

**Assessment of Damage Due to Aila of post SIDR  
Agricultural Rehabilitation: Insights from Sharankhola,  
Bagerhat**



**A Dissertation for the Degree of Master in Disaster Management**

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## Abstract of the study

*Natural disaster occurs almost every year in Bangladesh. Flood and cyclone are the very common phenomenon in this country. Every year it causes extensive damages to the lives and properties. Cyclone S/DR attacked on November 15, 2007 to the south and southwestern part of Bangladesh and caused devastating damage to the socio-economic and physical sectors. Damage of agriculture sector was havoc in SIDR, especially to the hardest hit Sharankhola area. Farmers have been facing a lot of problems to bring all of their arable land under crops cultivation, especially, during winter Boro crops season a lion portion of their land remain untilled only due to salinity problem, and non-availability of quality seeds, agricultural equipments, timely low interest or interest free loan.*

*The present study data revealed that due to cyclone SIDR 89% of the crops land was damaged and the post S/DR land cultivation recovery was about 65%, which was again affected by cyclone Aila. Few people could save their crops from damage of cyclone Aila. Crops land damage due to Aila was 21 % compare to the affect intensity of SIDR. Out of total 484 acres of arable land farmers' cultivated 84% of land in the present post Aila Aman crops cultivation. Due to lack of some essential agricultural support and some other constraints farmers could not bring all their arable land under cultivation, especially during winter crops (Boro) cultivation. Study results showed that even after one and half year of cyclone SIDR, farmers could not return to their normal livelihood based activities, fully. But meanwhile, again they were attacked by cyclone Aila. During this cyclone agriculture sectors were affected adversely, return to the normal lives by the farmers' now has become tougher for them unless they are supported externally. From the study findings, it was evident that most of the middle class family became lower middle class and poor in post SIDR, and a slight improvement was found in post Aila in this regard. In terms of household level income it was found that in post SIDR most of the families were found economically became worst. At present, number of economically worst household has improved by 24% compare to post S/DR status. In house hold level members' occupation, agricultural wage laborer and rickivan puller number has increased slightly. On the other hand number of farmers' and service holders has also increased in the family. From the sampled villages quite a big number of people dislocated to different places in the country.*

*Farmers became more interested to grow high yielding varieties through adopting new technology in cultivation for getting quicker and increased amount of production. It is essential to ensure all the agricultural support related to crops cultivation and to remove all hindrance in the process of smooth HYV cultivation and to set back the disaster victim farmers' to their original state of life, and agriculture based activities. By ensuring all these necessary agricultural supports the national food security can be strengthened*

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## **Some basic concepts and terminologies used for the study**

### **Agriculture:**

i) **Farming**: The occupation, business, or science of cultivating the land, producing crops, and raising livestock

ii) **Organic** : Is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

**Rehabilitation** : Actions taken in the aftermath of a disaster to: i) assist victims to repair their dwellings ii) re-establish essential services iii) revive key economic and social activities.

**Reconstruction** : Permanent measures to repair or replace damaged dwellings and infrastructure and to set the economy back on course.

**Mitigation** : Measures taken prior to the impact of a disaster to minimize its effects (sometimes referred to as structural and non-structural measures).

**Prevention**: Measures taken to avert a disaster from occurring, if possible to impede a hazard so that it does not have harmful effects.

**Recovery**: Recovery is the process by which communities and the nation are assisted in returning to their proper level of functioning following to a disaster.

**Hazard**: i) There is a potential for occurrence of an event. ii) It is a phenomenon or situation, which has the potential to cause disruption or damage to people, their property, services and their environment. iii) Hazard is a probabilistic function of magnitude or intensity, according to the hazard type over time.

**Disaster**: i) A disaster is a catastrophic situation in which the day to day pattern of life are suddenly disrupted and as a result people need protection, food including water, shelter, clothing, medical and social care and other necessities of life.

ii) An event, man-made or natural, sudden or progressive, causing widespread human, material or environmental losses. iii) The serious disruption of the functioning of society, causing widespread human, material or environmental losses, which exceed the ability of the affected people to cope using their own resources. iv)The damage cost by a natural hazard may be termed as disaster if it satisfies one of the following conditions: a) at least US\$ 3.6 million worth of damage; or b) At least one hundred people dead; or c) At least one hundred people injured.



**Vulnerability:** A condition or sets of conditions that reduces people's ability to prepare for, withstand or respond to a hazard.

**Capacity:** Capacities are those positive condition or abilities which increase a community's ability to deal with hazards.

**Risk:** The probability that a community's structure or geographic area is to be damaged or disrupted by the impact of a particular hazard, on account of their nature, construction, and proximity to a hazardous area.

**Relief:** Measures that is required in search and rescue of survivors, as well to meet the basic needs for shelter, water, food and health care.

**Preparedness:** Measures taken in anticipation of a disaster to ensure that appropriate and effective actions are taken in the aftermath.

**Response:** Actions taken immediately following the impact of a disaster when exceptional measures are required to meet the basic needs of the survivors.

**Participatory Rural Appraisal (PRA):** PRA is a growing combination of approaches and methods that enable people to share, enhance, and analyze their knowledge of life and conditions, to plan and act to monitor and evaluate. The role of the outsiders is that of a catalyst, a facilitator of processes within a community which is prepared to alter their situation.

**Focus Group Discussion (FGD):** Focus Group Discussion is a method being widely applied for qualitative research to gather information from a homogenous group of people. In qualitative research, it is important to assess, understand people's feeling, attitudes, perceptions, reactions and emotions, for which FGD is suitable.

**Observation:** "Seeing" and "listening" is the key to observations. Observations provide the opportunity to document activities, behavior and physical aspects without having to depend upon peoples' willingness and ability to respond to questions.

**Population:** Suppose we want to examine the nutritional status of SIDR affected areas. Then all the children of the SIDR affected area aged below five years at the time of investigation constitute the population of under five children.

**Sampling:** Any representative part of a population is called sample. Sampling is the technique, which says a part can be used to draw inference about population (whole).

## Abbreviation

ADPC	Asian Disaster Preparedness Center
BCAS	Bangladesh Center For Advanced Studies
BRAC	BRAC
BIRRI	Bangladesh Rice Research Institute
BUET	Bangladesh University of Engineering and Technology
CBDM	Community based Disaster Management
CLACC	Capacity Strengthening in the least developed countries (LDCs) for Adaptation to climate change
DMB	Disaster Management Bureau
DAE	Department of Agriculture Extension
DLS	Directorate of Livestock
ERD	External Resource Department
ECHO	European Commission for Humanitarian Aid
FGD	Focus Group Discussion
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GoB	Government of Bangladesh
HYV	High Yielding Variety
IIED	International Institute for Environment and Development
IRRI	International Rice Research Institute
JTWC	Joint Typhoon Warning Center
Kg	Kilo gram
LDC	Least Developed Countries
MT	Metric Ton
NOAA	National Oceanic and Atmospheric Administration
NGO	Non-governmental Organization
PPDM	Post Graduate Programs in Disaster Management
PRA	Participatory Rural Appraisal
SOS	Save Our Sole
SMRC	The Southern Metropolitan Regional Council
SAARC	South Asian Association for Regional Cooperation
UN	United Nations
US	United States
USA	United States of America
UK	United Kingdom
WB	World Bank



# Chapter-I

## Introduction

### 1.1 Agricultural scenario

The country is predominantly an agricultural country. Agriculture is the single largest producing sector of the economy since it comprises about 30% of the country's GDP and employs around 60% of the total labor force. The performance of this sector has an overwhelming impact on major macroeconomic objectives like employment generation, poverty alleviation, human resources development, and food security. Because of Bangladesh's fertile soil and nationally ample water supply, rice can be grown and harvested three times a year in many areas. It is mentioned that rice is the principal crop of Bangladesh and Bangladesh is the fourth largest rice producing country in the world.

But the Agriculture at coastal belt is always at risk of facing frequent disaster such as, tropical cyclone and storm surges. Due to recent cyclone SIDR (Nov. '07) and Aila (May '09) damages were extensive and immeasurable. People encountered losses from almost all sectors. Amongst them, agriculture was the most adversely affected sector. Seed bed, standing crops, Vegetation, Fisheries especially, Shrimp field (chingri gher), and Poultry and Livestock were damaged seriously.

**1.1.1 Agricultural Damage** by SIDR: As per the report of 'United Nations Rapid Initial Assessment Lite damages by SIDR in agriculture cropland sectors were more than 1.6 million acres. The main damaged crop was rice. As a result of severe damage to housing many households lost their food stocks. The government

estimated that nearly 3, 82,000 livestock were killed, majority of these are believed to be cattle. Due to damage of boats and nets the labor diverted to other critical activities such as housing repairs and reconstruction. Household pond based fish production also declined as many ponds and shrimp cultivation areas were badly damaged and



9, ^

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Photograph-]: Crops damaged by cyclone

littered with storm wreckage and debris. 'Forum' a monthly publication of The Daily Star stated that tropical cyclone; SIDR that hit Bangladesh devastated vast areas in the south-western coast. The cyclone severely ravaged four districts-Barguna, Bagerhat, Patuakhali and Pirojpur. According to the estimates 2 million households, 8.7 million people were affected, 1.5 million houses damaged, 4.1 million trees destroyed, the report also cited that the standing Aman crops damaged fully or partially. FAO Newsroom reported that the cyclone SIDR affected over 6.7 million people in 30 southern districts. According to data from the Disaster Bureau (DMB) of the Ministry of Food and Disaster Management, which includes government, UN, donor and NGO representatives, over 920,000 hectares of crops were completely destroyed, and over 551,000 hectares sustained partial damage. Livestock losses were also severe, with more than 350,000 ruminants (cattle, buffalo, sheep and goats) and poultry estimated to have been lost. Serious damage has also been observed in the fisheries and shrimp aquaculture sectors. In Morelgonj and Sharankhola upazilas which is an important shrimp producing areas, some 5,000 shrimp enclosures were destroyed. In Bagerhat district some 90% of the shrimp enclosures along the Baleshwar River were reportedly destroyed and flushed by tidal waves. *The Daily Star* on 2 February 2007 published a report titled "Donors propose \$ 4 billion plan to fight natural calamities" that the loss in agriculture sector was estimated at \$ 440 million and transport sector at \$ 140 million. Shahzada M Akram and others in their study report of "Integrity in Humanitarian Assistance: Issues and Benchmarks" mentioned that crops damaged fully in 742,827 acres and partially damaged in 1,730,117 acres of land. Number of Livestock death was 1,778,507.

BRAC mentioned in a report 'BRAC cyclone SIDR Emergency Relief and Rehabilitation one year Anniversary Report [Online]' According to the Ministry of Agriculture, 84% of the total population lives in rural areas and is directly or indirectly engaged in a wide range of agricultural activities. An estimated 70% of crops, mainly rice and pulses, were damaged in the severely affected sub districts and 20-40% in the moderately affected sub-districts. Crop damage in other, less affected districts has been estimated at about 10% of the normal production levels. The total losses of food grain (stocks and production losses) due to Cyclone SIDR are estimated at 0.8 to 1.3 million metric tons (MT).

**1.1.2 Agricultural Rehabilitation:** After SIDR in coastal belt the majority of the people rely on agriculture based activities. Their income and employments largely depend on agriculture. After SIDR, Govt. as well as NGOs works a lot for quick restoration of agricultural activities. Muslim Aid UK published in their report that Muslim Aid and ECHO



**Photograph -2: Bitter Gourd Supported**  
by NGU (BRAG)

have provided support to 100,000 families for agriculture and small businesses. In partnership with the UN food and Agriculture Organization (UN-FAO), and the Bangladesh Department of Agriculture Extension (DAE), rice seeds and other field crops and fertilizers were provided to around 60,000 farm families of the Bagerhat and Patuakhali districts by Muslim Aid. *The Daily Star* (2007) published an article "Donors propose \$ 4 b plan to fight natural calamities" that ERD sources said the donors had already accepted aid commitment of \$ 685 million from bilateral and multilateral donors, of this, the WB, Development Bank and Japanese government committed \$147 million as budget support. BRAC USA in their Anniversary report published in September 2008 has given a summary of Agricultural Rehabilitation by occupation (Table-1) in the SIDR affected areas. The report is given below:

**Table- 1: Summary of Agricultural Rehabilitation by Occupation**

Livelihood	Goods distributed (No. of family)	Livelihood	Goods distributed (No. of family)
Rice farmer (Taka 5,000/acre))	85,976	Fodder cultivation (cow and fodder seed )	9,033
Maize farmer (Taka 5,000/acre))	14,137	Tree Nursery (Taka 4,000/nursery)	901
Vegetable farmer (seed, fertilizer etc)	16,506	Homestead Plantation (Taka 300/family)	47,521
Watermelon farmer (seed, fertilizer etc)	1,995	Beetle leaf farmer (Taka 120/dec.)	1,151
Other crops (seed, fertilizer etc)	7,882	Rickshaw/van (Taka 8,000/family)	1,426
Goat, Poultry and Duck (Taka 7,000/family)	21,649	Spray machine	165
Cow Rearer (Taka 10,000/family))	9,746	Power Tiller	237
Fishing (Tatra 20,000/family))	1,175	Low Lift pump	187
Shrimp cultivation (Loan)	492	Subsistence allowance	2,811

Source: BRAC USA anniversary report 2008.



By one and half years after SIDR, farmers cultivated land at least three times and in last crops immediate before Aila farmers were involved in winter 'Boro' and vegetable cultivation. Only 27% of total arable land at Sharankhola was brought under cultivation and production was achieved up to 65% compare to the production of pre- SIDR summer production. Alamgir (2009, pp.32)

## 1.2 Agricultural Damage by Aila: *The Daily Star* in a report titled

"Rehabilitation of Aila-hit Farmers Starts Today" published on 3 July 2009 mentioned that the cyclone on May 25 damaged crops on about 3, 23 lakh acres of land, and destroyed 1.5 lakh livestock. *The New Nation* in an article "2.2 lakh hectares of agriculture land submerged in Aila" The submerged crops are seedbeds of Aus,



Photograph-3: Affected people by cyclonic surge of Aila

transplanted Aus, sweet potatoes, betel leaves, sesame, maize, and chilies. The devastating cyclone Aila caused deaths of some 3,570 cattle heads, 1,493 buffalos, 6,867 goats, 1,474 lambs 124,168 poultry birds and 39,795 ducks, besides, some 152,386 acres of pastureland, some 200 cattle and 761 poultry and duck farms across the country also have been damaged due to the onslaught of the cyclone. The cyclone caused a financial loss of nearly 311 crore throughout the country. International Federation of Red Cross and Red Crescent Societies in a web site report mentioned that the extend of the devastation caused by cyclone Aila as of 11 June 2009, that affected districts were 11, Upazila 64 and unions 195 fully and 334 partially. Affected households were 948,621 and affected population were 3, 928,238. Crops damaged fully of 77,486 acres and partially of 245,968 acres of land. Death of livestock was 150,131. *The Daily Independent*, Bangladesh on July 26 [internet] reported that the cyclonic storm Aila has caused damages to shrimp enclosures worth taka 163.26 crore in the districts. The tidal surge due to Aila washed away fish from 4,000 ponds on 428 hectares of land and 7,118 shrimp enclosures on 26.30 hectares. The district fisheries department estimated that the loss in terms of wastage is 4,712 tones of white fish and 3,107 tones of shrimp. Fry of white fish worth taka 26.73 crore and shrimp fry worth

taka 93.21 crore have been washed away. The loss in infrastructure has been estimated in taka 39.39 crore. The total loss in fish sector due to Aila in the districts has been estimated at taka 163.26 crore

*The New Nation* on 1 June, 2009 published an article "2.2 lakh hectares of agriculture land submerged in Aila" mentioned that the DLS has supplied vaccines for 34,177 animals and 24,400 poultry birds in the cyclone-affected regions, director (extension) AKM Omar Faruq of the DLS said adding that treatment has also been provided for some 21,300 cattle heads and 159,000 poultry birds. The daily star in an article titled "Rehabilitation of Aila-hit farmers starts today" published on 3 July 2009 mentioned that free seeds and fertilizers distribution for the farmers started in the southern districts for the Aman season. The government will distribute this agricultural aid among around 1.76 lakh farmers from 75 Upazilas in 12 Aila-affected districts. In the first phase, each of the farmers will get five kilograms of rice seeds, 18 kilograms fertilizer, 8 kilograms TSP and 9 kilograms MoP and for this first phase the government will need 18 crore taka to implement the program. For the second phase, the government will spend taka 20 crore to distribute seeds and fertilizer among 1.9 lakh farmers in winter.

