attack. Aila destroyed all the drinking water sources (ponds and tube wells). During Aila, high tidal surges polluted all fresh water sources with salty water. Many people are bound to drink such polluted water because they do not have any other option and so they are suffering from water borne diseases such as allergy, skin diseases, cholera and diarrhea.

Figure 4: Crossing by Boat for collecting drinking water (Bettina Fachinger, 2010).

Most of the area is still water logged, they have to use boat or sometimes walk in the polluted salt water to collect drinking water. People have had to travel by boats to collect drinking water. Mostly women and girls are generally responsible for water collection and now they have to travel a long distance to collect the pure drinking water. Some NGOs are distributing drinking water in the affected areas but these attempts are insufficient compared to demands and also there is irregular water supply for the broken communication system.

Most of the water sources such as Ground Water with Tube-wells and Open Ponds with Shallow Tube-wells are affected by saline water from the sea and many tube-wells are out of order. About 14.2 million liter water supplies is needed to meet the drinking needs of the people in three unions of Gabura, Dacope and Koira, but, DPHE and other NGOs have only been able to supply 0.11 million litter (Paul, 2010).

Various kind of water borne diseases such as Diarrhea and skin disease were the major infectious diseases in Aila-affected areas according to the post-disaster assessment conducted after one month by Save the Children, (SVC, 2009). People also got infections for taking baths in ponds (Uttaran, 2010). The incidence of infectious diseases including diarrhea and skin-infection are on the rise and so the conditions for present health service were getting worse at the time of one year-after assessment. Almost 80 percent people were not getting access to the health facilities. Only 3percent to 4 percent people were able to reach to the clinic or hospitals (ECBP, 2010 and ECBP, CSRL, 2010). Due to the lack of reconstruction work and still worsen structural situations, people lives without access to the basic

health care service (UN, 2010) and about 34% of households (over 108 000 people) have no access to drinking water (AP) (Agenzia Fides, 2011).

Good sanitation system is now an essential for safe and healthy life of the people. 80% peoples had sanitary latrines before cyclone Aila, whereas after Aila almost all people had non-sanitary latrines most of them are now using the temporary hanging latrine provided by relief organizations. Peoples started to settle down on the embankment and had no permanent sanitation facilities (Wash Cluste, WaterAid and Unicef, 2009).

3.2.4. Education

Cyclone Aila destroyed 5,043 educational facilities in all the affected areas (UN, 2010). After Aila, the international NGO, Save the Children-UK created a children education project, called Child Friendly Space (CFS) for 5 months in the two affected areas, Khulna and Satkhira districts. Many children did not come back to school because they joined their family works, such as collecting relief packages and drinking water (Save the Children, 2009). Even if their schools were not been damaged much, which is almost impossible for the two affected area and almost 90 percent of the students have to use boats to go to the school (Joint Assessment Consortium, 2009).

3.3. The cause of this vulnerability according to the PAR model

I have modified the PAR model as shown in figure 5 to introduce the vulnerability of cyclone Aila.

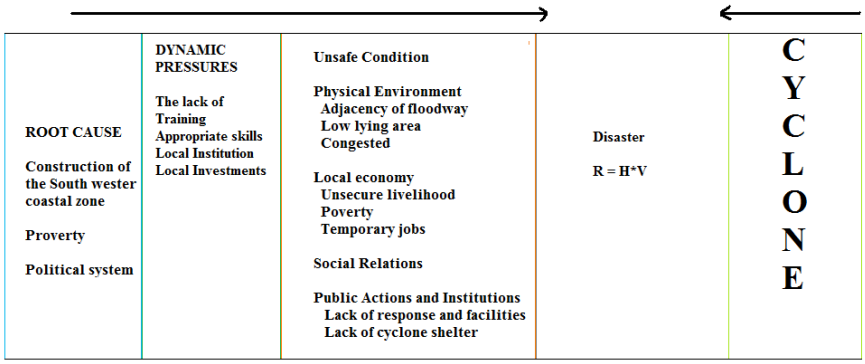

Figure 5*: PAR model to analyze the vulnerability of Aila*

I used the theoretical framework PAR to introduce the vulnerability of the South-western coastal region of Bangladesh after the attack of cyclone Aila. The PAR model also helps me to propose some solutions to give the Aila affected people a safe place.

The people of the coastal region get lower priority from government to deal with hazard mitigation, because they don't have the political and economic power. The root causes according to PAR model of the disaster are the construction of the South-western coastal zones of Bangladesh, where Aila was attacked and the poverty these communities. The construction is the root cause because first and foremost without the Floodway there won't be any zone in which this community would live in. The poverty that the people living there is the another root cause because, hypothetically, if poverty is not there than no residents can be found in these areas (see figure 6).

Figure 6: Housing condition in south western coastal zone (nimg.sulekha.com)

The dynamic pressures that supported the root causes to produce the Unsafe Conditions for the community of the Aila affected areas such as there is no *Local Institution* to train the people about disaster and so the people don't have the appropriate skills in southwestern coastal zone of Bangladesh and these laggings create due to the lower investment in this sector. The vulnerability also increased because of population growth, rapid urbanization, deforestation and a decline in soil productivity of the south western zone of Bangladesh. In the analysis, when the dynamic pressures worsen the root causes, it leads to the unsafe conditions.

Unsafe conditions of the South-western coastal area can be divided into four categories such as the physical environment, the local economy, social relations, public actions and institutions. In the first category, the unsafe conditions are the adjacency of the community to the floodway; the place is a low-lying area and the overcrowding of the houses in the community and the south western zone of Bangladesh (Aila attacked in this zone) is in the dangerous location (flood zone). Obviously, if you are living right beside a body of water, you can only expect flood to be a second away from you, and being in this circumstance is only aggravated by the fact that this community is found in a low-lying area. Therefore, they are living in the risk zone. The overcrowding of the houses prevents the residents from a quick get-away when an unexpected disaster occurs. The infrastructure and the buildings are insecure (not safe if disaster occurs) due to their economic condition, also the unsecure livelihood and the temporary jobs are the blames for the unsafe conditions and because of the poverty of the residents in there, they were not able to build sound human capital, which leads them into an unsecure livelihood and temporary jobs without a regular flow of income it would be very difficult for these community to cope up after a disaster hits in their community. These people don't have any disaster preparedness and also there is no prevalence of endemic disease. The poorest families in the Aila affected areas lives in ''kuccha'' houses, those are made from clay collected from the river bank. These houses often develop cracks and start collapsing in the dry season owing to the high saline content of the soil and obviously these houses are not protected from any kind of flood. Under the social relations, it can be concluded that the social divide in the community is also an unsafe condition. During the disaster, the social divide between the residents also worsened the problem of evacuation; people were not able to transfer more easily because the people are not cooperating with one another. At last but not the least, the unsafe conditions below the public actions and institutions are the lack of response and facilities and the lack of evacuation centers. In the study area, cyclone shelters are not available there to accommodate the large number of population that needed

temporary settlement during the disaster. Slow response and the lack of facilities is also an unsafe condition because lives are at risk here and we cannot afford to be unprepared and unresponsive to cries of help.