### **1.3 Constraints/Problems in Agricultural Recovery**

'Forum' a monthly publication of *The Daily Star (2008)* mentioned in an article that there exist some constraints for a large scale expansion and successful rehabilitation in the agricultural sector in the coastal belt. The identified major constraints are lack of and high cost of tillage equipment (power tillers), limited or non availability of irrigation facilities (power pumps), inadequate supply of quality seeds of newly introduced crops such as maize and HYV rice and lack of credit finance working capital.

Beside that, several factors, such as: i) timely support (loan, necessary inputs and equipments), ii) farmers attitudes i.e. reluctant to adopt modern technology, and iii) salinity detained or delayed the process for quick restoration of agriculture based farmers life. Farmers from their own experiences identified salinity as their number one and major barrier to bring into all land under full crop cultivation especially during winter crop.



Rahman & Alam in their report 'Mainstreaming Adaptation to Climate Change in Least Developed Countries (LDCs) working paper 2: "Bangladesh Country Case" mentioned that the future changes of temperature and rainfall will put overall adverse impact, especially on crop production. Habibullah and others in their report "Assessment of food grain production loss due to climate induced soil salinity" mentioned that the impact of climate change in agriculture production and food security in Bangladesh predicted that high temperature will reduce yields of HYVs of 'Aus', 'Aman', and 'Boro' rice in all seasons and it is particularly evident at a 4°C rise. Under a moderate climate change scenario the crop loss due to salinity intrusion could be about 0.2 Mt.

## Chapter-2

### Background

**2.1 Background of the study:** The economy of Bangladesh mostly depends on agriculture and the sector remains as the primary source of income for about 60% of the population. This is the single largest producing sector of the economy since it comprises about 30% of the country's GDP and employs around 60% of the total labor force. Therefore, the growth of agriculture holds the key to the nation's pervasive poverty. The performance of this sector has an overwhelming impact on major macroeconomic objectives like: employment generation, poverty alleviation, human resources development, and food security.

Bangladesh is frequently affected by natural calamities. Almost every year, flood, drought, and cyclone destroys human lives and affects different sectors. Considering the magnitudes of loss, agriculture is the most vulnerable sector of the country. The country has suffered badly from some of the most devastating natural calamities like floods, droughts and especially from cyclones.

The present study searched farmers' need, especially the needs to rebuild the agriculture sector, assessed their damages and the portion of damages that can be recovered by the farmers themselves and focus was given on assistance that was needed for full recovery of agricultural losses. This study also tried to explore the production scope of high yielding variety. This study was undertaken to give an idea of proper identification of loss and damages, instant requirements of cyclone victims for rebuilding their livelihoods, the pertinent constraints faces by them, and the ways of removing of constraints felt by the community that were not properly and specifically addressed before.

#### 2.2 Cyclone Tracks

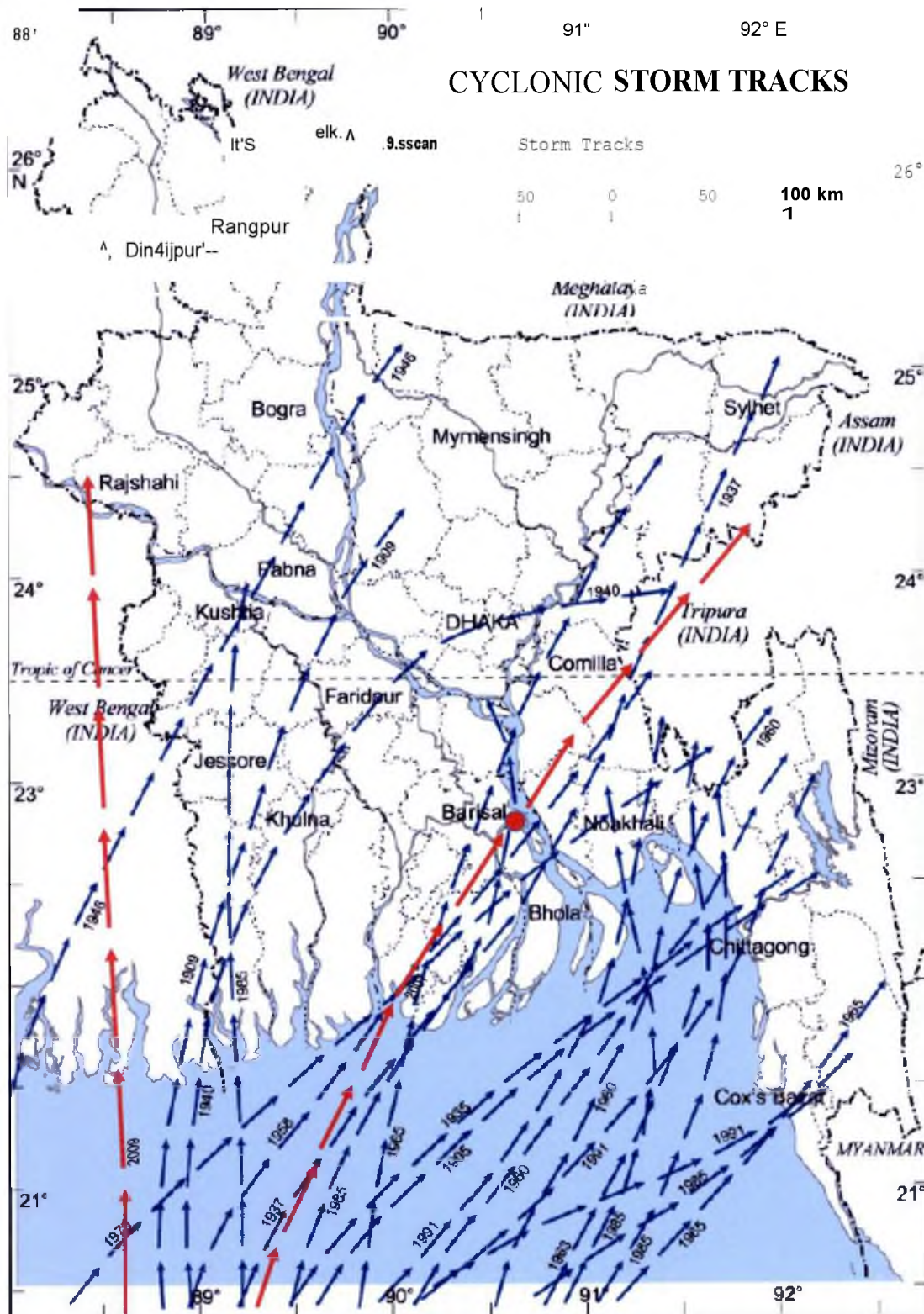
Cyclone is the tropical storm or atmospheric turbulence involving circular motion of winds, occurs in Bangladesh almost every year. About one tenth of the global tropical cyclone occurs in the Bay of Bengal (GOB, UNDP, World Bank, 1993). About one sixth of tropical cyclones developed in the Bay of Bengal had landfall on the Bangladesh coast. The Bay cyclones also move towards the eastern coast of India,

**towards Myanmar and occasionally into Sri Lanka . But they cause the maximum damage when they come into Bangladesh , west Bengal and Orissa of India. This is because of the low flat terrain, high density of population and poorly built houses. BUET, (2008, pp.1).**

Cyclones in their initial stages move at a rate of 5 to 10 km/hr. In their final stage they may move at a rate of 20 to 30 km/hr or even up to 40 km/hr. Cyclones in the Bay of Bengal usually move northwest in the beginning and then curve eastwards. But this pattern is not uniform as seen from the tracks of various cyclones. Cyclones accompanied by heavy rains and sea swells are called storm surges. If this occurs during high tide, the storm surge is reinforced considerably and can rise as high as 12m. This deadly wall of water does most of the damage to life and property. BUET (2008, pp.5).

In addition to the waves associated with winds, abrupt surges of water known as storm surges are associated with cyclones. They strike the coast nearly at the same time that the centre of the storm crosses the coast. In Bangladesh the maximum value of this storm surge has been reported to be as high as 13m. Most of the damage during a cyclone is done by the storm surges, which sometimes wash over entire offshore islands and large areas on the coast.

The most destructive element of a cyclone is its accompanying surge. There is little that can withstand a great mass of onrushing water often as high as 6m. In Bangladesh, cyclones occur in April-May and also in September-December. On an average, five severe cyclonic storms hit Bangladesh every year and the accompanying surge can reach as far as 200 km inland. Surge-heights increase with the increase of wind speed. Astronomical tides in combination with cyclonic surges lead to higher water levels and hence severe flooding. BUET (2008, pp.5).



Map-1: Cyclone storm tracks over Bangladesh  
Source: Banglapedia

Tracks of some major recent cyclones: The 1970 Bhola cyclone (12-13 November) is the deadliest tropical cyclone in record and is one of the deadliest natural disasters in the history of Bangladesh. In 1970 cyclone Chittagong was battered by hurricane

winds. It also hit Barguna, Khepupara, and Patuakhali, char Burhanuddin; char Tazumuddin and south of Maijdi, Haringhata (BUET, 2008, pp.9). The exact death toll will never be known, but it is estimated that between 300,000 to 500,000 people lost their lives. Over 3.6 million people were directly affected by the cyclone, and the total damage from the storm was estimated at \$ 86.4 million. The survivors claimed that approximately 85% of the homes in the area were destroyed or severely damaged, the greatest destruction occurred along the coast. Ninety percent of marine fishermen in the region suffered heavy losses, including the destruction of 9,000 offshore fishing boats. Of the 77,000 onshore fishermen, 46,000 were killed by the cyclone, and 40% of the survivors were affected severely. In total, approximately 65% of the fishing capacity of the coastal region was destroyed by the storm where about 80% of the protein consumed comes from fish. Agricultural damage was similarly severe with the loss of \$ 63 million worth of crops and 280,000 cattle. Bhola cyclone (1970).

The great cyclone of 1991 (29 April) crossed the Bangladesh coast during the night. It originated in the Pacific about 6,000 km away and took 20 days to reach the coast of Bangladesh. It had a dimension of more than the size of Bangladesh. The central overcast cloud had a diameter exceeding 600 km. The maximum wind speed observed at Sandwip was 225 km/hr. The wind speeds recorded at different places were Chittagong- 160 km/hr, Khepupara (Kalapara)- 180 km/hr, Kutubdia- 180 km/hr, Cox's Bazar- 185 km/hr, and Bhola- 178 km/hr. The maximum wind speed estimated from NOAA-11 satellite picture obtained at 13:38 hours on 29 April was about 240 km/hr. The cyclone **in its initial** stage moved slightly northwest and then north. From 28 April it started moving in a north-estuary direction and crossed the Bangladesh coast north Chittagong port during the night of the 29<sup>th</sup> April. The cyclone started affecting the coastal islands like Nijhum-Dwip, Manpura, Bhola and Sandwip from the evening of the day. The maximum storm surge height during this cyclone was estimated to be 5 to 8m. BUET (2008, pp.10).

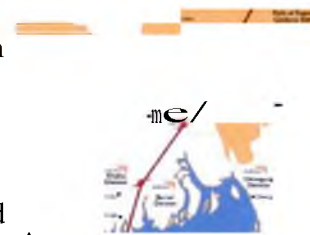
The 1991 cyclone was particularly severe, causing widespread damage, killing 1,38,882 people. Total loss for all sectors has been estimated at US \$ 2.07 billion. Nearly 11 million people were affected. Damages to agricultural crops were 924,893 acres of land, other important damaged sectors were, livestock 1,061,029, houses- 1,702,358, and roads, bridges, culverts and embankments Prof. Dr. M.A Miyan,

mentioned in a journal (Science News) titled: Cyclone in Bangladesh: Response and Preparedness.

### 2.3 Affecting south-west region

Because of the funnel shaped coast of the Bay of Bengal, Bangladesh very often becomes the landing ground of cyclones formed in the Bay of Bengal. The Bay cyclones also move towards the eastern coast of India, towards Myanmar and occasionally into Sri Lanka. But they cause the maximum damage when they come into Bangladesh, west Bengal and Orissa of India. This is because of the low flat terrain, high density of population and poorly built houses. Most of the damages occur in the coastal regions of Khulna, Patuakhali, Barisal, Noakhali and Chittagong and the offshore islands of Bhola, Hatiya, Sandwip, Manpura, Kutubdia, Maheshkhali, Nijhum Dwip, Urir Char and other newly formed islands. BUET (2008, pp.6).

**2.3.1 Cyclone SIDR (2007):** Cyclone SIDR (JTWC designation: 06B, also known as Very Severe Cyclonic Storm SIDR) is the fourth named storm of the 2007 North Indian Ocean cyclone season. The storm formed in the central Bay of Bengal, and quickly strengthened to reach peak sustained winds of 215 km/h (135 mp/h), which would make it a Category-4 equivalent to tropical cyclone on the Saffir-Simpson Scale. The storm eventually made landfall near Bangladesh on November 15, 2007. BUET (2008, pp.13 ).



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Map-2: Path of super cyclone SIDR

The devastating cyclone SIDR destroyed not only the lives of human and livestock but also damaged properties to the human and nature. Cyclone SIDR also damaged a total of 2.5 million acres of agricultural crops, which added increased food insecurity to the country. Alamgir (2009, pp.5).

The shrimp culture industry has posed major threat to the local agriculture and soil fertility. The diversion of salt water through the artificial canals to the former agricultural land caused serious decrease of paddy harvest. The decrease is so severe that from an area which was capable of harvesting about 35 tons of rice has the

**potential of harvesting about 100 kgs of the same. The reduced growth of other plants in the vicinity is also visible due to the same reason (BUET, 2008, pp.23).**

**Loss of agriculture was the havoc to SIDR affected area, especially to the hardest hit Sharankhola area. The study data (Alamgir, 2009, pp.32), revealed that after one and half year of SIDR farmers could recover only about 59% production ( Aman crop) of their agricultural loss. Study results showed that the farmers were slow, steady and increasingly recovering their agricultural loss but due to the recent cyclone Aila saline water penetrated almost all the arable land, which created a big challenge for the farmers to remove the salinity from their paddy field. In the above study following causes were found as the major problems to bring the land under full cultivation. The problems are: salinity, seed and money.**

**2.3.2 Cyclone Aila (2009):** Within a very short span of time another devastating cyclone Aila crossed the Bangladeshi coastlines on 25<sup>th</sup> May. Due to the coincidence of new moon, it inflated the sea water creating tidal waves higher than expected to inundate a larger area. According to the report of Bangladesh Agencies, Bangladesh escaped its main brunt that hit the neighboring West Bengal of India. But officials and local sources reported that the killer surges washed away a large number of cattle, crops, and fishing farms including shrimp cultivation grounds that account for the country's one of the major export earnings (2009. Cyclone Aila claims 21 lives in Bangladesh. Indian Express, [Internet] 26 May).



Photograph-4: Cyclone Aila

By cyclone Aila `Aus' crops of 2 lakh 18 thousand hectares of land has been damaged and Aus crops of 1 lakh and 20 thousand hectares of land damaged in 11 coastal districts, in which 60 thousand hectares of land in coastal districts has damaged fully. Other damaged crops were, seed beds, jute, vegetables, banana, betel leaf, chili and sesame (Bijdhon Ekhn Jakhkher Dhan - Prothom Alo, 04 June, 2009).

The study (Alamgir, 2009) findings depicted that agricultural rehabilitation for the SIDR affected farmers after one and half year of SIDR farmers could recover 65% of rice production and 25% of land under cultivation for winter crops. Immediate before

Aila, farmers were on the rehabilitation process but cyclone Aila suddenly destroyed all of their efforts and achievements.

Ghulam Mohammed Panaullah, BRRI in his study report mentioned that the Climate change is affecting Bangladesh in many ways. For example, rising sea level is making some coastal agricultural land more saline, affecting both the quality and quantity of crops. In the southern districts of the country where the land is only centimeters above the brackish estuarine water, large swatches of crop land are becoming arid. Crop yields are shrinking because of deeper saline intrusion due to a rising sea level of the Bay of Bengal. Agronomist and agricultural experts are worried about the creeping salinity which would engulf more and more land in the low-lying country. The impact of climate change on agriculture is undeniable and most certainly will worsen the situation if the government and donors fail to take suitable steps right now.

## **2.4 Rationale of the study**

In November 2007, Cyclone SIDR damaged crops of 2.5 million acres of land. When people were rebuilding their lives with full confidence the cyclone Aila destroyed the rebuilt process of agricultural rehabilitation. It is mentioned in the daily and weekly journals that due to the damage of embankment by cyclone Aila intrusion of saline water to the land have become a common phenomenon at the coastal belt area. This scenario will prevail for longer time and subsequently use of land in agriculture sector will substantially reduce and as a result, the ultimate impact will increase the vulnerability of the coastal belt people.

In this present study coastal belt people were involved in assessing their damage and future crop cultivation plan. This study was undertaken to raise their knowledge regarding demand, to make them aware about high yielding and salt-tolerant crops varieties.

Through the present study it was tried to assess the actual amount of land, not brought under cultivation and the causes behind it. In farmers' opinion on crops variety, seeds, services and problems they faced to bring back all their arable land under cultivation was searched. To recovery the enormous loss of Aila, especially the loss of agricultural sector and minimizing the gaps between farmers and development workers which were untraced were also identified through this study.



## Chapter-3

### Objectives of the study

**3.1 Objectives of the study:** The main objectives of the study are as follows:-

- To assess the overall losses of agricultural crops due to SIDR and Aila, and any new dimension that might be emerged as a result of consecutive events.
- To assess the efforts to agricultural (crops) rehabilitation activities.
- To identify the constraints and prospects related to recovery of agricultural crops damage.

### 3.2 Research questions

- Is there any devastating loss of agricultural crops due to Aila comparing to SIDR?
- is there any significant difference between the losses of agricultural crops of the two disasters?
- Is there any new dimension of life coming up as a result of consecutive events?
- Whether the efforts were sufficient for agricultural rehabilitation to recover SIDR losses?
- What are the efforts at different level for recovering agricultural losses by Aila?
- Is there any constraint faced by the farmers related to recovery of agricultural crops cultivation?
- Are the prospects and resources of environment suitable agricultural technologies easily available to the farmers?



### **3.4 Limitations of the study**

The selected study area was Sharankhola upazila. It consists of 4 union parishads, 12 mouzas and 44 villages. Total numbers of households were 24,683 and population of 128,000 in 2007. Devastating cyclone SIDR and consecutive cyclone Aila affected almost all human settlements; properties and most adversely affected the agriculture, livestock, fisheries and other different sectors. Out of total number of population, majority were farmers. Most of the population was more or less engaged in agriculture based activities. As the study focus was to assess only agricultural damage, especially crops (paddy and vegetables) of the farmers of Sharankhola, therefore, data was collected from 201 farmers from 4 unions of Sharankhola Upazila. The study did not address all areas or dimensions of Agricultural sector, such as: Fisheries, Poultry and Livestock etc. But in consideration to yield in agriculture, coverage of land under tilling, level of food security in the family, full employment in agriculture based activities, income generation from agriculture and overall to set back their economy in an individual level could not be commented due to non-expanding the sample in other Upazilas and to all agricultural sectors. The study result will not represent the scenario of total Aila affected Upazilas due to sample constraint as a whole. The result of the present study can be representative for the damage and agricultural rehabilitation of Sharankhola as a whole. The present study can give a clear view on performance of the farmers of Sharankhola.

## **Chapter-4**

### **Methodology**

**4.1 Methodology of the study** : Between two types of survey methods (census and sample) sample survey was adopted in the present study for data collection. In data collection approach of the present study both quantitative and qualitative approach was adopted. Quantitative data were collected through survey method i.e. individual interview by using designed questionnaires and for collection of qualitative type of data Questionnaires for Elite and key informants were used, besides, observation method and focused group discussion techniques were adopted also.

Study related data from field were collected from October 12, 2009 to October 19, 2009 from Sharankhola Upazila. Information on damage, relief and rehabilitation of whole Upazila were collected during field data collection.

## 4.2 Activity Flow chart

Activity flow chart of study is given below-.-

Selection of Research Topic  
June-July' 09

Preparation of Table of contents  
June-July' 09

4

Methodology and Approach  
August' 09

**Development of questionnaire &  
Checklist**

Autrust-September' 09

**Secondary data**

Report, Maps, Charts,  
books, media, journal  
and internet

o---

Data Collection  
October' 09

**Primary data**

Reconnaissance/field  
survey, Questionnaire  
survey, Key  
Informants and Focus  
Group Discussion

Data Analysis  
October' 09

Findings  
November' 09

**Recommendations**

November' 09

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Suggestions for implementation of  
recommendations  
November' 09

Conclusion  
November' 09

↑

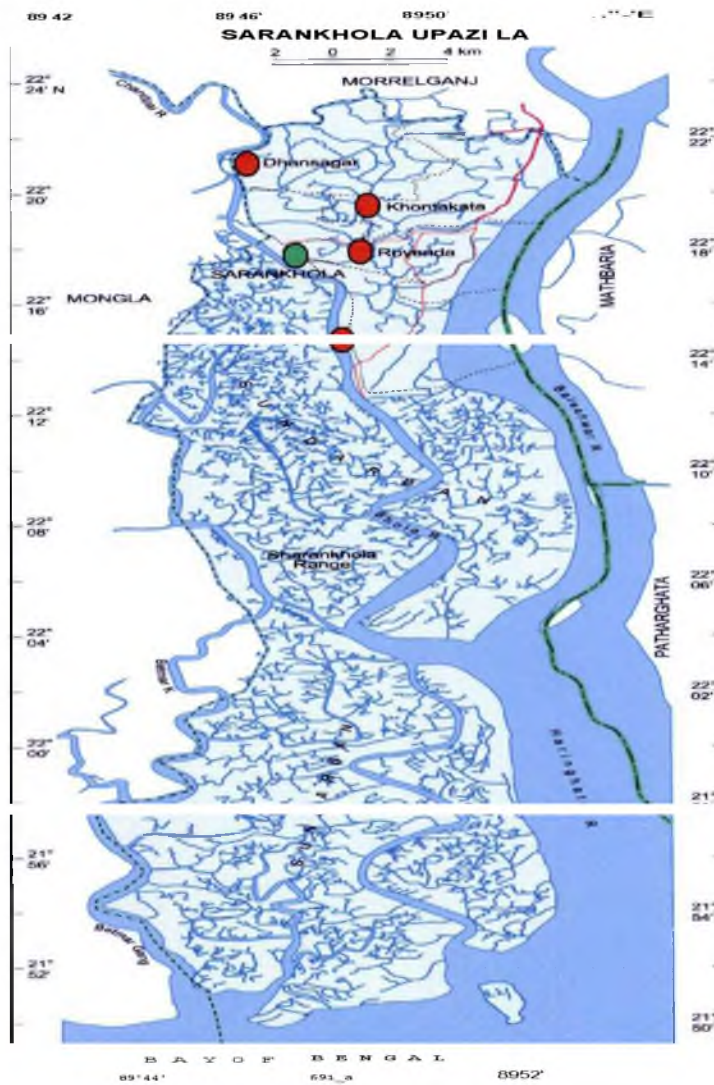
Submission of draft report  
November' 09

**Submission of final report  
By December 24, 2009**

### **4.3 Study Area Profile**

Sharankhola Upazila (Bagerhat district) with an area of 151.23 square kilometers is bounded by Morelgonj Upazila on the north, the Bay of Bengal on the south, and Mathhbaria and Patharghata Upazila on the east and Mongla Upazila on the west. Main rivers are Balleshwar, Haringhata and Chandpai; the Sundarban covers major area of the Upazila.

Normal life of the people of Sarankhola evolves with nature. For many, the forest is directly or indirectly a part of livelihood. They collect honey, wax, wood, golpata and hogla from the forest. The main livelihoods are fishing and agriculture. Mostly fishing is done in the wet season and agriculture during the rest of the year. People grow a lot of fruits and timber trees around the homesteads. They grow crops by storing rainwater. They are in harmony with nature in terms of their lifestyle and livelihood. Sharankhola has been one of the worst affected of the regions hit by the cyclone SIDR in November, 2007 and Aila in May, 2009. In Bagerhat district, most of the blow of the cyclone was taken by Sharankhola with Dublar char and Southkahali falling under it.



Map-3: Sharankhola Upazila showing working Union

- Sharankhola Upazila
- Working Union under Sharankhola Upazila



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MYANMAR

Map-4: Bangladesh map indicating Sharankhola Upazila

## Description of study Area- Sharankhola Unazila

<b>Sl</b>	<b>Geographical Location</b>	
No	Sharankhola (Town) consists of 2 mouzas. The area of the town is 29.08 sq km.	
1.	It has a population of 24,903; male 51.72%, female 48.28%. The density of population is 856 per sq km. The literacy rate among the town people is 44.6%. The town has one dakbangalow.	
<b>2</b>	<b>Administration</b>	<b>Name of Affected Union</b>
	Sharankhola thana was established in 1908 and was turned into an Upazila in 1982. It consists of 4 Union Parishads, 12 mouzas and 44 villages	Dhansagar
		Khontakata
		Rayenda
		Southkhali
<b>3</b>	<b>Population</b>	
	1,28,000; male 51.28%, female 48.72%; Muslim 91.11%, Hindu 8.84%, others ,05%.	
<b>4.</b>	<b>Religious Institutions</b>	
	Mosque 171, Madrasha 18 and temple 18. Orphanage 4	
<b>5.</b>	<b>Literacy and Educational Institutions</b>	
	Average literacy 35.46%; male 39%, female 31.9%. Educational Institutions: College 5, High School 17, Junior School 8, Community School 7, Madrasha 18, Satellite School 14, Government Primary School 34, Registered Primary School 71, Vocational Institute 2,	
<b>6</b>	<b>Cultural Organizations</b>	
	Press club 1, Cinema hall 2, Cultural Organization 2	
<b>7</b>	<b>Main occupations</b>	
	Agriculture 30.82%, wood, wax and honey collection 9.81%, Fishing 37.27%, Agricultural and wage laborer 11.96%, Service and Commerce 10.14	
<b>8</b>	<b>Land use and main crops</b>	
	Arable land 11,616 hectares, fallow land 829 hectares; single crop 53.02%, double crop 26.67% and triple crop land 20.31 %.	
	<b>Land control:</b> Among the peasants, 35.03% landless, 7.23% marginal, 22.10% small, 29.67% intermediate, 5.97% rich; cultivable land per head 0.09 hectare.	
	<b>Value of land Market:</b> Value of first grade of land is Tk 2500 per 0.01 hectare.	
	<b>Extinct and nearly extinct crops :</b> Coconut and betel nut.	
	<b>Main fruits:</b> Hog plum (amra), Banana, lemon and mango.	
<b>9</b>	<b>Communication facilities and traditional transport</b>	
	Roads: pucca 25 km, semi pucca 34 km and mud road 150 km. Nature of the transportation can be categorized as palanquin (extinct), horse carriage and bullock cart (nearly extinct) and boat.	
<b>10</b>	<b>Bank, Manufactories and Cottage industries</b>	
	Bank 3, Welding 5, ice factory 3, Bamboo and cane work 15, goldsmith 15, blacksmith 2, weaving and cottages are 11.	
<b>11</b>	<b>Main hats, Bazar and fairs</b>	
	Hats and Bazaars are 21, most noted of which are Rayenda Bazar and Talfalbari Bazar.	
<b>12</b>	<b>Health centers</b>	
	Upazila health complex I. family planning centers 4.	



## Chapter-5

### Data collection

#### 5.1 Data collection tools, techniques and sampling

**5.1.1 Sample:** Sharankhola sub-district is consisted of 4 union parishad. Data were collected from all 4 unions of Sharankhola. A total of 201 farmers' were selected from 16 villages (4 villages from each union). From each of a village 12-13 farmers' were sampled and data were collected for the study (50 from each union). Union wise mostly affected village list was collected and next villages were sampled through simple random sampling method from that list (4 villages from each union). Farmers were selected adopting systematic random sampling method. Among the selected farmers, there were mixed groups of marginal and poor farmers. For getting information of their own ability, the sorts of support they managed by themselves and sorts of support they needed relying on others, their opinion on seeds, equipment, other inputs and services provided by Govt. and NGOs were asked also. In regards to problems they faced in cultivation and their possible solution, farmers were the main respondent. Occupational changes and displacement was a major point to know from them through focus group discussions, in this regard elite and key informants were interviewed. But other family members were interviewed in providing information related to family level damage, rescue, receiving relief. Besides, local govt. officials and experts were also interviewed.