Weak disaster management organizations and a low-level of preparedness are the main causes for the high level of vulnerability during the post disaster period. Almost all the people were not aware of the risk of cyclone, tidal surge or other hazards. Sometimes early warnings are received just a few hours before the hazards attack, through the local mosques and this is not giving enough time to most of the people to go safe shelter places. Safe shelter places also are not available in most of the affected areas and also the amount of the safe shelter places is very less compare to the population. In Shymnagar Upazila[i] only 5 cyclone shelters are available for more than 3 hundred thousand people. The coastal region of Bangladesh like Khulna and Shatkhira are not prepared much to face the increasing risk of cyclones and tidal surge. There are no Cyclone Preparedness programs (CPP) in these 02 Aila affected districts Khulna and Shatkhira (In-depth Recovery Needs Assessment of Cyclone Aila Affected Areas, Conducted by International agencies, 2009). There is a Union[ii] and Upazila Disaster management Committee but the committees are not active. The water and sanitation infrastructure and shelters are not protected from disasters. And for the lack of preparedness there is a significant impact on the water situation after Aila also there is no emergency stock of water treatment units available at district level to meet the required pure drinking water. Also the weak constructed and maintained embankments are one of the main causes for the high casualty rate, damages and losses for the Aila's affect.

For this reason the vulnerability of this region after Aila's attack is extreme. Bangladesh is improving by starting water and sanitation program, vaccination

[i] Below the district level there are the *Thanas*. During 1982-1990, *Thanas* were upgraded to *Upazilas* or Sub-Districts.
[ii] Below the level of *Thana*, there are rural micro areas known as Unions.

and awareness rising program after Aila's attack and I am certain that these programs can help to reduce the next disaster risk.

In the following sub-sections I have tried to explore the reasons behind the prolonged suffering of the people in the South-western coastal region in Bangladesh, by analysing from some articles, newspapers and internet sources. I have consider two things separately as the major factors for the 3 years long suffering of the Aila affected people; one is the delay in post-Aila reconstruction work, and another is the broken embankments as the source of secondary disaster. There are some other factors also responsible for this prolonged suffering of the people such as, Governance Issues, some problems behind the NGOs, and the requirement of some fund. The results after the analysing are described as follows.

3.4. Why there is a delay at Reconstruction Work

At the very beginning organizations were much more concerned with the emergency needs and responses. A number of GOs and NGOs provided food and other items (like cloths, wallet) to the affected families. Medical care, temporary shelter materials and wash kits were distributed by a numbers of local and international NGOs. Food and cash were distributed under the Government's Vulnerable Group Feeding (VGF), Vulnerable Group Development (VGD) and Gratuitous Relief (GR) programs, which account for almost 90 percent of all relief assistance (UN, 2010). The government also started some emergency repair of embankments to stop the sea water inundation during high tide. This repairing work ran for 40 days name as Cash for Work programs, in which 6,637 households in two Upazilas of Khulna district and 19,330 households in two Upazilas of Satkhira were received 120 taka per day for day-labor work. This program started in March 2010 and ended in May of the same year (UN, 2010). Due to broken embankment and water-logged situation all over the roads, it was not possible to catch all the victims by the GOs or NGOs in time. The front-liner or those who resides near the market places are able to collect relief goods and

helps. The majority people are still out of any formal and informal relief program. NGOs are now distributing micro-credit to them who can pay back the loan. GOs and NGOs have been working to recover structural damages. At *Khulna* the IOM (International Organization for Migration) have already distributed 1,768,710 BDT for rehabilitation works including VGF cards and each VGF card holder receives 20 kg rice per month (Interim Report) for only 5 Months (16th October 2009 to 15th March 2010), but this support is insufficient. Recently in Lalmonirhat district administration distributed 73,500 Eid special VGF cards in the district and each of 45 unions gets 1500 cards. Two municipalities get 3000 cards and 735 tons of rice under special VGF program have been distributed among 73,500 vulnerable families in 45 unions and two municipalities of five upazilas. Each of the poor families has got 10 Kg of rice (The Daily Star, Sunday, November 6, 2011). There are many national and international NGOs are working in the Aila affected area. The lack of co-ordination among them and between government and NGO driven programs is now the major problem in recovery work. Because of these problem the less or non-affected people gets more relief and helps than worse affected people.

The Government of Bangladesh (GoB) called immediately for international assistance as a national emergency response when Cyclone Sidr came, but the government did not appeal for any assistance from the international society immediately after Cyclone Aila hit the country (UN, 2010). The government thought that it would be able to fully manage the situation. Later the government realized that more funds were needed for further reconstruction work and long-term rehabilitation, such as raising the embankments, fixing damaged houses and building strong cyclone shelters (Uttaran, 2010). On June 19, 2009 the Bangladesh government made a US$1,149 million appeal to the international community for reconstruction work and rehabilitation in the affected districts (ECBP, 2010), which has not been fully met for some reasons. Before the formal appeal of the GoB the international community gave assistance to a number of intergovernmental, governmental and non-governmental organizations working in

the most affected areas well (UN, 2010). The overall relief and reconstruction work have not been sufficient to maintain the local people's lives, and so a great deal of people still lived in vulnerable condition in September 2010.

Relief and reconstruction work have been provided by GoB and the international community. More than a year have past but still a great number of people were still living in the vulnerable conditions with their minimum basic human needs remain unmet (ECBP, 2010).

3.4.1. Un-timeliness

Cyclone Aila hit the study areas two years after the cyclone Sidr, in the middle of the recovery process and it was occurred shortly before the monsoon season. This thing has made the Water Development Board (WDB) to wait until the dry season, at least four or five months, before they launching a full-fledged reconstruction work.

3.4.2. Shortage of Ready Fund for Emergency

The fund for emergency reconstruction work was not sufficiently available for WDB, after Aila, since much of the ready fund needed to be spent for relief activity. Therefore, WDB have to follow the normal and time consuming procedures of project application and implementation after the government approval as well as open tendering.