**5.1.2 Tools and techniques:** Structured questionnaires were designed to collect data from field. Questionnaires were finalized after field test. After finalizing the questionnaire, orientations on questionnaire were given to the 4 members' team on data collection process. Then the team went to the field for collecting data. Observation techniques were also adopted to understand the agricultural rehabilitation activities of farmers and recovery of losses. And to have a practical view of their livelihood based activities and losses due to cyclone Aila. Focus group discussions were conducted with the farmers to know about agricultural losses, occupational changes and their future plan for cultivation. Their thinking about the problems they face in cultivation and the way they are planning for solution of their problems were also addressed in this study.

A four member group was involved in data collection for this study. They were from monitoring department. All of them are professional data collectors and they were given a detail orientation on data collection. All of them have motor bike, they used their motor cycle during data collection from villages. All of them stayed at Sharankhola BRAC office during data collection period.

For maintaining quality of data their data collection activities were supervised initially by me and subsequently by another person. In total it took 10 days for collection of this study data. Everyday after finishing data collection the 4 members sat together in the evening at office, gone through the filled up questionnaire, checked carefully, discussed each other with the emerging issues and find out appropriate solutions for overcoming the problems.

## **5.2 Data sources**

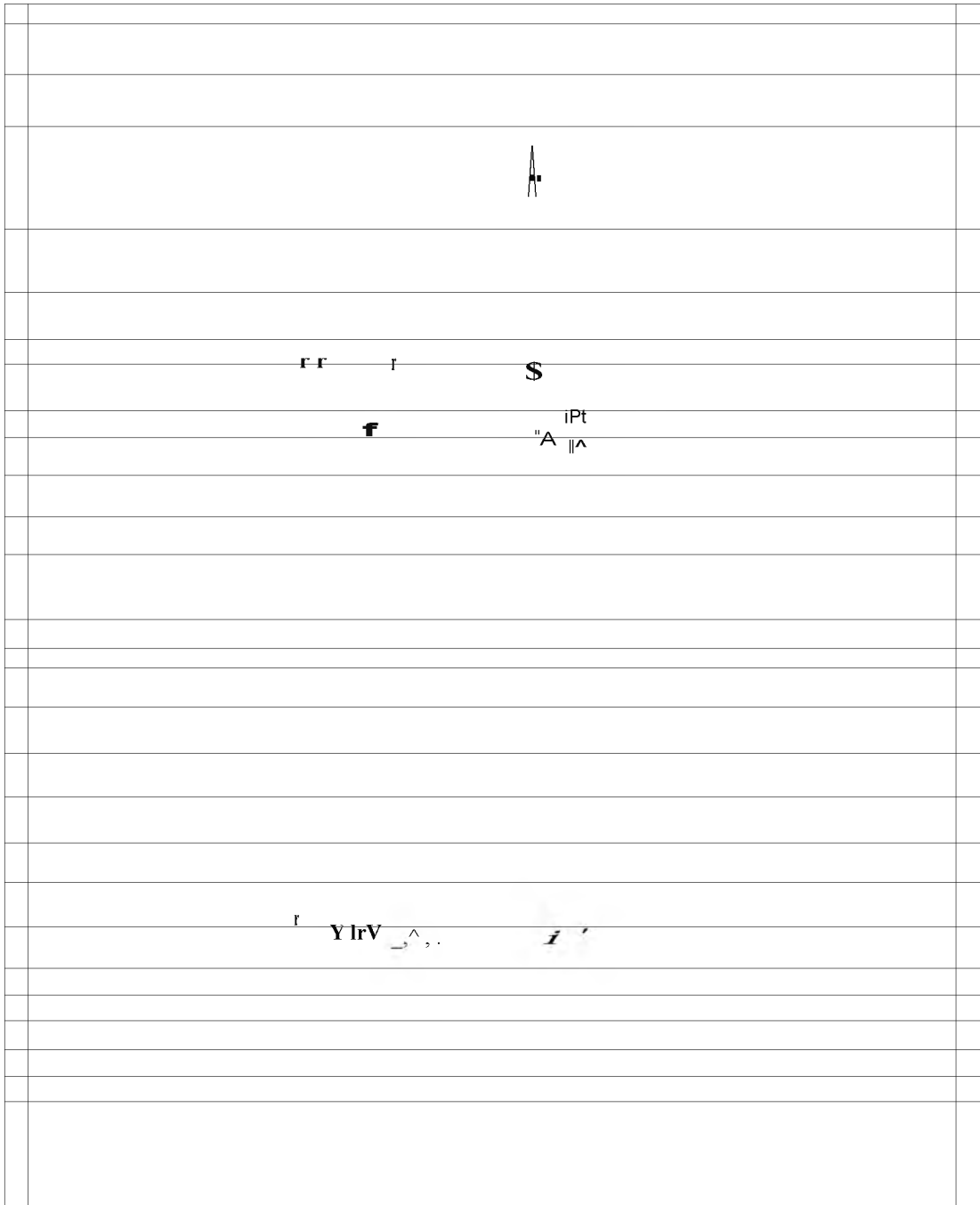
In this study, data was collected from both primary and secondary sources. The primary sources of data were as follows:-

**5.2.1 Primary**: Primary data was collected directly from the farmers, key informants and elites through field survey. Data collected through structured questionnaires. For primary data collection the following techniques were applied

**5.2.1.1 Reconnaissance** survey: The results of the independent study DMG-605 in second semester (spring-2009) depicted that after one and half years farmers could recover 65% of rice production and 37% of land cultivation. When the farmers were on the process to recovery of their agricultural losses, another cyclone Aila hit and destroyed their rehabilitation achievements, either fully or partially. To gather preliminary idea about damage caused by cyclone Aila a visit paid to Sharankhola helped much for designing and finalizing the study questionnaires. Finally, during data collection of the present dissertation a week long visit was paid to the study area from October 12-15, 2009. Ideas and learning through preliminary visit at Sharankhola helped in finalizing dissertation questionnaires and the last visit helped to have an overall idea of the present situation of the study area. While walking through the Embankment along side Balleshawar River, through the village pave and kancha road, or connecting road from Upazila to different village, it was observed that the post Aila agricultural rehabilitation activities were running in full swing at

Sharankhola Upazila. There were green paddy and paddy all over the field. Very near to the houses and by the side of the ponds, even at the edge (aile) of paddy fields still there were several vegetables plots. Pumpkin, bitter gourd was seen hanging on the bamboo made platform (macha).

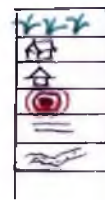
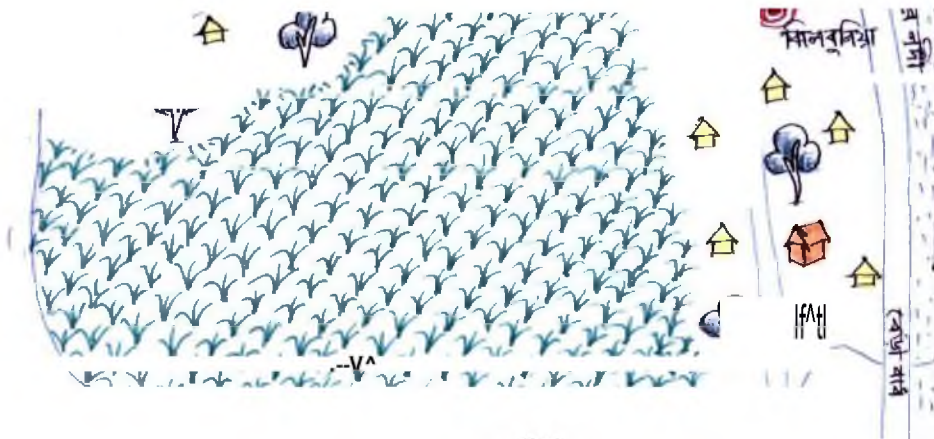
Regarding agricultural damage, small shop keepers and villagers were asked. They replied that during Aila in the field there were seed beds and in few plots there were crops, but in fact most of the winter crops were harvested before Aila attack. Fisheries (pond and chingri gher) were damaged most adversely. On sample basis, sketch map of 4 villages from 4 working unions (one village from each of working union) are placed below.



Map-5: **Dhan** Sagor Union **showing** study village



# রায়েন্দা ইউনিয়ন (ভারবখোলা)



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Map-7: Rayenda Union showing study village





**Map-8: Southkhali Union  
showing study village**

**5.2.1.2 Questionnaire survey for beneficiary** : A total of 201 farmers were selected from 16 villages (4 villages from each **union**). From each of a village 12-13 farmers were sampled and data were collected from them through a designed questionnaire. For necessary information face to face interview was conducted. The questionnaire mostly contained the following major information:-

- a. Occupation and income of family members of the sampled farmers
- b. Dislocation of the families from the village
- c. Early warning, rescue and evacuation of the family
- d. Relief and rehabilitation support received by the family
- e. Social and Economical status before SIDR, after SIDR and at present
- f. Damage to the family due to SIDR and Aila
- g. Item wise crops damage
- h. Seed use in post Aila land cultivation
- i. Post Aila paddy cultivation by variety and sources of receiving seed
- j. Loan facility and farmers orientation on HYV cultivation
- k. Support needed and practically received
- l. Land that farmers could not bring under cultivation along with causes and possible solutions
- m. Production scope of high yielding variety

**5.2.1.3 Questionnaire survey for elites**: Through this questionnaire about 28 elites were interviewed from 16 sampled villages for understanding the following basic elements of the study. The interviewed elites answered in the way to figure out the questions in percentage. The main aspects of the questionnaire were as follows:-

- a. Damage intensity of the village he (elite) resides
- b. Family dislocated from the village
- c. Change of Social or Economical status to any family
- d. Sources of seed collection by the farmers
- e. Support needed and practically received by the farmers
- f. Land could not bring under cultivation, its causes and possible solution
- g. Post Aila crops cultivation by variety
- h. Production scope of HYV



**5.2.1.4 Questionnaire survey for key respondents**: Some (8 eight) key respondents were selected in this study who knew more than others. In this group 2 UP Chairmen, 3 Teachers and 3 local Social workers were given priority to speak. The same questionnaire as used for elites was used in data collection from them.

**5.2.2 Secondary**: Data regarding agricultural damage and rehabilitation activities after cyclone SIDR and damages of agricultural rehabilitation due to Aila were collected from different sources, such as:

**5.2.2.1 Reports, maps, journals and web- sites**: The profile of Sharankhola Upazila and Upazila's total information related to damage by cyclone SIDR and Aila were collected from the reports that they prepared for cyclone SIDR and Aila. Sharankhola map was down loaded from web site. Cyclone tracking map was taken from web site. Damage and rehabilitation information of cyclone SIDR and Aila was derived from several e-journals.

**5.2.2.2 Sharankhola Upazila office**: Sector wise damage and rehabilitation information of Sharankhola Upazila was collected by data collectors during their data collection period, which they generated through form-D (a prescribed form designed by the GoB). They also provided a booklet named "Ghurnijhar 'SIDR' parobarti punarbashan karjokram" and a handout related to Agricultural scenario of the Upazila.

**5.2.2.3 Reports from local NGO offices**: Relief and rehabilitation activities launched by the local and international NGOs after cyclone SIDR and Aila were collected from different NGOs.

**5.2.2.4 Field study report (PPDM)**: Few necessary references related to land use before SIDR, post SIDR crops cultivation is used in this report from the independent study report (DMG-605, PPDM) under BRAC University.

### **5.3 Data Analysis**

At first, all collected data were categorized according to land holding and crop cultivation by variety. Cultivators were aggregated accordingly. The aggregation activities were done by data collectors themselves. In analysis of quantitative data, ratio data scaling method were used and for qualitative data analysis nominal and ordinal scales were used.

## Chapter-6

### Major findings

#### 6.1 Damage and rehabilitation scenario of Sharankhola Upazila

**6.1.1 Information on Institutional damages: Due** to SIDR most of the educational and religious institution was damaged fully or partially but due to Aila institutional damages was mentionable as fewer compare to SIDR. In case of recovery of institutional damages it was found that 100% damages were recovered in case of 5 colleges, 17 high schools, 5 Junior high schools, 27 BRAC schools, 18 Madrashes, and 217 Mosques. But after Aila till the date of data collection for the study no rehabilitation or recovery was made for the institutional damages. (Table-2)

**Table-2 Institutional dams a and rehabilitation scenario of Sharankhola U pazila**

Particulars	SIDR (Figure is in number)			Aila (Figure is in number)	
	Status before SIDR	Damaged	Re-covered	Status before Aila	Damaged
College	5	5	5	5	-
High School	17	17	17	17	-
Junior High School	5	5	5	5	5
Govt. primary School	34	31	3	34	20
Registered Primary School	71	53	18	71	-
Community School	7	5	2	7	-
BRAC School	27	27	27	48	2
Madrasha	18	18	18	18	8
Mosque	217	217	217	300	20
Houses	No information	20,000	No information	No information	6,950

**6.1.2 Information on Infrastructural damages:** 35 km Pucca road, 50 km Kancha road, bridges and 42 km of embankment was damaged due to SIDR which was repaired in post SIDR rehabilitation program. But it is reported by the local people that the embankment was repaired in less height than its original height. During Aila, roads and bridges were reported as not affected but in some places the embankments were seriously damaged.

**6.1.3 Information on damages of Fisheries:** During SIDR 293 chingri gher and 1,006 carp culture ponds were inundated and approximately 319.26 acres of water body were washed away by the storm surge water. As per report provided by the Upazila authority, due to cyclone Aila 255 chingri gher were affected but the number of affected ponds and water body were same as the number of SIDR.

**6.1.4 Information on damage of Poultry and Livestock:** During SIDR in Sharankhola Upazila, 22 buffalos out of 984 and 4,345 cows out of 17,651 were lost, besides 7,132 goats out of 8,642 and 104,422 poultry birds out of 230,200 were reported as lost. In that particular Upazila post SIDR recovery rate was 45% for buffalos, 29% for cows, 67% for goats and 51% for poultry birds. During Aila damage of cattle and poultry birds are seen considerably less than the damage intensity of cyclone SIDR. (Text table-3)

**Table-3 Information on damage of Poultry and Livestock**

Particulars	SIDR			Aila	
	Status before SIDR	Damaged	Recovered	Status before Aila	Damaged
Buffalos	984	22 (2%)	10 (45%)	972	-
Cows	17,651	4,345 (24%)	1,281 (29%)	14,587	22 (0.15%)
Goats	8,642	7,132 (83%)	4,812 (67%)	6,322	245 (4%)
Poultry birds	230,200	104,422 (45%)	53,418 (51%)	179,196	30,659 (17%)

**6.1.5 Information on Crops damage and recovery:** As per the Upazila report of Sharankhola, during SIDR a total of 83% (7,648 hectares) out of 9,200 hectares of land, rice crops (estimated 19,120 metric tons), 78% (196 hectares) out of 250 hectares of Vegetables land, 24% (1,000 hectares) out of 4,140 hectares of fruit land were damaged. Upazila had no such recovery information on rice crops. But post SIDR vegetables cultivation was recovered more than 100%, fruits cultivation was recovered 24% and damage of trees were recovered 100% by planting new tree plants. In cyclone Aila 60% (12 hectares) rice crop land out of 20 hectares, for vegetables 43% (81 hectares) out of 190 hectare, for fruits 10% (400 hectares) of land were damaged; here also the damage due to Aila was very less compare to the damage of

cyclone SIDR. The post Aila recovery of paddy and vegetables damage was more than 100% and 79% respectively. (Table-4)

**Table-4 Information on Crops damage and recovery**

Crops	SIDR			Aila		
	Land cultivated (in hectare)	Damage	Recovered	Land cultivated (in hectare)	Damage	Recovered
Paddy	9,200	7,648	-	20	12	-
Vegetables	250	196	300	190	81	-
Fruits	4,140	1,000	1,000	4140	400	-
Trees	2,120	450	450	-	-	-

## 6.2 Damage and rehabilitation scenario of the sampled family

### 6.2.1 Asset damage and recovery status of the farmers' families

The intensity of asset damage due to cyclone Aila compare to cyclone SIDR was negligible. The asset damage intensity of cyclone SIDR was about 80% and the intensity was more in terms of poultry birds, fisheries, houses and boat & nets of the farmers' families, whereas this damage was found quite less and in a negligible amount due to cyclone Aila. The damage intensity by cyclone Aila, in terms of property loss it was found almost 20% or less in all sectors except fisheries. In case of recovery status, it was found that during the post SIDR rehabilitation activities the farmers families could recover very little of their losses except personal belongings and utensils. The recovery of personal belongings and utensils were highest. But during post Aila rehabilitation activities recovery of damages and losses were very poor except in housing sector.

If anybody looks into the asset holding/status by the sampled family before Aila it could easily be perceived that the family could not fully replace/recover their lost/damaged assets even after one and half years of SIDR. Meantime they faced another devastating cyclone, that time they had to loss some of their remaining assets which they could not replace after six months of cyclone Aila. (Table-5)

Table-5 Asset **damage to the families due to cyclone SIDR & Aila and the status of recovery**

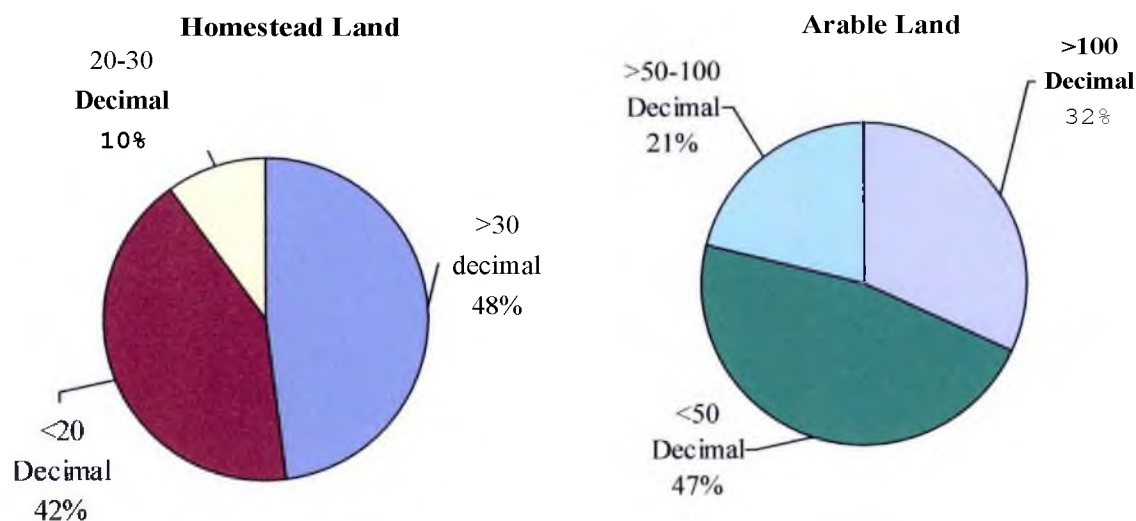
Asset		During SIDR			During Aila		
		Status before SIDR	Damaged	Re-covered	Status before Aila	Damaged	Re-covered
Buffalos/cows		441	122 (28)	19(16)	305 (69)	3 (1)	
Goats/sheep		262	162 (62)	40(25)	126 (48)	16 (13)	-
Poultry birds		6,103	4,823 (79)	304 (6)	2,855 (47)	686 (24)	-
Fisheries	Water body	4,478	4,165 (93)	53 (1)	3,897 (87)	1,729 (44)	-
	Production	25,119	23,622 (94)	835 (4)	7,818 (31)	5,542 (71)	-
Personal belongings		420	257 (61)	131 (51)	372 (76)	-	-
Utensils		1,944	1,246 (64)	395 (32)	1,312 (67)	-	-
Pucca houses		11	9 (82)	4 (44)	6 (55)	-	-
Tin shed houses		213	179 (84)	91 (51)	181 (85)	5 (3)	3(60)
Thatched houses		270	255 (94)	64(25)	218 (81)	7 (3)	1 (14)
Trees/plantation		39,037	17,626 (45)	310(2)	19,788 (51)	340 (17)	-
Livelihood assets	Boat/net	32	31 (99)	8 (26)	11 (34)	-	-
	Rick/Van	19	14 (74)	4(29)	9	-	-
	P.tiller/Pump	21	15 (71)	5 (33)	13	-	-

**N.B: Figures in parenthesis indicates percentages**

#### 6.2.2 Agricultural **Damage** (crops)

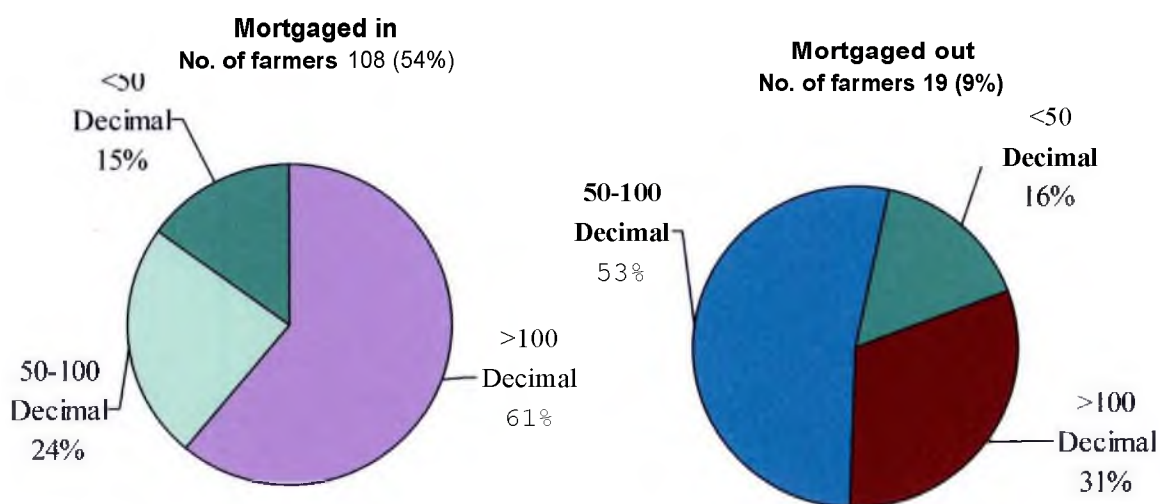
6.2.2.1 Land **holding** by the **sampled farmers**: From the following distribution chart of farmers' own land, the data depicted that majority 48% sampled farmers have more than 30 decimal (1 decimal=40 sq. meter) of homestead land and 42% farmers have less than 20 decimal of homestead land and the other have in between. In regards to ownership of cultivable land of the sampled farmers it was found that the majority (32%) farmers have more than 1 00 decimal of arable land and the rest have less than 100 decimal of arable land. 47% farmers were found with less than 50 decimal of own arable land. (Graph-1)

**Graph-1: Land holding by the sampled farmers**



6.2.2.2 **Information on mortgaged land:** According to the information from the following chart it was found that 54% (108) of sampled farmers took arable land lease from others for crops cultivation and another 9% (19) farmers mortgaged out their arable land to others. One point is clear that most of the sampled farmers are poor, they have little amount of arable land for cultivation, so that they took land lease from others. (Graph-2)

**Graph-2: Information on mortgaged land**



### 6.2.2.3 Land damaged to the farmers due to super cyclone SIDR and Aila:

Immediate before SIDR the sampled 201 farmers cultivated Aman crops in 195.37 hectares of land and the tentative productions of crops projected to be yielded was 620.87 metric tons. The damage due to super cyclone SIDR was devastating in agricultural sector as 89% of crops were damaged. The estimated market price of the damaged crops were calculated to be approximately BDT 6.7 million; per farmer 0.033 million.

Immediate before the strike of cyclone Aila there were seed bed and late winter (boro) crops in 41.92 hectares of land in the field. Due to cyclone Aila 60% (25 hectares) of crops land was damaged. And crops damage was estimated to be BDT 1.78 million (0.0088 million/farmer). It is to be mentioned here that during winter crop cultivation farmers face salinity problem and scarcity of sweet water in crop cultivation. (Table-6)

Table-6: Land damaged to the farmers due to super cyclone SIDR and Aila

During SIDR				During Aila			
Land Cultivated		Damaged		Land Cultivated		Damaged	
In	Tentative	In	Production	In	Tentative	In	Production
hectares	product	hectares	(MT)	hectares	production	hectares	ion
	ion				(MT)		(MT)
	(MT)						
195.37	620.87	174.53	481.11	41.92	152.36	25	129.02
		(89%)	(77%)			(60%)	(85%)

**6.2.2.4 Crops damage due to cyclone SIDR and Aila :** By analyzing item wise crops data it was found that during SIDR there was Aman crops and summer vegetables (Bitter gourd, pumpkin etc.) in the field. During summer farmers cultivate more land for Aman paddy and less amount of land for vegetables. Immediate before SIDR farmers cultivated 96% (184.79 hectares) land for Aman crops and 4% (8.34 hectares) of land for summer vegetables. On the other hand during Aila farmers cultivated winter crops and at that time it was almost the end of winter harvesting so, the farmers were taking preparation for Aman seed bed. At that time there was boro paddy in some 21.62 hectares of land, seed beds and a total of 12.55 hectares of winter vegetables in the field. It was noticeable that land cultivation immediate before Aila was only about 18%; naturally the damage amount due to Aila was less than SIDR. As it was mentioned before that for salinity problem and scarcity of sweet water

farmers could not bring their all arable land under winter boro crops cultivation. But whatever farmers attempted in crop cultivation immediate before Aila, cyclone Aila destroyed everything. (Table-7.a & 7.b)

**Table-7.a: Crops damage due to cyclone SIDR**

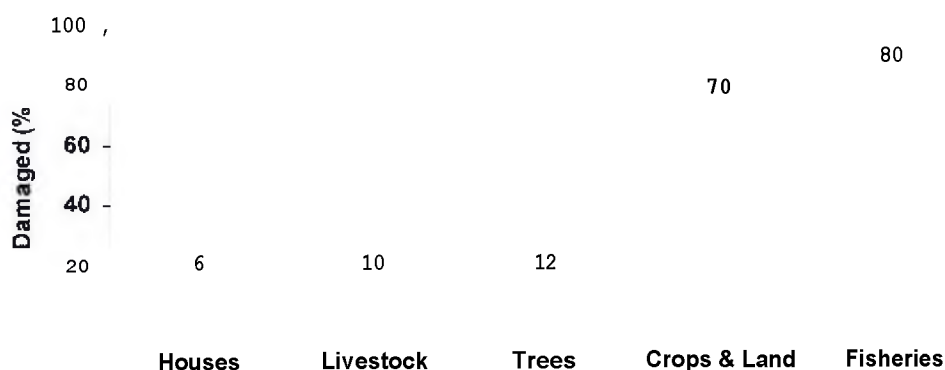
Name of Union	Paddy cultivation			Vegetable cultivation		
	Land (hectare)	Land (hectare)	Production (MT)	Land (hectare)	Land (hectare)	Production (MT)
Rayenda	52.55	43.20	112.22	1.92	1.92	20.19
Southkhali	46.32	46.32	70.41	0.74	0.74	9.30
Khontakata	38.95	35.43	105.32	4.52	4.52	50.83
Dhansagar	46.96	42.67	91.99	1.16	1.16	12.17
<b>Total</b>	<b>184.78</b>	<b>167.61</b>	<b>379.94</b>	<b>8.34</b>	<b>8.34</b>	<b>92.49</b>
		(91%)	(BDT 5.65 million)		(100%)	(BDT 122million)

**Table-7.b: Crops damage due to cyclone Aila**

Name of Union	Paddy cultivation			Vegetable cultivation		
	Land (hectare)	Land (hectare)	Production (MT)	Land (hectare)	Land (hectare)	Production (MT)
Rayenda	10.87	9.30	39.3	4.84	4.29	26.3
Southkhali	7.89	7.89	43.57	1.55	1.55	6.2
Khontakata	2.45	2.45	1.21	2.15	2.15	18.5
Dhansagar	0.40	0.40	1.4	4.01	3.94	39.7
<b>Total</b>	<b>21.61</b>	<b>20.04</b>	<b>85.48</b>	<b>12.55</b>	<b>11.93</b>	<b>90.7</b>
		(93%)	(BDT 1.45 million)		(95%)	(BDT 1.15 million)

**6.2.2.5 Damage as per assessment of elites and key informants:** From the statement of elites and key informants it was revealed that about 6% of houses, 70% of standing crops land were damaged due to cyclone Aila. Livestock were damaged about 10% and fisheries were damaged about 80%. (Graph-3)