3.5. Weakness of Bangladesh Government, NGOs and other International organizations

3.5.1. Governance Issues

Thousands of peoples in the affected area have been surviving in extreme difficulty. Local government officials were aware to make the reconstruction work in the low lying land on first priority basis for the rehabilitation of people's normal life. Only during the dry season the reconstruction work of embankment can be done, the heavy rain fall and increased water depth do not allowed

reconstruction work of the embankment in this area and so reconstruction work needs to wait for the dry season to begin, reconstruction had partially been done for a short period remaining before monsoon season both by the government (WDB) and the local people. WDB is under the Ministry of Water in Bangladesh and this is the only legal unit which executes the construction and reconstruction work on embankments that covers the area more than 1,000 hectare. In the first dry season, the progress work of WDB was not quick enough to complete the work before the upcoming monsoon season. There are some doubts of corruption between WDB officials and contractors and complaints about the poor quality of their work and so, the work created further need of reworking on deteriorating parts. This is a lengthy process, in addition to lack of emergency fund, amounted to an overall delay in the reconstruction of the embankment and socio- economic rehabilitation. In early April 2010, the current prime minister of Bangladesh, Sheikh Hasina, presiding over the National Disaster Management Council's meeting, blamed that the authority's failure to complete the embankment reconstruction by January and she ordered an immediate measure for expediting the reconstruction and for the rehabilitation of the Aila affected people before the monsoon (New Age, 8 April 2010).

The GoB decided to provide shelter grants BDT 20,000 per family to 47,800 affected peoples, but only 510 people have received this grant as of March. The few families those have received shelter grants but they have used the money to meet the household immediate needs such as food and payment of debt. In addition, there is no GoB monitoring mechanism in place to identify that the families have reconstructed their houses with the grant or not. Recovery is still demanding because 10,906 peoples still living on temporary places and outside of embankment (In-depth Recovery Needs Assessment of Cyclone Aila Affected Areas, Conducted by International agencies, 2009). At last the GoB managed to repair the main embankments and this leads to a return of most of the displaced population to their home areas, in March 2011, almost 210,000-230,000 people were still staying on the embankments. Some houses have been completely

washed away and not allowing the people a way to return (HIP BANGLADESH, 2011). Some families do not have the ability to make their homesteads inhabitable and therefore they prefer to stay on the temporary houses on the embankment. Although the embankment construction is completed, the situation of the people remains the same as before, because they do not have any alternative land to shift. Almost 10M EUR allocation was provided to support the early recovery phase of the returnee population, to allow the vast majority of the ECHO supported population to recover self-sufficiency and restart former livelihood activities according to the latest needs assessments carried out between November and December 2011. The cyclone affected people have been identified that they are in need of Humanitarian assistance for their daily survival, as conditions for their recovery are not yet met. Almost 50,000 people in the south-western districts of Khulna and Satkhira (HIP BANGLADESH, 2011), the majority of them are either displaced or living on embankments or outside of ring embankments because their land inundated with salt water. All the people are in a high state of vulnerability, without livelihoods opportunities, and inadequate shelter and WatSan facilities. After the saline water flooding, the land has been polluted by high levels of salinity which halting the cultivation of local crops. The reduced income sources largely impacted on the income of the affected families. The completion of embankment reconstruction and repair of the major broken sections have allowed the most families to return to their homes. Though the land is now free from inundation, it is not ready to use for cultivation because the salinity level is high enough on the land. Other labor opportunities like repairing and maintenance work for NGOs will end in March leaving few employment opportunities. As a result the majority of people who returned to their homes or are still living in a temporary place have no sufficient income to feed their families so the current situation is very critical for these affected communities and they are living without livelihood opportunities for their survival. For the food insecurity situation, many male family members are migrating for extended periods to seek work outside the community to manage their family needs.

The full recovery of livelihood may be delayed until next Aman harvest in November/December 2012 at the earliest. It was anticipated that almost 32,000 wage labour households and 23,000 marginal farm households require recovery assistance in Khulna. The ongoing needs of recovery assistance in Satkhira alone are 28,000 wage labor household and 21,000 marginal farm households. Based on extreme poverty rates WFP estimated around 49,000 households in need of recover assistance (FAO and Shushilan, 2011).

3.5.2. Problems behind the NGOs

In the relief and recovery program in cyclone Aila the major actors involved were Govt. and some bi-lateral humanitarian donors such as EU, ECHO, USAID, DFID, SDC, etc. The recovery process was interrupted several times for the delays in the repair of embankments. ECHO were mostly engage to meet the emergency needs of the affected communities on the other hand EU tried through BRAC to restore the informal economic activities. Other humanitarian donors followed some mixed approach but none of them could adopt a coordinated recovery approach and produced limited success towards recovery of the affected communities.

Till now in the Aila affected areas have the shortage of safe drinking water sources. The distance to collect safe drinking water is large and this situation will remain the same until the next rainy season. May be during the coming monsoon season the newly installed rain water harvesting tanks will be operational, and access to clean drinking water will be increased bring families back to pre Aila situation.

Weak coordination and overlapping NGOs

Almost 21 NGOs (national and international) were operating in the affected unions. On average nine agencies were operating in every union **(**lcgbangladesh.org**)**. The coordination was weak and most of the agencies implemented their own program following their own recovery process with very

limited coordinating with other agency approaches which results in some overlap of services and areas underserved.

"Progress of recovery not sustainable, and not producing expected result due to lack of comprehensive/coordinated approach in spite of spending huge amount of money from different sources"(lcgbangladesh.org**).**

For many reasons the repairing of embankment were delayed and many broken points collapsed several times after completion of the repairing work which delayed the overall progress of recovery process and this is completely understandable that due to lack of coordinated and comprehensive response, the overall progress of the recovery program was delayed. Almost all agencies are implementing their stand-alone programs by following their own recovery method with a very limited cross checking with other approaches and to avoid duplication. During the FGD many people reported that they received same items several times but on the other hand many urgent needs remain unmet. NGOs presence is high in villages where access is easy but there are many villages affected severely but which remain left out due to difficult access. Good coordination, between Govt. and NGOs and among the NGOs response and recovery programs could have produced better utilization of limited resources and resulted in distribution of services and resources equally to all the affected families and villages.