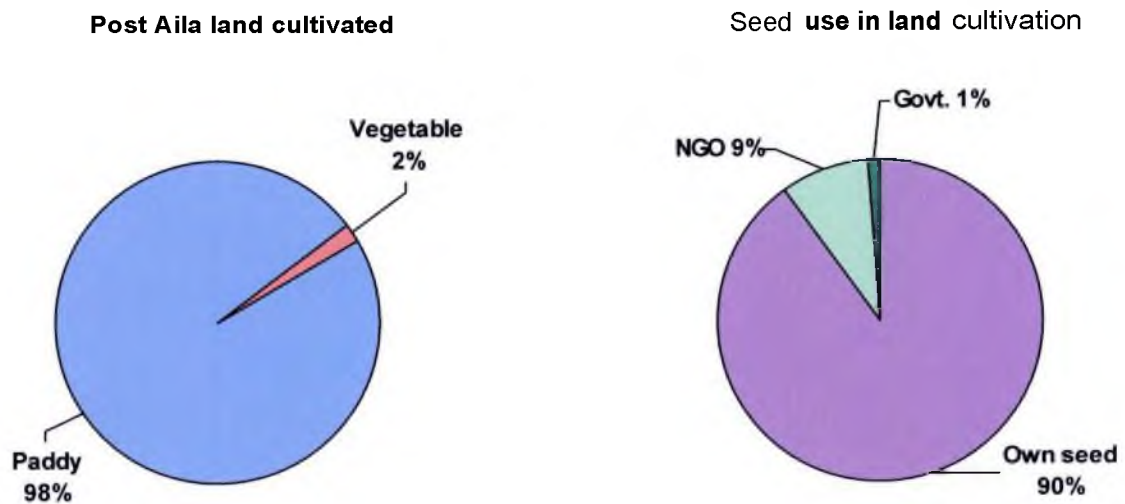
**Graph-3: Damage as per assessment of elites and key informants**





**6.2.2.6 Seed used by the farmers in post Aila Aman and vegetable cultivation:** In the present on going Aman crops cultivation, farmers have cultivated Aman paddy in 98% (160.55 hectares) of land and vegetables in 2% (3.61 hectares) of land. In paddy cultivation 91% of total seed were used by the farmers own and 9% was NGO supported. In vegetable cultivation 59% seeds were used of their own and 41% were NGO supported. Farmers received Government seed only for 0.50 hectare of land. (Graph-4)

**Graph-4: Seed used by the farmers in post Aila Aman and vegetable cultivation**

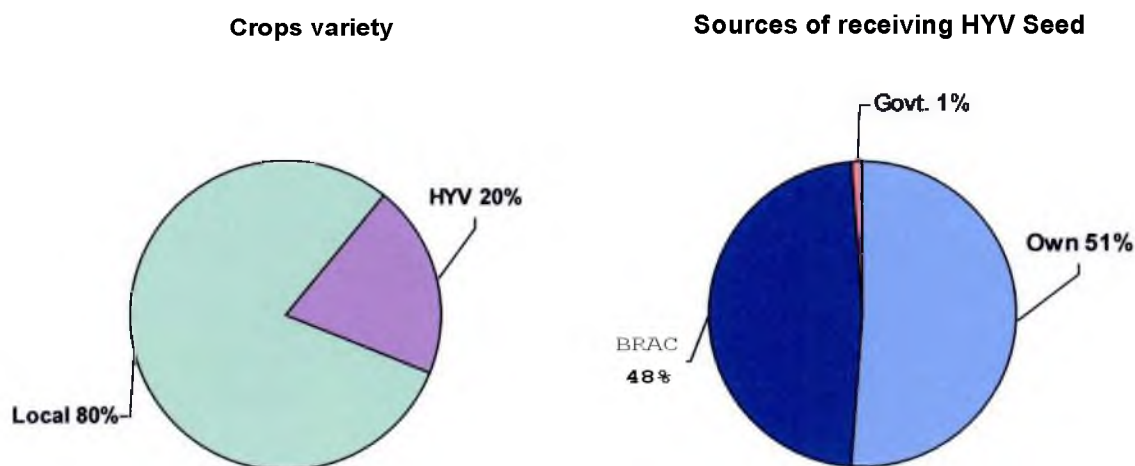


**6.2.2.7 Post Aila crops cultivation by variety and sources of seed collection:** In sampled 16 villages, observed 201 farmers cultivated local Aman in 80% (130.70 hectares) of their land and HYV variety in 20% (32.28 hectares) of their land. The HYV varieties were BR-11 and BR-22. For HYV variety sources of seed collection were farmers own 51 %, the highest and the second highest (48%) was BRAC provided seed. Government supported the farmers with 1% HYV seed in this regard. (Graph-5)



**Photograph-5: Paddy by BRAC Provided HYV Seeds**

Graph-5: Post Aila crops **cultivation** by variety **and sources** of seed **collection**



**6.2.2.8 Post Aila crop cultivation : support needed and practically received: All** (201) sampled farmers were asked about the support they needed during and before Aman crops cultivation. Farmers mentioned that they needed support regarding seeds, fertilizer, **tilling**, irrigation and pesticide. But practically they received seed, fertilizer and tilling support at very negligible (11% to 13%) amount from NGOs and Government. Farmers had to manage all the remaining supports by their own efforts. Farmers did not receive any support related to pesticide and irrigation from any where. (Table-8)

**Table-8: Post Aila support needed and practically received by the farmers**

Support needed	Required	Practically received	Own managed
Seed (in Taka)	243,604	13%	87%
Fertilizer(in Taka)	346,141	12%	88%
Tilling (in Taka)	597,485	11%	89%
Pesticide (in Taka)	207,365	-	100%
Irrigation (in Taka)	Not mentioned	-	-

**6.2.2.9 Production** scope of HYV **in the area**: Data revealed that almost 95% of total arable land of the farmers could be brought under HYV cultivation. Farmers opined that they are interested to cultivate BR-11, BR-22 and BR-23 in their fields. Regarding the constraint in cultivating HYV in their fields, the farmers identified the following obstacles:

- 0 Saline water

- Natural disaster
- Financial problem
- Water logging
- Low height embankment
- Scarcity of quality seed
- Scarcity of quality pesticide

6.2.2.10 HYV **crops cultivation opportunity as per opinion of elites and key informants**: The respondents (elites and key informants) opined that in Boro season the HYV crops cultivation opportunities were 20% and in Aman (summer) season it was 100%. In regards to constraint of HYV cultivation they mentioned about salinity problem, scarcity of sweet water, necessary equipments, water logging and intrusion of saline water due to broken embankment & sluice gate, quality seed, fertilizer, pesticide and finance. Regarding overcoming of these problems they recommended several suggestions such as: Arrange reservoir for preservation of sweet water, repairing of embankment & sluice gate, ensuring quality seeds and agricultural equipments. (Table-9)

Table-9: HYV crops **cultivation opportunity as per opinion of elites and key informants**

HYV crops cultivation opportunity		Constraints in HYV cultivation	Suggestions for overcoming of these problems
Boro (winter)	Aman (summer)		
		• Salinity	• Digging of canal
		• Scarcity of sweet water	• Construction and repairing
		• Scarcity of irrigation	of dam and sluice gate
		• Scarcity of quality seeds and agricultural equipments	• Ensuring quality seeds, fertilizer, pesticide
20%	100%	• Scarcity of fertilizer and pesticide	• Ensuring agricultural equipments
		• Scarcity of finance	• Ensuring water reservoir, pump, and spray machine
		• Broken dam and sluice gate	
			• Training on HYV cultivation

### 6.3 Assessment of the status of farmers ' families

6.3.1 **Income status of farmers ' families**: From the following table it is revealed that at present the majority (52%) of farmers' families became economically more vulnerable compare to pre SIDR condition. The post SIDR vulnerability compare to pre SIDR was 49%. But after Aila this rate was considerably reduced into 24% from

post SIDR status (49%), it might have happened due to post SIDR farmer's intensive effort and relief & rehabilitation activities. (Table- 10)

**Table- 10: Distribution of farmers as Der fami**

Particulars	Distribution of farmers' as per family income		
	Post SIDR status compare to pre SIDR	At present status compare to post SIDR	At present status compare to pre SIDR
Remained same	84 (42%)	127 (63%)	73 (36%)
Became better	19 (9%)	23 (12%)	23 (12%)
Became worse	98 (49%)	51(25%)	105 (52%)

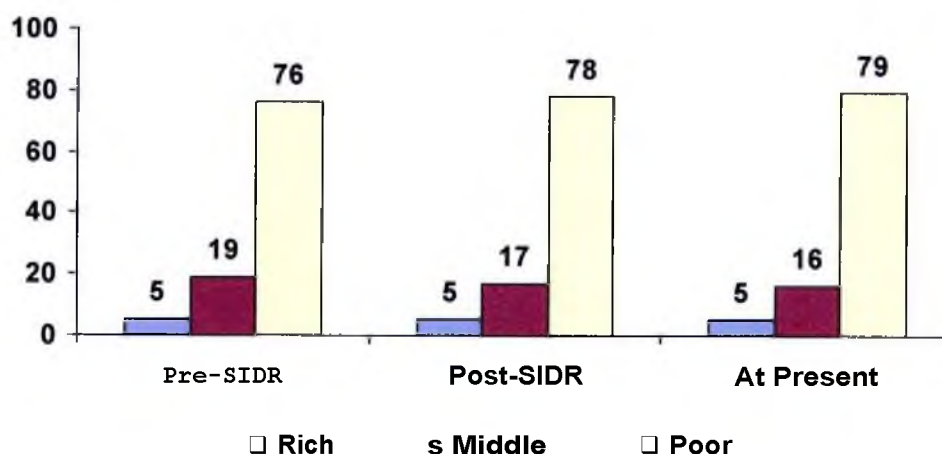
**6.3.2 Social status of farmers' families:** The following table shows that the number of hard core poor had gradually increased from pre SIDR to post Aila (at present) and similarly the number of lower middle class family had considerably decreased at present compare to post SIDR status. (Table-11)

**Table-11: Distribution of farmers' famil**

Social status	Before SIDR	Post SIDR	After Aila (at present)
Rich	3	2 (67%)	2 (67%)
Middle	81	20( 5%)	32 (40%)
Lower middle	85	90 (106%)	83 (98%)
Poor	27	73 (270%)	63 (233%)
Hardcore poor	5	16 (320%)	21(420%)

**6.3.2.1 Opinion of elites and key informants:** The elites and key informants were asked about the social and economical status of the farmers' families were asked about 3,600 households of 16 sampled villages. From their opinion it was found that the number of rich family remained unchanged even after two consecutive events. But 1-2% middle class families changed into poor families in both cyclones SIDR and Aila respectively. (Graph-6)

**Graph-6: Social status of the families of sampled villages**



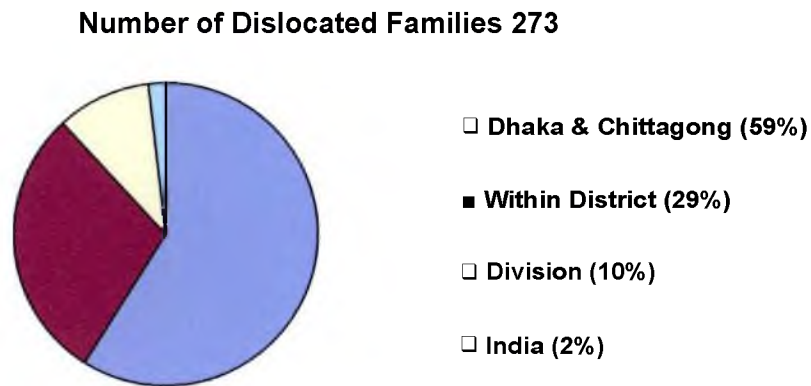
**6.3.3 Occupational change in farmers' families due to consecutive cyclone:** The following table showed that in the sampled 201 farmers' family there were 1,006 family members. In the farmers' families, number of farmers increased by 2% in post SIDR and this number was found as remain same during post Aila period. It was also found that the trading and fisheries occupation has decreased in post SIDR and the occupation of agriculture wage labor has increased. Service holder occupation increased gradually from pre SIDR to post Aila, rick/van puller and fishing occupation was found as remain same in both post SIDR and post Aila. The majority of family members in the farmers' families were found as children, aged person, students and house wives. (Table-12)

**Table- 12: Occupational change in farmers' families due to cyclone S1 DR and Aila**

Occupation	Before SIDR	Post SIDR	Post Aila (at present)
Farmer	189	193 (102%)	193(102%)
Agriculture wage labor	19	28 (147%)	26 (137%)
Trading	17	13 (76%)	14 (82%)
Service	23	25 (109%)	29(126%)
Fishing	24	16 (67)	16 (67)
Rick/van puller	22	24 (109%)	24 (109%)
Driver	-	1	1
Others (child, old, student and house wife)	712	706 (99%)	703 (99%)

**6.4 Dislocation of families from the villages due to consecutive cyclone:** According to the information provided by elites and key informants it was found that in total 273 families/persons from sampled villages were dislocated to different places due to cyclone SIDR and Aila. The mentionable major places of migrations were Dhaka and Chittagong 59%, within the district 29% and India 2%. (Graph-7)

**Graph-7: Dislocation of families due to consecutive cyclone**



### 6.5 Early warning and rescue during cyclone Aila

**6.5.1 Early warning:** It was found that 100% of sampled families received early warning. As per their **statement** it was known that 70% of them received warning in the same day of cyclone hit and 30% received warning message before 1-2 days of cyclone. Sources of receiving early warning **message** was multiple, of those miking was the highest (62%), and second highest was radio and TV 33% and 31% respectively. All (100%) of them understood the warning message clearly.

**6.5.2: Rescue and responses during cyclone Aila by the respondent:** During cyclone Aila only 21% took shelter at different cyclone shelters. It was observed that most of them (79%) did not leave their houses; they resided at their own houses because they were not interested to leave their properties and belongings unsafe. In saving lives of the family members 74% of the house hold members themselves saved their own lives and properties, in this regard 26% relatives joined with them to save

their lives and properties. It was observed that they could not save only 4% of their livelihood based properties. (Table-13)

**Table-13: Early warning , rescue and responses during cyclone Aila**

Early warning before cyclone Aila			Rescue and responses during cyclone Aila						
Received early warning message	Period of receiving message		Took shelter during cyclone				Involved in rescuing lives and saving properties		Could not save family belongings
	Same day	1-2 days before	Cyclone shelter	Own house	Relatives house	Others	Self/family members	Relatives/neighbors	
201	140	61	43	144	8	6	149	52	8
(100%)	(70%)	(30%)	(21%)	(72%)	(4%)	(3%)	(74%)	(26%)	(4%)

## 6.6 Findings and survival model

Asset recovery rate through getting assistance after SIDR was 51% for tin shed houses and personal belongings, 32% for utensils, 25% for thatched houses and goats respectively, and 16% for cows mainly. Analyzing the status of family income it was clear that 12% of the affected households walked in the better income group compared to pre SIDR income condition of the families and in post SIDR it was 9%. Gradual improvement happened here. Besides, economic condition of 14% poor and 8% of the lower middle class families were improved after Aila compared to post SIDR status. Findings indicate that repeated efforts against repeated disasters helped in reducing cumulative loss and impacts, and thus, the findings support the survival model mentioned below:

## Disaster **and assistance**: A survival model

Community at normal stage	Single hazard	Community affected	
Hazard repeated	Close to normal state	Rehabilitation program	
Community affected again	<b>Further rehabilitation program</b>	Close to <b>normal state</b>	Community <b>Institution</b>
<b>Policy recommendation and formulation</b>		Supports provided	Organization

Remove vicious state



## Chapter-7

### Major Problems and Constraints

The kind of data was collected by adopting several techniques, such as: spot meeting, FGD, face to face interview with the farmers, elites and key informants. In this regard observation techniques were also used. According to the respondents opinion they mentioned about the following problems as major hindrance in HYV cultivation. Problems lying with the community are given below:

#### 7.1 In agriculture sector

- During winter farmers could bring only 20-25% of total arable land under Boro cultivation, but in summer crop (Aman) cultivation it increased up to 80%. So, a big portion of land remain uncultivated due to a number of factors, which as per statement of the respondents are as follows:
  - i) Surface and soil Salinity
  - ii) Scarcity of sweet water
  - iii) Scarcity of irrigation facility
  - iv) Lack of salt resilient seeds and agricultural equipments
  - v) Scarcity of fertilizer and pesticide
  - vi) Scarcity of low interest and interest free loan
  - vii) Broken dam and sluice gate
  - viii) Water logging
- Besides shortage and non availability of qualitative seed, timely supply of fertilizer and other agricultural inputs are the main barriers in cultivation.
- In winter Boro crops and vegetables cultivation, salinity is the main problem to bring their land under proper utilization.
- At present post Aila Aman crop cultivation, farmers mostly have cultivated local variety rather than HYV, and it is because lack of HYV seeds at their reach. Only

BRAC was found providing HYV paddy and vegetable seeds to the farmers in the locality.