3.6. Fund requirement

Fund requirement (FSL, shelter and WASH) for recovery programme in Aila affected areas

Table 7: Fund requirements for recovery program (FSL, shelter, WASH) (lcgbangladesh.org)

Sector	Target HH	Unit cost	Amount BDT	Amount Euro	Million Euro
EFSL				**5059758**	**5.06**
CFW-60 days	42250	6300	266175000	2688636	2.69
Cash For Training- (30% of total HH)Female	12675	9000	114075000	1152273	1.15
Cash grnats for producer	12675	8000	101400000	1024242	1.02
Agricultural Input	9718	1200	11661000	117788	0.12
Plantation	12675	200	2535000	25606	0.03
Homestead gardening (Veg seed)	12675	400	5070000	51212	0.05
WASH				**1651061**	**1.65**
Pond dewatering	300	30000	9000000	90909	0.09
Rainwater Harvesting	500	25000	12500000	126263	0.13
Water Tracking	15000	810	12150000	122727	0.12
New PSF	20	80000	1600000	16162	0.02
HH latrine	28490	4500	128205000	1295000	1.30
Shelter				**3290303**	**3.29**
New transitional house	4700	40000	188000000	1898990	1.90
Shelter material for displaced hh (ring emb)	2585	5000	12925000	130556	0.13
Complementary shelter grants for reparing	8321	15000	124815000	1260758	1.26
Total					**10.00**

Almost 10 Million Euro still required to complete the recovery work as shown in table 7.

3.7. Secondary Disaster

For the broken section of the embankments represented a second disaster. The embankments had been weakened by the previous cyclone Sidr and the embankments had already been made vulnerable by the numerous pipes put through them for the purpose of bringing saline water from the sea into the shrimp farms in the low land areas. It is illegal to do such work for shrimp farming, and nobody except the WDB is officially allowed to do any construction work on the embankments, but this illegal piping into the embankments had not been effectively controlled. This illegal piping into the embankments had been overlooked by the GOB because of the importance of income earned by shrimp production for export as well as the influence from some powerful shrimp farm owners. WDB's fails to properly maintain the embankments which are the central factors to consider the factors of the secondary disaster. The infrastructure are weakened due to the illegal activities (piping through the embankments) and have resulted in the breach of embankments and following inundation, which should be define as the secondary, and largely manmade disaster.

The coastal region of Bangladesh is most vulnerable for Cyclone as discussed above in section 2.1. The vulnerability of the Aila affected area is high as discussed above in section 2.2 according to the PAR model. For all of the above reasons presented in this section 3 and also the reasons explains in section 2, the daily life of the Aila affected people still not recovered. The present scenario of the Aila affected area is remains terrible. Till now the people are fighting to acquire the minimum basic needs to survive. The next section will describe the present condition in the Aila affected areas.

3.8. Discussion

This section presents a discussion about the context of vulnerability. This section attempt to give a summary about why the vulnerability is so high after Aila attack and why the condition of the Aila affected people are still in worst stage.

This study identifies the current livelihood condition in the affected area was destroyed by cyclone Aila and the affected people faces problem with drinking water scarcity, sub-merged agricultural land, destroyed road communication network, wrecked embankment as well as less income opportunities.

The cyclone Aila was a category 1 cyclone on the other hand Sidr was category 5 cyclone. Cyclone Aila hit 2 years after the attack of cyclone Sidr and before the completion of recovery work. This is one of the reasons of the high vulnerability after Aila hit. The people of South-western coast zone of Bangladesh is poor and so the housing condition of the study areas (Khulna and Shatkhira) is not good and not protected from any type of cyclone. Without the Floodway there won't be any zone in which this community would live in. The infrastructure and the buildings are unsecured (not safe if disaster occurs). If the people are rich then definitely they will not live in these low lying areas. For these reasons, cyclone Aila washed away almost all the houses and people lost their place to stay.

There is no *Local Institution* in the Aila affected areas to train the people about disaster to make them prepared about cyclone and so the people don't have the appropriate skills and that's why vulnerability increased. Therefore, the *dynamic pressures* of PAR model give an importance for having *Local Institutions*. Furthermore the vulnerability also increased because a large number of people stay in this coastal zone and the overcrowding of the houses. Some other facts such as urbanization, deforestation also increase the probability of vulnerability.

The middle class family cannot seek relief and also cannot be a day labor due to their social status and psychological barrier and it increases their vulnerabilities. Shrimp production was reduced from normal year's 2,350.14 kg/h to 470.03 kg/h for Aila attack (CYCLONE AILA JOINT UN MULTISECTOR ASSESSMENT & RESPONSE FRAMEWORK, 2010), almost all the agriculture land went under salty water which destroys the scope of food production. Shrimp farming and agriculture are the two main income sources of the people of these areas. Though these two sectors are almost fully damaged for Aila, the people became workless. Most of the people are living in the embankments, there is no source of income remains after Aila and so the poverty increases and because of this the chances to earn something by day labor is negligible. Furthermore the temporary jobs without a regular flow of income increase the vulnerability and so it is very difficult for these communities to cope up after a disaster hits.

For the lack of preparedness the water and sanitation infrastructure are not protected from disasters. Aila have destroyed almost all the sanitary latrines, all the drinking water sources (ponds and tube wells). High tidal surge of Aila polluted all fresh water sources with salty water and also there is no emergency stock of water treatment units available at district level to meet the required pure drinking water. That's why many people are bound to drink this polluted water because they do not have any other option and that's why the water borne diseases spread out everywhere in these study areas after Aila attack. Moreover there is no prevalence of endemic disease, and this increases the vulnerability.

Cyclone shelters are not available to accommodate the large number of population that needed temporary settlement during the disaster increases which also increases the vulnerability after cyclone.

Weak disaster management organizations, lack of disaster preparedness, weak infrastructure and poverty are the main causes for the high level of vulnerability during the post disaster period. Warnings about any type of hazards are received just a few hours before the hazards attack and this is not given enough time to the people to go to the safe places. The weak constructed embankments are one of the main causes for the high casualty rate, damages and losses for the Aila's affect. For these reasons the vulnerability of this region after Aila's attack is extreme. Bangladesh is improving by starting water and sanitation program, vaccination and awareness rising program after Aila's attack and I am certain that these programs can help to reduce the next disaster risk. Some best works are described below.

Almost 18,272 latrines were constructed by the GoB/NGOs, and from this almost 7,993 latrines were constructed on the embankment. Some families have already reused the materials of latrine and reinstall it at their homes. Almost 20% of emergency latrines could be reused (lcgbangladesh.org).

Some NGOs have continued secured funding for future recovery and rehabilitation, the GoB supported the Aila communities through its safety net programs, that is, employment scheme (40 days), test relief, Vulnerable Group Development, Vulnerable Group Feeding (VGF) and shelter grants. Based on assessment findings there is a need to restart the VGF, due to the limited earning opportunities to feed their family members. On the other hand embankment repair has not been fully completed but people still fear to return home as there are many points likely to be damaged with a tidal surge or medium scale cyclone. Further, it is recommended that the GoB invest in strengthening and maintain embankments.

Few NGOs have secured funding for the continuation of their recovery program after March 2011 (lcgbangladesh.org). The pipeline funding (GoB and NGO) is insufficient compared to current recovery needs of the affected communities.

Chapter 4

In the following section I tried to provide some suggestions to recover the running situation of the Aila affected people as early as possible followed by conclusion.

4.1. Recommendations

After three years of Aila attack, people of the affected areas are still suffering from insufficient food, water, shelter and sanitation facilities. Therefore it is topmost importance to ensure at least subsistence living requirements to the affected people.

The acceptance for recovery planning and disaster risk reduction peaks after the disaster, when the needs of the recovering community are on top in the thoughts of the planners, the government, the law makers, and the community itself and then it creates a 'window of opportunity' to integrate mitigation measures in recovery and long term development activities, but this window remains open only for a short time (Christoplos, 2006). By integrating risk reducing concepts and measures into the Pre Disaster Recovery Planning (PDRP), communities and governments can be prepared in advance to utilize this window of opportunity to enhance their resilience to future disasters. Post disaster reconstruction is an important period in disaster management where it becomes a window of opportunity for communities and nations.

As an example in 2004, Indian Ocean Tsunami devastated several countries, particularly Indonesia, Thailand, Sri Lanka and India. On vulnerability research and the theory that a "window of opportunity" for disaster risk reduction and improved re-development is created during the post-disaster recovery period. During this post-disaster recovery period, local citizens may have increased awareness of disasters risks and place pressure on government and organizations to use reconstruction funds to remedy the weaknesses in developmental policies, infrastructure and institutional arrangements (Christopolos, 2006; Clinton, 2006;

UNISDR, 2005). The Earthquake Reconstruction and Rehabilitation Authority (ERRA) in Pakistan launched their "Build Back Better" strategy for the earthquake reconstruction (erra.pk). It is found that the post-disaster period to be a window of opportunity with great potential to benefit both humans and nature if well-planned, collaborative, sustainable recovery efforts are implemented.

At first the disaster has destroyed those infrastructures which were improperly designed and vulnerable, creating a fresh start from which to address disaster risk. The experience gained during the disaster typically generates new knowledge, which brings various stakeholders together around a shared awareness of the nature of risk and the mistakes of previous development policies and strategies are exposed and can be addressed. The political will and desire to act is almost certainly stronger than usual. Interest in disaster risk reduction that were in side-lined before the disaster, will gain prominence in the recovery period. Most importantly, the post-disaster time period often provides a level of resourcing, including considerable external funding, that would be otherwise unattainable. If properly utilized this additional resource does afford a major opportunity to reduce vulnerability. Window of opportunity exists does not mean that the various actor involved in reconstruction will take advantage of it.

There are a countless reasons are working behind this failure. In post disaster recovery phase, all the response should be in time and it is essential. Poverty mitigation, better health, and good governance should be the mainstreamed in the post-disaster recovery work. Resilient built environment can contribute to these main objectives. There will certainly be a delay, so, some other recovery methods can be applied for their ability to deliver result in a short term. "If the window of opportunity can be taken advantage of, then advocates of a more resilient built environment will need to demonstrate the vital role it plays in helping society achieve much broader development goals" (Haig, p.13). Government can make a long term plan and make a proper building guideline.

For the development of a resilient built environment, realistic method needs to be included. Government authorities should understand the difficulties properly and take appropriate decision about what can actually be done to recover from these difficulties, with in a short term. Government should start this process in the beginning of the recovery phase. “Macro-level planning and consensus building are shown to be essential to realizing the advantages of this ‘window of opportunity” (Dorothy C, 2008).

Unavailability of pure drinking water is one of the prime problems after the attack of cyclone Aila (Uthpal Kumar et. al, 2010). To fulfill the demand of pure drinking water, an adequate amount of tube-well should be built within a short time. Governmental organizations should help the affected peoples to drive out the dirty water from the pond. Government should provide water resilient seeds without any cost. Aila destroyed the income sources of the people of the Aila affected area (Uthpal Kumar et. al, 2010). Therefore, some types of employment should be started as early as possible for the affected people.

“Local natural resources can also be used for some livelihood opportunities. In long term, small scale job opportunities can be introduced from the local investors, government and NGOs. Training on craft, tailoring, poultry and fish feed firming, ice factory, umbrellas, bat factory, match factory, cold storage and other small and medium scale industries may be introduced to improve the poverty situation and reduce vulnerability of the local people” (Uthpal Kumar et. al, 2010).

To protect the coastal people from future hazard the broken embankments and essential renovation should be done in short term. The relief program, government’s VGF program should be monitored in a better coordinated way. Governmental, International donors and NGOs may provide some financial help to the affected people to repair their houses. Disaster preparedness program

should be started in more organized way to increase the awareness and adaptive capacity of the coastal people about the hazards (Uthpal Kumar et. al, 2010).

The total number of cyclone shelter in the study area is not sufficient to give shelter to all the coastal people (Uthpal Kumar et. al, 2010). Therefore, necessary quantity of cyclone shelters must be built. Attaining funds in future from international donors to build enough shelters may be a forlorn hope. Shelters should provide facilities for the both sexes.

Try to establish a consensus at community level and agree that all public and private building above one stores could act as 'safe havens' accessible to all, and it could be planned with local people to determine the optimum placement of these refuges. Having smaller shelters which are nearer to the communities than less time is required to reach the shelters and people will remain much closer to their homes. All shelters should have an adjacent high place, where cattle are being taken care of during any disaster, for livestock. Routes from the communities to shelters should be metallic and those roads or tracks to be reinforced should be identified at the community level. Local people should need more knowledge about where and when to take shelters during the unwanted natural events. Construction of the embankments of the Aila affected areas with appropriate heights and slopes, based on predicated water level conditions is now a very important task for the government of Bangladesh. Embankments should be designed, constructed and managed in a multi-purpose way to maximize their benefits as places of residence, economic production from forestry and also roads. The illegal piping into the embankments by some locals shrimp firms owners should be controlled to reduce the risk of a secondary disaster. The quality of the post-disaster reconstruction work by the government and contractors should also be monitored by the local stakeholders. For the purpose of risk-reduction, river management like remove the siltation on the river bed to reduce the risk of drainage jamming might bear more importance than strengthening the embankments. A meaningful involvement of the local people is needed both in

pre-disaster risk identification and reduction and also in the post-disaster reconstruction process.

4.2. Conclusion

A close relation between the developing countries and developed countries in terms of cyclone hazard adaptation strategies is absent, and human development status on disaster risk is also apparent. Rural populations seem to be more vulnerable to cyclone hazard than urban ones. Disaster mitigation generally consists of action that can be categorized as: structural, location, operational and risk transfer (Scawthorn C, 2009). A structural action consists of the availability of cyclone shelter; local actions consist of moving, nearness of cyclone shelter from the house. Operational actions can also term as preparedness and response; and risk transfer explains the risk reduction through proper disaster mitigation work. There is an obstacle to get the satisfactory supports and availability of the respective structural actions is the vulnerability due to infrastructure. The construction or reconstruction of physical infrastructure has been a proven means of preparedness as the vulnerable populations can be evacuated to those infrastructures immediately after receiving the early warning and the, sustainability of such infrastructural development depends on the uses and maintenance during rest of the year when there are no natural hazards happening. This thesis shows that the cause of suffering during the cyclone Aila event due to inadequate infrastructural supports. Academic institutes and structural engineers need to be engaged to explore on sustainable building materials improvement and to understand ‘non-engineered’ and ‘owner-built’ housing construction process is further important, otherwise, it will not be possible to save the populations who are living in such coastal areas.

Appendix

Pressure and release model (PAR

PAR model describes the vulnerability as a process that starts from *root causes*. The root causes, such as political or economical systems, establish a distribution of power within a society. Dynamic pressures are the processes and activities that convert the effects of the *root causes* into vulnerability. The process from root causes, through dynamic pressures into unsafe conditions is named as the *progress of vulnerability* in literature. Figure 5 shows the PAR model.

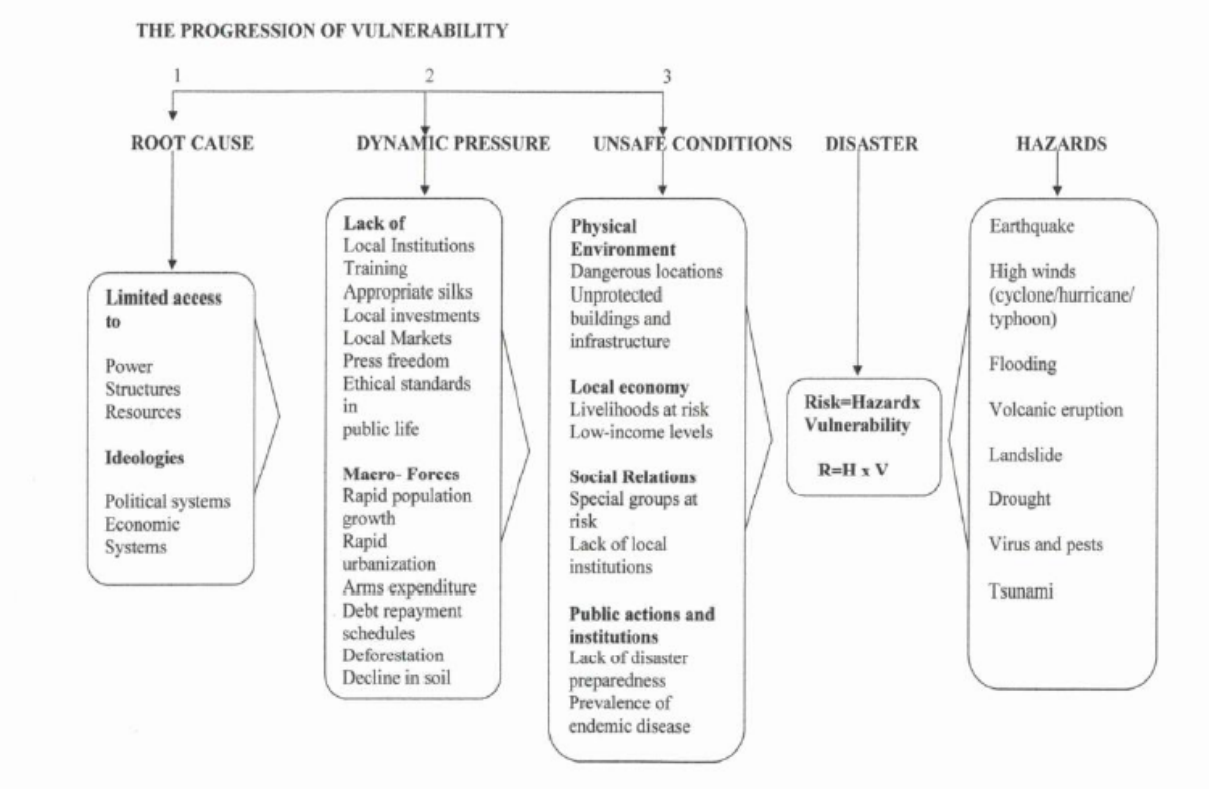

Figure 7: Pressure and Release (PAR) model: The Progression of Vulnerability (Wisner. B et al., 2004).

Bibliography

Books & Articles:

Bishawjit Mallick, Joachim Vogt, (2011), "*Social supremacy and its role in local level disaster mitigation planning in Bangladesh*", Disaster Prevention and Management, Vol. 20 Iss: 5 pp. 543 – 556. From <www.emeraldinsight.com/0965-3562.htm>

Blaikie, P., Cannon, T., Davis, I. and Wisner, B., (1994), "*At Risk - Natural Hazards,People's Vulnerability, and Disasters*". Routledge, 11 New Fetter Lane: London EC4P 4EE.

Bryman, Allen, (2004), "*Social Research Methods"*. Oxford: Oxford University Press. *change* London: Allen Lane.

Christoplos, Ian., (2006), "*The elusive 'window of opportunity' for risk reduction. Paper presented at ProVention Consortium Forum 2006, Bangkok, Thailand*". ALNAP and Glemminge Development Research, Bangkok, February 2-3 2006

Clinton, William. (2006). "*Lessons Learned from Tsunami Recovery: Key Propositions for Building Back Better*". A Report by the United Nations Secretary-General's Special Envoy for Tsunami Recovery. New York: Office of the UN Secretary-General's Special Envoy for Tsunami Recovery.

Dorothy C. Ibes, B.A., (2008), "*POST-DISASTER PARKS: PROSPECTS, PROBLEMS, AND PRESCRIPTIONS*". From <https://digital.library.txstate.edu/bitstream/handle/10877/3365/fulltext.pdf?sequence=1>

Haigh, Richard "Disaster Management Lifecycle". Centre for Disaster Resilience, University of Salford and ORBEE. From < http://www.orbee.org/images/5cc-resource-files/1314112213_Introduction%20to%20Disaster%20Management%20Lifecycle.pdf >

Garissa, Marsabit, Samburu and Wajir, (2009), "*Drought Cycle Management in arid and semi-arid Kenya: A relevant disaster risk reduction model*". Gerard Schilderinck, Development Economist, Catholic Organisation for Relief and Development Aid. From < http://www.ngovoice.org/documents/100-10035b%20-%20FINAL%20DRR%20research%20report.pdf >

Lein, H., (2000), "*Hazards and 'forced' migration in Bangladesh*", Norsk Geografisk Tidsskrift 54: 122_7. From <http://www.tandfonline.com/doi/abs/10.1080/002919500423735#preview>

Lindsay, John Roderick, (1993), "*Exploring the Interface of Urban Planning and Disaster Management: Establishing the Connection Between the Fields*". University of Manitoba. <http://books.google.se/books/about/Exploring_the_Interface_of_Urban_Plannin.html?id=H6LlSgAACAAJ&redir_esc=y>

Romasa Mohapatra, (2009), "*Community Based Planning in Post-Disaster Reconstruction: A Case Study of Tsunami Affected Fishing Communities in Tamil Nadu Coast of India*". From <https://uwspace.uwaterloo.ca/bitstream/10012/4727/1/Mohapatra_Romasa.pdf>

Roy, K., Kumar, U., Mehedi, H., Sultana, T. and Ershad, D. M., (2009), "*Initial Assessment Report with focus on Khulna District*", Unnayan Onneshan-Humanitywatch-Nijera Kori, Khulna Bangladesh. From <http://www.findthatpdf.com/search-2766621-hPDF/download-documents-aila.pdf.htm >

Sarwar, (2005), "*Impacts of Sea Level Rise on the Coastal Zone of Bangladesh*". From < http://static.weadapt.org/placemarks/files/225/golam_sarwar.pdf>

Scawthorn C, (2009), "*Disaster management for infrastructure. In: Shaw, Krishnamurthy (eds) Disaster management – Global challenges and local solutions*". Universities Press (India) Private Limited, Hyderabad

Silverman, D., (2001), "*Interpreting Qualitative Data: Methods for Analysing Talk, Text and Interaction*". London, Sage.

Singh, A., (2003), "*UNEP, Assessing Human Vulnerability due to Environmental Change: Concepts, Issues, Methods and Case Studies*". From <http://www.unep.org/geo/GEO3/pdfs/AssessingHumanVulnerabilityC.pdf>

Uthpal Kumar, Mohammed Abdul Baten, Abdullah-Al-Masud, Khandakar Showkat Osman, and M. Mizanur Rahman, (20010), "*Cyclone Aila: One Year on, Natural Disaster to Human Sufferings*". Unnayan Onneshan-The Innovators House-16 / 2, Indira Road, Dhaka, Bangladesh

Wisner. B, Piers Blaikie, Terry Cannon, Ian Davis, (2004), "*At risk, second edition: natural hazards, people's vulnerability and disasters*". Routledge, 11 New Fetter Lane: London EC4P 4EE

WMU Sasakawa Fellows' Network Meeting In The South Asian Region, (2010). From <http://www.sof.or.jp/en/report/pdf/201003_ISBN978_4_88404_239_4.pdf>

Yin RK, (2003), "Case study research. Design and methods", 3rd edn. London, Sage.

Reports:
"*A Follow Up Rapid Food Security Assessment in Satkhira in the Context of August 2011 Flood and Water Logging*'', The assessment was jointly conducted by the World Food Programme (WFP), Food and Agricultural Organization (FAO) and Shushilan, December 2011.
From <http://foodsecuritycluster.org/c/document_library/get_file?p_l_id=321902&groupId=120482&folderId=329380&name=DLFE-12982.pdf>

"ASIA/BANGLADESH-After two years victims of the cyclone Aila still need help", (2011-05-26). From <http://www.fides.org/aree/news/newsdet.php?idnews=29104&lan=eng>. Access on May 15, 2012.

Bangladesh Bureau of Statistics, (2001b) Population Census, (2001), "*Community Series, Zila-Khulna, Dhaka, Bangladesh: Planning Division, Ministry of Planning*". From < http://www.bbs.gov.bd/home.aspx>

Bangladesh Bureau of Statistics (2001a) Population Census, (2001), "*Community Series, Zila-Satkhira, Dhaka, Bangladesh: Planning Division, Ministry of Planning*". From < http://www.bbs.gov.bd/home.aspx>

Bangladesh Bureau of Statistics, (2001), "*Information on Khulna and Satkhira District*", Community Series, Bangladesh Bureau of Statistics, Dhaka, Bangladesh.
From < http://www.bbs.gov.bd/home.aspx>

Bureau of South and Central Asian Affairs, (2010), "*Background Note: Bangladesh*". From <http://www.state.gov/r/pa/ei/bgn/3452.htm>, Accesse on 11 February 2012.

"Build Back Better" *Earthquake Reconstruction* And *Rehabilitation Authoriy* (*ERRA*), GOP. From
<*http://www.erra.pk/Reports/Livelihood_%20strategy111206.pdf*>.

"CYCLONE AILA JOINT UN MULTISECTOR ASSESSMENT & RESPONSE FRAMEWORK", (June 2010).
From
<http://www.lcgbangladesh.org/DERweb/Needs%20Assessment/Reports/Aila_UN_AssessmentFramework_FINAL.pdf>

ECBP and Campaign for Sustainable Rural Livelihoods (CSRL), (2010), "*Testimony of Journalists*". From
<http://www.reliefweb.int/rw/RWFiles2010.nsf/FilesByRW DocUnidFilename/MYAI-85RB5T-full_report.pdf/$File/full_report.pdf>.

Emergency Capacity Building Project Bangladesh Consortium (ECBP), (2009), "*Swelled sufferings: Challenges After 3 months of Cyclone Aila.* 2010, *One Year On- Plight of Cyclone Aila Communities Countries"*. From <http:// www.ecbproject.org/where/bangladesh> Retrieved 7 February 2011.

"*HUMANITARIAN IMPLEMENTATION PLAN (HIP) BANGLADESH*"
From
<http://ec.europa.eu/echo/files/funding/decisions/2011/HIPs/bangladesh.pdf>

"*JOINT POSITION PAPER ON, CYCLONE AILA: PRIORITIES FORACTION*"
From < *http://cccm.iom.org.bd/file/pdf/32.pdf*>, Accessed on February 15, 2012.

"*Interim Report On Emergency Response to Aila Affected Area in Bangladesh*" From < http://cccm.iom.org.bd/file/pdf/22.pdf >

IPCC Fourth Assessment Report (AR4): Climate Change, (2007), "Impacts, Adaptation and Vulnerability". From <http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm>

Joint Assessment Consortium, 2009, "*In-depth Recovery Needs assessment of Cyclone Aila affected Areas"*, Action Aid, Concern Worldwide, DanChurchAid, Muslim Aid, Islamic Relief, Oxfam-GB and Save the Children-UK. From <http://www.lcgbangladesh.org/DERweb/Needs%20Assessment/Reports/In-depth%20Recovery%20Needs%20Assessment%20of%20Cyclone%20Aila%20Affected%20Areas_ECHO%20funded.pdf>

Ministry of Environment and Forest, Government of the People's Republic of Bangladesh, (2005), "*National Adaptation Programme of Action (NAPA)*". From <http://www.thegef.org/gef/sites/thegef.org/files/documents/document/ban01%20(1).pdf >. Access on February 10, 2012.

National Food Policy Capacity Strengthening Programme (NFPCSP)
Workshop on "*Research to Inform Food and Nutrition Security Policies*"
7 and 8 of May 2012, Dhaka
Compendium of Inception and Interim Reports, Volume 2,
Safety net and Migration (Session III)
From
<http://www.nfpcsp.org/agridrupal/sites/default/files/Compendium%20of%20inception%20and%20interim%20reports%20-%20Volume%20II.pdf>

Oxfam in Bangladesh, (March 2012). From <https://docs.google.com/viewer?a=v&q=cache:j6sMc_ZLUO8J:www.oxfam.org.uk/~/media/Files/OGB/What%2520we%2520do/Countries%2520we%2520work%2520in/Bangladesh/bangladesh_FINAL.ashx+damaged+embankments,+Oxfam+in+Bangladesh,+March+2012.+pdf&hl=en&pid=bl&srcid=ADGEESiR9HmcSG3r4DlBYabR312xDZh7SU9bzFhpdI-hHvI5FPfokSTfzNqLgXz98GriwqWjGGghVYTY0_ACWxyUEhSyFk7xZz7nBRUtfFxtiqy1_4mrd7gP0KuuXGA51juM1DTrssjq&sig=AHIEtbQK4KmSUW6AdqBlS0bpt9NlMfpWvw>

Paul, Reba, (2010), "*Impacts of Alia, post Aila water problems and delayed reconstruction of embankment in Aila affected areas in Bangladesh*". *Presentation Handout, Bangladesh Water Partnership (BWP), Dhaka*.

Recovery Needs Assessment Report for Cyclone Aila, (March 2011). From <http://www.lcgbangladesh.org/derweb/Needs%20Assessment/Reports/Recovery%20Needs%20Asessment%20Report_Cyclone%20Aila_Final_07%20April%2011.pdf>

Save the Children, (2009), "*Child Protection Rapid Assessment"*, Save the Children Australia, East Melbourne.

South Asia Disaster News, SAARC Disaster Management Centre, New Delhi, (08-06-2009). From < http://saarc-sdmc.nic.in/pdf/saarc_news/news87.pdf>

UNDP, accessed on 26th September 2009. From <*http://www.undp.org/cpr/disred/english/publications/rdr.htm*>

United Nations, (2010), "*Cyclone Aila: Joint UN Multi-Sector Assessment & Response Framework"*, United Nations, New York.

United Nations Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR), (2005). Hyogo Framework for Action 2005 –2015: Building the Resilience of Nations and Communities to Disaster. Extract from the final report of the World Conference on Disaster Reduction. From <http://www.unisdr.org/wcdr/intergover/official-doc/L-docs/Hyogoframework-for-action-english.pdf>

UN-OHRLLS, (2010), "Least Developed Countries: Country Profiles". From <*http://www.unohrlls.org/en/ldc/related/62/*>.

Uttaran, (2010), "*Aftermath of Cyclone Aila: Humanity cries in Southwest Coastal Region in Bangladesh, in Rivers & Communities (1), Uttaran, Tala*".

Wash Cluste, WaterAid and Unicef, (2009), "*Learning and Knowledge Sharing Workshop on Response to Cyclone Aila, Khulna, Bangladesh*". From <http://cccm.iom.org.bd/file/pdf/29.pdf>

News Paper:

New Age, (April 8, 2010), "*Mitigate Aila Problems before Monsoon*". From <http:// www.newagebd.com/2010/apr/08/front.html#2> Retrieved 15 September 2010.

New Age, (May 20, 2010), "*Government Programme to Distribute Drinking Water to Aila Victims*". From <http://www.newagebd.com/2010/may/20/nat. html> Retrieved 15 September 2010.

Priyo Internet life, (Tue, 24/05/2011) "*Two years on: 54,530 people still living in makeshift huts in Aila-affected areas by Fahud Khan*". From <http://news.priyo.com/environment/2011/05/24/two-years-54530-people-still-l-26992.html>. Access on March 12, 2012.

The Daily Star, (November 6, 2011), "*Waterlogged, Flood-hit People of Satkhira, Lalmonirhat, Eid makes no difference to 5 lakh*". From <http://www.thedailystar.net/newDesign/news-details.php?nid=209448>, Accessed on February 8, 2012.

The Daily Star, (July 3, 2009), "*Rehabilitation of Aila-hit Farmers Starts Today*". From <http://thedailystar.net/newDesign/news-details.php?nid=95242>, Accessed on February 8, 2010.

The Guardian (London), (September 8, 2008), "*International: UK gives £50m to Bangladesh climate change fund*". From <http://www.guardian.co.uk/world/2008/sep/08/bangladesh.climatechange>

UNB Connect, (May 24, 2011), "*Many Aila hit people still live on embankments*". From <http://203.202.240.242/component/news/task-show/id-48521>. Accessed on February 8, 2012.

Internet Database:
http://www.preventionweb.net/files/8199_Salinity.pdf

http://www.careinternational.org.uk/news-and-press/news-feature-archive-2007/371-surviving-cyclone-sidr

http://www.foodsecurityatlas.org/bgd/country/availability/agriculturalproduction_files/PtotoProduction_200708_Bangladesh.jpg

http://www.foodsecurityatlas.org/bgd/country/availability/agricultural-production

http://knowledge.allianz.com/health/natural_disasters/?575/disaster-protection-shouting-saves-lives

http://nimg.sulekha.com/others/original700/bangladesh-cyclone-miseries-2010-5-23-9-2-18.jpg