- Upazila Agriculture Officer told that they need repairing of some sluice gates as an emergency basis, but due to lack of fund they could not do anything in this regard.
- Respondent farmers, elites and key informants told that in many places the dam is of low height, so, it is essential to raise the height.
- In recent cyclone Aila dam in many places were broken which needs immediate repairing.
- Dam to be retrofitted in the way so that it is built stronger and protected from strong storm surge occurs due to cyclone.
- For storing sweet water and irrigation facility, especially, during Boro crop cultivation canals to be excavated and dug out immediately.

### 7.2 Emergency **relief and rehabilitation activities**

- Usually it happened that hard to reach people did not receive relief immediately, because most of the relief teams were found to be interested in exhibiting their activities in public media. As a result what happens; those who reside by the side of the dam or main road they receive relief repeatedly.
- Most of the time lack of proper coordination and need assessment is found regarding item selection and distribution. Some times the victims receive undesired items rather than essential one.
- In practice, still big gap is found in the selection and distribution process of beneficiaries. Most of the time monitoring and follow-up system is found as weak.

### 7.3 In awareness level

- Faulty warning destroys people's confidence on disaster warning, because there was a warning of tsunami immediate before SIDR but no tsunami occurred. During that warning many people took shelter in the cyclone shelters, and they found no **tsunami**. As a result during cyclone SIDR people did not believe the early warning rather they thought it was false and stayed at home.

- People gave less importance to the warning message.
- For psychological shock most of capable people became nervous and could not take proper decision in quicker process when they were in danger.
- Still people are dependent on the kindness of God or dependent on their destiny.
- Most of the people do not move from their dwellings least their valuable belongings are stolen. They stayed at home as safe- guard of their properties.

#### 7.4 Rules of some NGOs **are not Pro-poor**

- Most of the families could not receive housing assistance due to non- fulfillment of the criterion set by the donors/NGOs. For example, during post SIDR it was found that if one person could manage /spend Tk. 30,000 he/she received Tk 90,000. as housing assistance. This impractical condition created adverse impact on the poor.

#### 7.5 Cyclone **shelter**

- The numbers of cyclone shelters are insufficient. The accommodation space of existing shelters is quite inadequate for large number of population. So it requires more shelter to be constructed and apart of that, Government and NGOs should take initiatives to build more cyclone shelters in the coastal belt.
- At present, there is no shelter (Killa) for livestock and that makes people reluctant to leave their home.
- The cyclone shelters became over crowded during disaster and some people could not enter the shelter so they had to return to their homes.

## **Chapter- 8**

### **Recommendations**

It is derived from the present study that farmers could not bring their full land under cultivation, especially during winter Boro crop cultivation. In this season they could bring at best 20% land under Boro cultivation, and in summer crop cultivation though they cultivated more land, but not 100%, and it is due to salinity problem, scarcity of sweet water for irrigation during winter Boro crops. There were some other causes behind the untilled land, such as: scarcity of quality seeds, fertilizer, insecticide, agricultural equipment, training on modern and HYV technology and non-repairing of the broken dams. The study recommends the following for full restoration of agricultural based activities, full land coverage for cultivation, for larger scale cultivation of HYV crop, and to bring back a better situation in this sector.

#### **8.1 Agricultural crops**

- Canals to be excavated and dug, so that rain water can be stored for substantial use in paddy cultivation. Under this condition of storing fresh water, the farmers could go for extensive winter crop cultivation and could bring almost all their arable land under cultivation.
- Salt tolerant seeds to be introduced. In this regard Bangladesh Rice Research Institute (BRRI) has developed salt resilient crops seed for coastal belt area. In some part of the south-western region of Bangladesh farmers have already introduced this type of variety in their crop cultivation.
- Most of the farmers in coastal belt areas are habituated in traditional method of cultivation and rely on the kindness of God for good production. By adopting modern technology the farmers will be able to cultivate their land quicker than by using the traditional (bullock plough) method. Farmers can grow more by using quality seeds, timely fertilizer and insecticide in proper dose. Now it is necessary to disseminate the message among the farmer about the benefits of high-yielding varieties, its quicker and high productivity by demonstration.
- Recovery and rehabilitation activities are to be arranged in the way so that agriculture gets priority.

- Changes to be brought into the whole community to grow more crops through HYV cultivation in the cyclone affected areas.
- Necessary Training/orientation to be arranged for farmer communities about cultivation of high yielding varieties, use of proper dose of fertilizer and pesticide.
- At an emergency basis steps to be taken to repair or retrofitting of sluice gates and the broken dams and to raise the height of embankments.
- Steps to be taken to ensure quality agricultural inputs (seeds, fertilizer and pesticide etc.) and equipments (power tiller, pump and spray machine etc.).
- Intensive coastal forestation, especially beside embankments is mostly needed to protect strong storm surge. The kind of trees to be planted that are deeply rooted to the earth.

## 8.2 Warning message and response

- **Study findings depicted that most of the respondents received warning message on the day of the cyclone hit, the Government should be more active in this regard so that the people can get warning message earlier.**
- **It was also found that more than 70% of the respondents did not leave their house, because least they loss their properties . In this regard Government and NGOs have role to ensure protection of their properties and to ensure shelter in cyclone shelters.**

## 8.3 Emergency relief and rehabilitation

- For strengthening the relief & rehabilitation activities and ensuring fare selection & distribution, monitoring and follow up system to be strengthened.
- Relief team requires more dedication and hard work in visiting hard to reach areas for ensuring emergency relief in equal basis.

#### 8.4 Cyclone **shelter**

- More shelters at dense spatial frequency are proposed. Shelters should be close to the community.
- Houses can be retrofitted and home land can be elevated and for this purpose families should be provided interest free loan.
- Considering the budget constraint, more shelters of smaller size will be preferable than less number of larger sized cyclone shelters.
- There should be provision for keeping the livestock in the shelter premises, safe drinking water supply and sanitation system should be ensured as well.
- For the proper management of the shelters it should be institutionalized during the non disaster period and can be used as schools, community centers and can also be leased out to NGOs.

#### 8.5 More **research**

- More scientific and social researches are required to be conducted in the affected areas for proper diagnosis of soil condition and to identify the suitable crop varieties in the salinity prone area.
- Interestingly a large number of farmers in the study area are share croppers, so research to be carried out to find out the cost benefit of share croppers and whether it is their first option as an occupation.
- Study on dislocated families due to cyclone SIDR and cyclone Aila should be conducted to know about their present condition.
- A study inclusive all sectors and all sub sectors should be carried out to know the actual damages and problems which might help in policy recommendations.

## Chapter-9

### Suggestions for Implementation of Recommendations

Suggestions on the basis of problems and recommendations are given in the following matrix:

**Table- 14: Recommendation, suggestion, and policy implication :** A matrix

Recommendation	Suggestion	
	How to implement?	Policy implication
Meeting crisis effectively	Search and rescue:	- Arrangement of fund for meeting crisis
	- Selecting and preparing the list of the affected areas and people on faster and priority basis	- Utilization of regional development funds
	- Provide support to meet crisis on priority basis	- Standing order
	- Maintain proper monitoring and follow up	
	- Review and implement strictly	
Supporting livelihood	- Preparing the list of affected households in discussion with community people on priority basis	- Employment for the victims
	- Ensure employment in cooperation with both government and non-governmental initiatives like: food for work, work for SOS etc.	- Intra-inter governmental efforts
	- Monitoring and follow up	
	- Review and implement	
Supporting means of production	- Survey and prepare the list of areas to be focused	- Intensification to agricultural production in affected areas
	- Ensure suitable seeds through accepted networks	- Intra-inter governmental efforts
	- Ensure fertilizer through accepted networks	- Standing order
	- Ensure irrigation through proper water-shed management including digging canals as needed	
	- Ensure necessary capital through easy loan with affordable payback system	
	- Ensuring technical know-how	
	- Monitoring and follow up	
	- Review and implement	

Recommendation	Suggestion	
	How to implement?	Policy implication
Ensure continuity of education	- Survey on quicker basis	- Ensuring continuing education
	- Prepare the list of affected areas to be focused	- Intra-inter regional cooperation
	- Employ necessary logistics	
	- Monitoring and follow up	
Ensure effective early warning system	- Review and implement	
	- Accurate Forecasting	Functioning early warning system with integrated approach
	- Designing the message with understandable language for dissemination	
	- Designing the channel of dissemination to ensure full coverage	
Ensure suitable embankment	- Monitoring and follow up	
	- Review and follow up	
	- Mapping physical status	Strengthen coastal embankment with intra-inter regional efforts
	- Designing for the suitable embankment for long term longevity	
Ensure adequate and proper water-shed management	- Ensure embankment with level of safety	
	- Needs assessment with surveying the existing water bodies (ponds, canals, rivers, etc.)	Water-shed management with intra-inter regional cooperation
	- Ensure renovation and new set up as necessary	
	- Ensure preservation and proper utilization of rain water	
Ensure adequate and proper shelter management	- Monitoring and follow up	
	- Review and implement	
	- Survey and capacity assessment	Shelter management with intra-inter regional cooperation
	- Planning for sufficient shelters considering both human and non-human aspects at suitable locations	
	- Set up target	
	- Monitoring and follow up	
	- Review and implement	
<b>Above all political commitments are needed very much for both policy formulation and proper implementation of successful disaster management</b>		



## Chapter-10

### Conclusion

Bangladesh is critically vulnerable to climate-induced hazards, but the core elements of its vulnerability are primarily contextual. The country also lies in a very active cyclone corridor that transects the Bay of Bengal.

Our economy, economy based activities, and food supply mostly depends on agricultural sector. It has decade over experience in facing natural disaster and hazards, like cyclone, flood and earthquake and so forth. For these calamities, sufferings of people are beyond description. Adaptation and coping mechanism needs to be ensured along with assurance of food security to minimize this hazard. Bangladesh has to be self reliant in food production for reducing dependency on foreign aid.

India, China and Japan resettled their economy within 12 months of disaster. Government of those countries keeps sufficient money in their annual budget for recovery activities, but the Government of Bangladesh has to depend on foreign aid to meet-up recovery expenses. Even after passing of almost more than two years of cyclone SIDR, and six months of cyclone Aila, people could not fully employ themselves in economic based activities; they could not utilize their total land for agricultural production. Rather, people were found to be changed their occupation in some other sectors and waiting for relief and external assistances for livelihoods.

In this regard all related problems and constraints in cultivation to be minimized and possible cases to be eradicated by identifying the problems pertaining to the agricultural crops cultivation, such as: salinity, quality seeds and equipment supply, dredging and digging of canals for storing rain water, construction and repairing of dam and ensuring financial support with lenient condition is needed to be ensured for the farmers.

It has been observed that the people have great interest to cultivate high yielding variety crops, and there a good scope has been created in the locality of south and southern-western area of Bangladesh to introduce hybrid rice and vegetables cultivation and use of modern technology. BRAC is performing the leading role in bringing change in cultivation and crops pattern; from traditional to modern. By promoting hybrid seeds, Government as well as NGOs can bring radical change in cultivation and crops pattern.

Flood resilient crops and quality seeds of high yielding varieties should be ensured as easily available to the farmers so that they can introduce the technology timely and properly and thus can contribute to the national food security.

# Appendices

# Appendix-A: Questionnaire for Upazila Total Assessment of Damage Due to Aila of post SIDR Agricultural Rehabilitation : Insights from Sharankhola

## Part-A (Upazila Total)

### Information on Upazila total:

#### 1. General Information

a. Name of Upazila: Sharankhola:

b. Total no of Unions: 04.

c. Total no Villages: 44.

d. Total no H/Hs: 28,800

e. Total no of population: 1,37,615

Male: 71,61

Female: 66,004

Total: 1,37,615

#### 2. Institutional Information (Figure will be in number)

Sl. No.	Particulars	SIDR			Aila		
		Status before SIDR	Damaged (Number)	Recovered (Number)	Status before Aila	Damaged (Number)	Recovered/ recovering (Number)
1	College	5	5				
2	High School	17	17	17	17		
3	Junior High School	5	5	5	5	5	
4	Govt_ primary School			2	3	2	
5	Registered Primary School	53	53				
6	Community School	5	5	5		-	
7	Satellite School						
8	Vocational School						
9	BRAG School			2	2	2	
10	Madrasha				2	P	
11	Mosque	7	7	2	0		
12	Temple						

B PS

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## 5. Information of land and crops

Crops	SIDR						Aila					
	Land cultivated (in hectare.)	Tentative pro. (in ton)	Damage		Recovered		Land cultivated (in hectare.)	Tentative pro. (in ton)	Damage		Recovered/Recovering	
			Land (in hectare.)	Pro. (in ton.)	Land (in hectare)	Pro. (in ton.)			Land (in hectare.)	Pro. (in ton.)	Land (in hectare.)	Pro. (in ton.)
Paddy	200	23,004	99	3,120	-	-	90	90	12	36	10	-
Wheat								-	-		-	
Maize	-	-	-	-	30	100	-	-	-	-	-	-
Vegetables	250	900	96	3,552.8	300	9500	190	9350	81	1215	150	-
Fruits	1,144	5,590	1,000	1,000	1,000	9,000	1,110	5,500	100	1,000	-	-
Frees (Pro.)	2120		150		950	-	-	-	-			

# Appendix-B: Questionnaire for Beneficiary Assessment of Damage Due to Aila of post SIDR Agricultural Rehabilitation: Insights from Sharankhola

## Part -B (Farmer)

1. Personal **Information**

a. Name of respondent: **Su Kk a h** ( -n HcA^ e r .

b. Age:

d Village: **(9 eO**

e. Union: Sfl>I- 6, h9,h† £ Thana: **xr(vrKh;c^)** a

g. Occupation and income of family members:

Name of member	Sex ( male-I- female 2)	Age	Relati onship with h/head	Occupation*			Monthly income (in taka)		
				Before SIDR	After SIDR	At present	Before SIDR	After SIDR	At present
^;char3,`s <b>jaw</b>	j	^	J wrl				<b>0000</b>	<b>3,500</b>	<b>4000</b>
,T^ a,Uu	2		f,^ 1 fe		,3.	^^	-	-	-
u7 t ow-tr	2	1	rau	3			-	-	-

\* Farmer-1, Agriculture and wage labor-2, Trading-3, Service-4, Fishing-5, Rick/ Van puller-6, Honey/wax collector-7, Wood-collector-8, Driver-9, Mechanic- 10, beggar- 12 and others (specify)-13

h. Any body from this village dislocated due to cyclone : yes/no i. If yes, where: **NA** .

j. And when: After SIDR/after Aila ^r A . k. Dislocated (put tick) whole family/earning member ^t

## 2. Preparedness Activities

### 2.1 Early warning

- a. Did you hear/inform about cyclone Aila? Yes/no
- b. If yes, how many days before hitting Aila: 1 day
- c. Mention the sources of receiving information: Radio/TV/miking/ Person/ NGO /volunteers/others

(specify):

- d. **Could you remember the message you receive** from TV/ Radio/ miking/ person :

Ir- a3" ^ ^,

- e. **I have you understand the message** clearly: yes/no

- f. **If no, would you tell me words or sentences you could not understand?** n^ A

### 2.2 Evacuation/ Rescue/ response

- a. How did you save yourself (specify): ,

Hand own house.  
fir, z

- b. **Were you able to save your household/family belongings ?** Yes/no

- c. **If yes, how much ?** Fully/partially

- d. **Who did save your other family members (specify):**

Iy `n- e rm b e n'r5

- e. **Specially children, old and disabled if any (specify):** N A

- f. **Did you loss any livelihood based assets?** Yes/no

- g. **If yes, please mention the name of the assets:** N A

- h. What are the other things you could **not save from** cyclone (specify): ^1 A

- i. Who did help you **in evacuation and rescue activities** (put tick):

Relatives, neighbors, yourself, others (specify):

- j. **where did you take shelter:** Cyclone shelter, relatives house, own house, School/College, embankment/dam and others (specify):

### 3. Family received relief **and rehabilitation** support

Name of Asset		Asset (quantity with taka) (During SIDR)				Asset (quantity with taka) (During Aila)			
		Status before SIDR	Damaged	Recovered	Sources of receiving	Status before Aila	Damaged	Recovered	Sources of receiving
Buffalos/Cows		1	1	-		-	-	-	-
Goats/ Sheep		-	-	-	-	-	-	-	-
Poultry birds		21	21	-	-	-	-	-	-
Fisheries	water body (in dcc)	2-0	2-0	-	-	2 0	2-0	-	-
	Production. (in kg)	9 0	9 0	-	-	5	5	-	-
Personal belongings*		1 0	7	6	N/A	9	-	-	-
Utensils**		20	10	-	51 0	10	-	-	-
Pucca/semi pucca Houses		-	-	-	-	-	-	-	-
Tin shed houses		1	-	-	-	1	-	-	-
Thatched/mud houses		-	-	-	-	-	-	-	-
Trees/plantation		150	12-0	-	-	3 0	-	-	-
Others(specify)		-	-	-	-	-	-	-	-
Livelihood based asset	Boat/net	-	-	-	-	-	-	-	-
	Rick/van	-	-	-	-	-	-	-	-
	P.tiller/pump/spray machine etc	-	-	-	-	-	-	-	-
	Others***	-	-	-	-	-	-	-	-

#### Details of personal belongings:

#### \*\* Description of utensils:

"Y\* Specify other livelihood assets:

### 4. Social/Economical changes put tick mark in appropriate places

Social/Economical status	Rich	Middle	Poor	Hardcore poor	Remarks
Before SIDR		✓			
Before Aila			✓		
At present			✓		



**5. Own Land in Decimal:**

a. Homestead:

b. Cultivable: 100

c. Cultivating: 1 Q

A"

6 ... ^

d, veg. cultivation)

d. Fallow land: 0

**6. Land mortgaged in and out (in decimal)**

a. mortgaged in: 0

b. mortgaged out: 0

**7. Damage to the family due to SIDR and Aila**

SI.No	Particulars		Status before SIDR		Damage/loss Due to SIDR		Status before Aila		Damage/loss Due to Aila	
			No.	Value (in taka)	No.	Value (in taka)	No.	Value (in taka)	No.	Value (in taka)
1	Loss of life									
2	Persons injured									
3	Damage of houses			200	2	u2C	1	12,000		-
4	Damage of trees		10	75,000	12-0	60,000	30	12,000		
5	Loss of business		1	90,000	1	90,000	1	10,000		
6	Los of Agriculture	in dec. In kg.	105	-	105	-	0	-	0	-
			1750	21,000	1750	27,000	2000	20,000	2000	20,000.
7	Damage of fisheries	Water body Prod. In kg	20	-	20	-	20	-	20	-
			0	3,500	90	13,500	5	1006		1000
8	Buffalos			-		-		-		-
9	Cows		1	51000	1	1^,000		-		-
10	Goats			-		-		-		-
11	Sheep			-		-		-		-
12	Poultry birds		21	3,500	21	x,150		-		-
13	Others (specify)			-		-		-		-
14	Livelihood based asset			-		-		-		-
15	Personal belongings		10	9,000	7	5,600	9	5,400		-

### 8. Crops Damaged (item wise)

Particulars	Cyclone SIDR				Land cultivated before Aila (in dec)	Cyclone Aila			Crops cultivated by supports (in decimal)	
	Land cultivated before SIDR (in dec.)	land	Production (in kg)	Taka		land	Production (in kg)	Taka	Before Aila (winter)	After Aila (Amax')
Paddy	100	100	1200	15,000	66	6	2000	20,000	66	33
Wheat				-	-	-	-	-		
Maize										
Brinjal	-	-	-		-	-	-	-	-	-
Bean	-				-	-	-	-	-	
Potato	-	-			-					-
Ladies finger										
Bottle gourd		5	750	6,000		-	-	-		
Sweet gourd	-				-	-	-	-	-	-
Bitter gourd	-	-	-		-				-	-
Pulse										
Others*	-	-			-	-	-	-	-	-
<b>Total</b>	<b>105</b>	<b>105</b>	<b>1950</b>	<b>21,000</b>	<b>66</b>	<b>66</b>	<b>X000</b>	<b>20,000</b>	<b>66</b>	<b>33</b>

\* Specify other:

### 9. Seed use in post Aila land Cultivation

Particulars	Own		NGO		Government		Others	
	Land in decimal	Estimated Production (in Kg)	Land in decimal	Estimated production (in Kg)	Land in decimal	Estimated production (in Kg)	Land in decimal	Estimated production (in Kg)
Paddy	6	U		aj (s (^			-	
Wheat				-	-	-		
Maize							-	
Ladies finger								
Bean								
Bottle gourd	-			-		-	-	-
Sweet gourd								
Bitter gourd				-				-
Others (speciIN )								
<b>Total</b>	<b>7</b>		<b>33</b>	<b>80</b>		-	-	

**10. Post Aila paddy crops (Aman) cultivation by variety**

Crops variety	Salinity resilient (yes/no)	Floating crops (yes/no)	Land (in decimal)	Estimated production (in kg.)	Tentative value of rice (in takai)
			33 .	X00	'3, 00 C-
	-		67,	800	0, 0 00

**11 Sources of seed collection (put tick mark)**

Seed item	Sources of collection (Quantity in gram .)					Land cultivated (in decimal)			
	Own	Govt.	NGOs		Other (specify)	Own seed	Govt. seed	NGOs seed	Others seed
			Name	Quantity (in gram)					
f3R-- 11	.	-	f3R C	y000		-	-	33	-

**12. Orientation**

a. Have you received any training/ orientation for cultivation of hybrid variety: yes/ no? If yes, from where? Got. /NGO (specify): 131 AC

Other (specify):

b. Duration of training/orientation (in days): 8

**13. Loan facilities**

a. Have you got Agricultural loan: Yes/no

If yes, from where (specify): N 4 Amount in Taka: i A

b. Amount used in cultivation: H 4 Amount used in other: purposes: -,- -

c. Have you got loan in time? Yes/no N,-,A

If no, after how many days of your requirement:

d. Does this late hamper your cultivation process? Yes/no

If, yes, how? N A .

e. Have you got loan as per your requirement? Yes/no <sup>A</sup>  
 If no how much did you want? (Amount in Taka): <sup>tir</sup>

**14. Support needed and practically received (Post Aila Aman Cultivation)**

Supports needed	Total required		Support received				Farmers own managed	
	Quantity (no./kg)	Amount (in taka)	Quantity (no./ kg)	Amount (in Taka)	Support provider	Support Received*	Quantity (no./kg)	Amount (in Taka)
Seed	16.	500	-1	200			12	300
Fertilizer	38.	2.9		12-0			2.0	100
Tilling facility		169	-	9	AR	1.		200
Pesticide	-	700	-	-	-			700
Irrigation facility		-						-
Agriculture Loan					-	-	-	t
Others (specify)	-		-	-		-	-	-

\*Timely-1, Late-2, Very late-3

**15. Land farmers could not bring under cultivation causes and possible remission**

Land could not bring under cultivation (in decimal.)	Causes* (Put code)	Farmers opinion of overcoming of the problem

Salinity-1, Crisis of sweet water-2, Finance=3, power tiller-4, Water Pump machine-5, Spray machine-6, Seeds-7, fertilizer-8, insecticide-9, Attitude-10, Technical knowledge-11, others (specify)-12.

**16. General Question**

a. What are the factors, you feel influenced in more production?

wry x,1;3 b^A r '

b. What are the factors you feel influence in low production?

**17. Farmers opinion about seeds quality**

a. Positive sense: i) More reduction ii) Quicker production iii) Less diseases iv) Less dried v) Others (specify)

b. Negative sense: i) Less production ii) Longer time in production iii) More disease iv) More dried- v) Others (specify)

**18. Production scope of high yielding variety**

Crops Season	Total arable land (in decimal)	Land could be brought under high yielding variety cultivation (in decimal)	Varieties that farmers are interested to cultivate	Obstacle to bring land under such cultivation (farmers opinion)
Bo r, 0	1		(Fri l	071,
A Yom.	100	100	= <sup>^</sup> . <sup>^j</sup> ^c +n, >	

Signature and name of data collector: *Prisho.*

Date: 18- 10-0-9

*Prigomka Shaker Prisho.*

**Thanks**

## Appendix-C: Questionnaire for Elites

### Assessment of Damage Due to Aila of post SIDR Agricultural Rehabilitation: Insights from Sharankhola

#### Part-C (Elite)

1. Name: <u>1-1</u> , <u>E u-r, Uh</u>		2. Occupation: <u>Te-I C-^e-ra.</u>		3. Age: <u>2</u>		4. Sex: <u>M</u>		
d. Father's name: <u>Lev L Cbra rtei.</u>		5. Village: <u>o TQ 1 ^bC^f^i</u>						
6. Households in the village <u>9 (0</u>		8. Population of the village: <u>9 800</u>		a. Male: <u>2300</u>		b. Female: <u>, 5 0 0</u>		
9. Damage in the village								
Human casualties		House damage in %	Crops damage in %		Livestock damage (in %)	Fisheries damage (in %)	Trees damage (in %)	Others damage (mention with no.)
Total death	Total injury	%	Land (in dec.)	Production (in kg.)	(in %)	(in %)	(in %)	(mention with no.)
	<u>10</u>	<u>7</u>	<u>100</u>	<u>100</u>	<u>1 0</u>	<u>10 0</u>		

10. No of household dislocated/migrated from the village: 0

11. Place of dislocation (family no.)

Within **the union**    Within the Upazila    Within the District    Within the division    Dhaka    Others\*

\*Others (Specify):

12. Social/Economical changes of the families of the village

#### Social/Economical status of the family

Particulars	Social/Economical status of the family				Remarks
	Rich (family number)	Middle (family number)	Poor (family number)	hardcore poor (family numbers)	
<b>Be fore SIDR</b>		<u>2-10.</u>	<u>-1 01?</u>	<u>8 1 1</u>	
<b>Befo re Aila</b>	<u>29-</u>	<u>1 92</u>	<u>'355</u>	<u>03 Sl.</u>	
<b>At present</b>	<u>29,</u>	<u>259</u>	<u>39-1</u>	<u>tag,</u>	

13. Sources of seed collection

Seed item	Sources of collection					Land cultivated (out of total )	
	Own	Govt.	NGOs		Other (specify)	By supported seeds (in %)	Own managed seeds (in %)
			Name	National/local			
	90	5	Ms -It-A, ^.	^ 15		24,	00,
Ve e c e	-90	5	^^NTHR.	^^	-	60,	90

14. Land farmers could not bring under cultivation causes and possible remission

Land could not bring under cultivation (in %.)	Causes* (Put code)	Farmers opinion of overcoming of the problem
	1 2	

Salinity-1, Crisis of sweet water-2, Finance=3, power tiller-4, Water Pump machine-5, Spray machine-6, Seeds-7, fertilizer-8, insecticide-9, Attitude-10, Technical knowledge- 11, others (specify)-12.

15. Post Aila paddy crops (Aman) **cultivation** by variety (in %)

Land cultivated by variety		Normal	Salinity resilient	Floating crops	Remarks
Crops variety	land				
/3R, II.	15	✓			
3/^ - 22,	10	✓	-	-	
	70	V-			







13. Sources of seed collection

Seed item	Sources of collection				Land cultivated (out of total)		
	Own	Govt.	NGOs		Other (specify)	By supported seeds (in %)	Own managed seeds (in %)
			Name	National/local			
PO Y	90		Ue A, D.	IS		20	80
Ve et^ble	00		P PArCrA	35-	-	10	60

14. Land farmers could not bring under cultivation causes and possible remission

Land could not bring under cultivation (in %.)	Causes* (Put code)	Farmers opinion of overcoming of the problem
		12.

Salinity-1, Crisis of sweet water-2, Finance=3, power tiller-4, Water Pump machine-5, Spray machine-6, Seeds-7, fertilizer-8, insecticide-9, Attitude-10, Technical knowledge- 11, others (specify)-12.

15. Post Aila paddy crops (Aman) cultivation by variety (in %)

Land cultivated by variety		Normal	Salinity resilient	Floating crops	Remarks
Crops variety	land				
X312-^)	20	v		-	-
22.	fS	✓	-	.	
(^^.- 23,					

16. Production scope of high yielding variety

Crop Season	Land could bring under HYV cultivation (in %)	Varieties that farmers are interested to cultivate	Obstacle to bring land under such cultivation	Suggestion to overcome the obstacles
13 aho	0	117 ^r^^a	^^ w ^-	^s11, s1r^^
				der q a Jam. yF ^
				> s 7ZzJ VC!
				rte'-g "

17. Any other problems farmers face in crops production:

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"

o-

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18. Any other suggestion/recommendations to increase crop production: