Government of People's Republic of Bangladesh

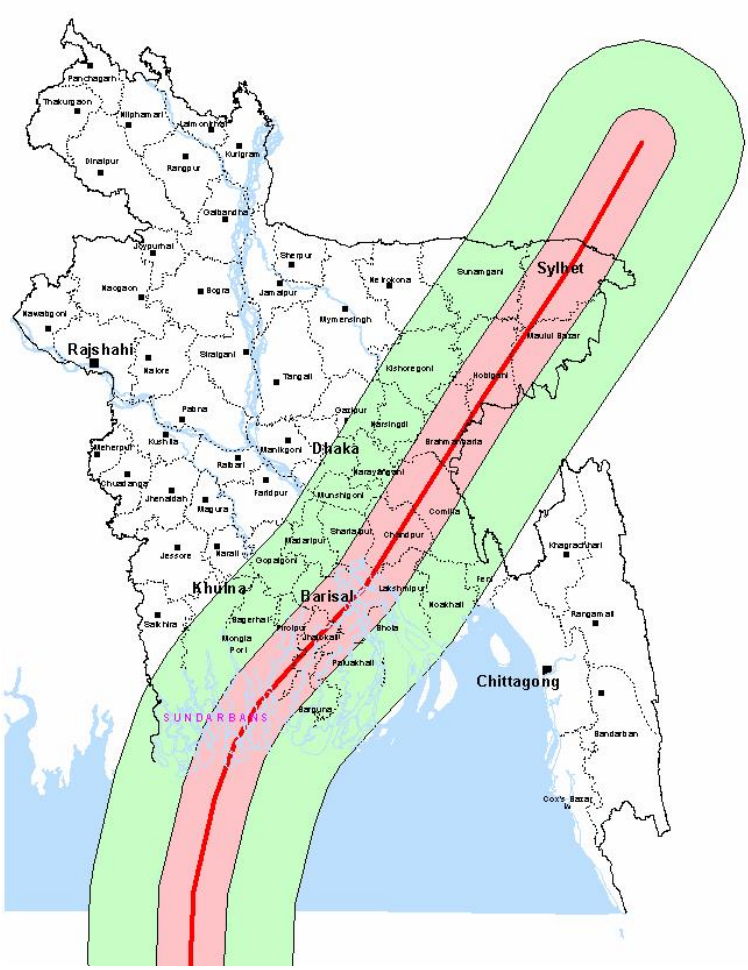
SUPER CYCLONE SIDR 2007

Impacts and Strategies for Interventions

Ministry of Food and Disaster Management
Bangladesh Secretariat, Dhaka, Bangladesh

February 2008

Destructive Path of Super Cyclone Sidr 2007



(Courtesy of CEGIS)

FOREWORD

This report has been produced to facilitate discussion leading to the finalization of a government endorsed strategy for early recovery and beyond.

The report is structured in five main sections supported by a number of Annexes.

1. Section One: summarises the pre impact preparedness measures undertaken including some initial lessons learned
2. Section Two: overviews the immediate post impact response actions including some initial lessons learned
3. Section Three: lists the sector impacts and provides recommendations for future strategies
4. Section Four: summaries the National Disaster Management Coordination Systems
5. Section Five: lists the monitoring and reporting networks.

Although every effort has been made to ensure the accuracy of information contained within the report, it is recognized that some important information is either missing or incorrect. Your early advice on such matters would be welcomed and very much appreciated.

Can I take this opportunity to thank every agency and individual who has participated in the relief operation to date as without your efforts it would have been an even more daunting task. Special recognition to our Armed Forces Division for the way in which they so quickly responded to the crisis and so professionally engaged themselves in supporting the people of Bangladesh. Special mention must also be given to the visiting US Forces who have so wonderfully supported our relief efforts as they did in 1991.

Despite the fact that our government did not launch an international appeal, our international partners responded magnificently to our needs. We are truly grateful to them for this support.

Finally I would like to express my gratitude to my special coordination cell officers, professional staff of CDMP and the office of the United Nations Resident Coordinator for contributing toward the production of this interim report.

Dr Mohammad Ayub Miah
Secretary in Charge
Ministry of Food and Disaster Management

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EXECUTIVE SUMMARY

Cyclone SIDR was the most powerful cyclone to impact Bangladesh since 1991 when a reported 140,000 people perished and billions of dollars damage was reported. In this instance the death toll is significantly less (approximately 3,406) however the damage to crop and infrastructure is significant across 30 districts, 200 upazila and 1,950 unions. Over 55,000 people were injured, while over 1,000 remain missing.

Cyclone warnings were issued on a timely manner by the Bangladesh Meteorological Department and district officials together with the Cyclone preparedness Programme (CPP) Volunteers ensured rapid expansion of the warning messages and the early evacuation of over 1.5 million people to safe shelters. Some concerns have been voiced over the perceived inaccuracy of the predictions by the BMD and also that many community members did not understand what signal number 10 meant in terms of level of risk and actions to take. Other sources have suggested that a number of people did not believe warning because of false alarms over tsunami warnings in the weeks leading up to the cyclone.

It was clear that most damage and deaths were caused by the 4 meters plus storm surge that ravished every community that lay in its path. While a storm surge of this magnitude was predicted by the BMD, survivors have reported that many people did not fully understand or comprehend what a storm surge of this magnitude meant and were caught out when they tried to leave their communities for safe ground.

All of these matters must be further investigated and addressed within a comprehensive disaster management strategy.

Initial information suggested that the number of shelters was inadequate to accommodate the number of at risk communities. Further, some communities were expected to walk long distances to find shelter space. Many did not seek shelter because there were no facilities for the cattle and other livestock. More shelters are required however design and construction should consider a full risk analysis of the area. Consideration of gender facilities, amenities for people with disabilities and additional space for sheltering livestock must also be factored into the design phase. There is also a view that more community shelters should be built rather than larger shelters that are expected to service a number of communities or unions. A large number of shelters were reported to be in need of significant maintenance and in some cases rebuilding.

The Bangladesh Armed Forces reacted extremely well to the cyclone impact and had developed the initial search and rescue and early relief operations within hours of the cyclone impacting the country. This effort was progressively ramped up over the ensuing days with many thousands of people having directly benefited when it was most needed. The Armed Forces Division continued to coordinate the relief and rescue operations and was joined by United States Armed Forces personnel and equipment approximately nine days into the operation. A forward coordination post was established at Barisal on 25th November, 2007 (Impact plus 10days) to oversee the entire relief effort.

Early assessment of the cyclone's impact was made extremely difficult through the failure of the electricity grid which through much of Bangladesh into darkness. Telephone systems were also affected as were the road systems which in many places were impassable. Despite this, district and upazila officials worked extremely hard to bring together a snapshot of the cyclones devastations. National and international news media provided a graphic image of the devastation and this prompted world wide action and concern. The United Nations deployed a number of assessment teams on day after the cyclone and had hit and these teams produced a comprehensive damage and needs assessment within 6 days of initial impact. This served as the basis for initial UN relief operations. Again working is close collaboration with government systems.

Coordination of relief efforts was always going to be greatest challenge for the government, particularly in the early days when so many national and international NGOs, supported by donors had proactively initiated relief operations. In some cases this occurred outside of the government system; however the majority of cases relief was distributed in close collaboration with the United Nations Resident Coordinator (UNRC) moved quickly to establish a UN/Donor Coordination Mechanism with the first meeting being held on Sunday 18 November just two days after impact. A small coordination cell or secretariat was established to provide support to the Secretary, MoFDM and assist him in meeting the growing list of demands.

Development partners and donors responded extremely well to the cyclone impact pledging well over US$200 million in cash in kind support. This was despite the decision of the government not to launch an international appeal. The government has been impressed with the leadership shown by the Ambassadors, High Commissioners and Country Representatives who personally attended each meeting of the coordination group.

Food security from Cyclone Sidr was estimated to be 1.12 millions ha fully damaged and nearly 1.39 millions ha partially damaged. Almost 1.87 million livestock and poultry were killed. This represents significant hardship and loss of livelihood to the almost 7 million people affected.

A comprehensive analysis undertaken by a team of Bangladesh Government and international experts, using state of the art assessment methodologies, estimated the total damage and loss caused by the cyclone to be BDT 113 billion (**USD 1.6 billion**).

Damage and losses were concentrated on the housing sector (BDT 55.7 billion, or 49% of the total), productive sectors (33.8 billion and on public sector infrastructure (BDT 17.5 billion or 16%). Most affected sectors were housing, agriculture, transport, water control structures education and industry.

The effects of the disaster were highly concentrated in the districts of Patuakhali, Pirojpur, Barguna and Bagerhat. Preliminary estimates indicate that overall economic growth in the country will be affected by less than 1 percent. Poverty, which is very high in the affected area – will be exacerbated due to the losses caused by the disaster. It is estimated that a total of 567,000 persons lost income and employment in the affected districts.

Reconstructing infrastructure and recovering the economy of the affected areas necessitates a multi pronged approach that restores assets and protects the most vulnerable members of the society for future calamities.

The strategy for short term recovery is to take care of the immediate needs arising from the humanitarian phase, while building a foundation for medium to long term interventions. Immediate needs arising from humanitarian relief phase are:

- Food security
- Cash
- Shelter
- Medical support

For short term recovery a total estimated amount is about BDT 15.9 billion (USD 230 million) of which 87% are nutritional related.

Once immediate needs are met, reconstruction of infrastructures i.e. housing, embankments, roads, and recovery of Agriculture, industries and commerce needs to occur. The medium to long term recovery and reconstruction is based upon a comprehensive strategy to reconstruct better and recover the economy in a sustainable manner by applying a strategy of protection that reduces exposure to climate risks and adaptation that enhances coping ability.

Total mid to long term reconstruction and rehabilitation needs are about BDT 72 billion (USD 1.05 billion) about 25% of which are each devoted to infrastructure reconstruction and agricultural sector interventions.

Strategies for Interventions

The short term and mid to long terms strategies for recovery and reconstructions are as follows:

- The resources and competencies of the BMD should be assessed and where necessary strengthened to ensure timely and accurate warnings and produced delivered.

- The current warning signal alerting system should be reviewed to ensure that communities can better understand the level of actual risk they face and the actions they must take to protect themselves and their livelihoods. This should be complimented by an expansive education and awareness programme.

- A new national cyclone shelter strategy should be established with designs based on an all hazards risk assessment with specific emphasis on gender needs and safety of livestock factored in. consideration should also be given to the construction of single community based shelters to compliment larger shelters that are designed to accommodate a broad range of communities. Such shelters should also have provision for storing immediate relief needs.

- A national Contingency Plan for major crisis events should be developed. This plan should detail policy and arrangements for such matters as, overall coordination, dissemination of warnings, evacuation management, search and rescue, relief management including damage assessment information management, government/donor and NGO coordination and recovery planning.

- Contingency plans for each district should be developed to bring greater efficiencies to response management operations. This plan should consider the issues outlined in the national plan and provide greater emphasis to the establishment of a district relief management system that may include the establishment of pre-positioned relief centres.

- Reconstruction of damaged infrastructure including embankments should be undertaken following a full risk assessment to establish very clearly why damage occurred and more specifically how it could have been avoided. Climate changes has added new risk dimensions to cyclone, storm surge and flood threats and therefore simply replacing damaged infrastructure will not prevent future damages or even deaths.

- Strategies should be implemented as a matter of urgency to restore the livelihood of affected families.

ABBREVIATIONS

AFD	Armed Forces Division
BIWTA	Bangladesh Inland Water Transport Authority
BMD	Bangladesh Meteorological Department
BWDB	Bangladesh Water Development Board
CBO	Community Based Organization
CDMP	Comprehensive Disaster Management Programme
CEGIS	Centre for Environmental Geographic Information Services
CI	Corrugated-Iron
CPP	Cyclone Preparedness Programme
DC	Deputy Commissioner
DER	Disaster and Emergency Response
DPHE	Department of Public Health Engineering
DMIC	Disaster Management Information Centre
DRRO	District Relief and Rehabilitation Officer
DFID	Department for International Development
DRRO	District Relief and Rehabilitation Office
EC	European Commission
IFRC	International Federation of Red Cross and Red Crescent Society
IMDMCC	Inter-Ministerial Disaster Management Coordinating Committee
INGO	International NGO
IWM	Institute of Water Modelling
LCG	Local Consultative Group
LGED	Local Government Engineering Department
MoFDM	Ministry of Food and Disaster Management
NGO	Non-Governmental Organisation
R&H	Roads and Highways
UDMC	Union Disaster Management Committee
USAID	United States Agency for International Development
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Programme
UNO	Upazila Nirbahi Officer
UN OCHA	United Nations Office Coordination for Humanitarian Assistance
VGD	Vulnerable Group Feeding
VGF	Vulnerable Group Development

I. Preparedness

1.1 The Cyclone Sidr

On November 15, 2007 the super cyclone Sidr roared across the south western coast of Bangladesh with driving rain and high waves affected total 30 districts. Heavy rains accompanying cyclone and the tidal waves due to wind effects, called storm surge reached maximum heights of about 20 feet in certain areas, which causing extensive physical destruction, causalities, damages of crops, livestock and flooding low lying lands. The cyclone's attained winds up to 220 km per hour causing further destruction to buildings and uprooting trees that in turn destroyed housing and other infrastructures. The devastating cyclone also disrupted communication network and electricity supplies at south western coastal region.

Government has classified four districts as 'worst' affected – Bagerhat, Barguna, Patuakhali and Pirojpur and eight districts as 'badly' affected – Khulna, Madaripur, Sariatpur, Barisal, Bhola, Satkhira, Jhalakathi and Gopalganj of the total 30 affected districts. Total damage has been estimated to 1.6 billion US dollars.

1.2 Early Warning

The Super Cyclone 'Sidr' was first observed on 9 November 2007 near the southeast of the Andaman Islands with a weak low-level circulation near the Nicobar Islands. It showed indication of the formation of a tropical cyclone on 11 November while located a short distance south of the Andaman Islands. Bangladesh Meteorological Department (BMD) advised maritime ports of Chittagong, Cox's Bazar and Mongla to keep hoisted distant cautionary signal number one which is the lowest level of preparedness on a scale of 1 to 11. On 13 November, the depression had turned into a cyclonic storm with a core of hurricane force winds. Maritime ports of Chittagong, Cox's Bazar, and Mongla were advised by the BMD to hoist warning signal number four, which meant that all fishing boats and trawlers over North Bay were advised to take shelter immediately.

Cyclone Sidr moved northwards and was centred at 9 p.m. on 14 November 2007 about 725 km South-southwest of Chittagong port, 645 km South-southwest of Cox's Bazar port and 670 km South of Mongla port. BMD predicted that it was likely to intensify further and move in a Northerly direction and may cross Khulna-Barisal coast by noon of 15 November 2007. Maximum sustained wind speed within 74 kms of the storm centre was about 190 kph rising to 210 kph in gusts/squalls. Maritime port of Mongla was advised to keep hoisted great danger *signal number ten*. The coastal districts of Bhola, Barisal, Patuakhali, Barguna, Pirojpur, Jhalakathi, Bagerhat, Khulna, Satkhira and their offshore inlands and chars were also put under great danger *signal number ten*. Chittagong and Cox's Bazar were put under great danger *signal number 9*.

Bangladesh Meteorological Department was responsible for the issuance of cyclone warnings which included advisory messages on the level of warning using the government warning signal system. Warnings were being regularly sent to communities and once warning signal number 4 was hoisted the Cyclone Preparedness Programme (CPP) mobilised its 44,000 volunteers who immediately began to implement a community based warning system utilizing megaphones and other devices.

Overall, the Early Warning System worked well. Three million people were evacuated and 1.5 million were accommodated in cyclone shelters.

Cyclone Sidr hit Bangladesh's offshore islands at approximately 18:30 hours on the evening of 15 November and made landfall across the Barisal coast at 2100 hours local time during ebb tide. Wind speeds reached up to 240 km per hour (JTWC) affecting 15 districts with 15 others partly affected.

Hindcasting of the Sidr storm surge has been made using available storm surge model in Institute of Water Modeling (IWM) to assess the temporal variation of storm surge height and coastal flooding during the passage of the Sidr along the Bay of Bengal and across the Barisal coast. The large domain of the Bay of Bengal Model of IWM allows the storm surge to naturally and accurately propagate from deepwater into the shallower continental shelf and adjacent river networks.

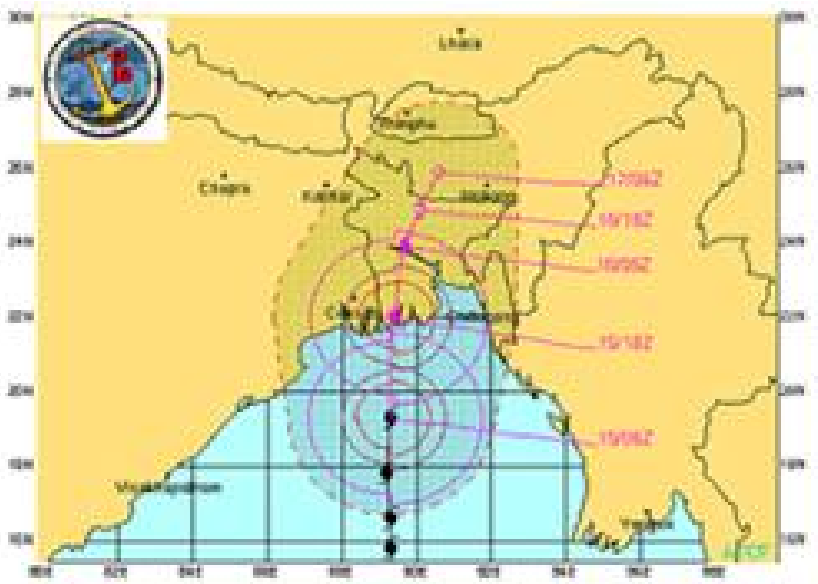

Figure 1.1 Cyclone Sidr track and affected areas in Bangladesh (Source: JTRC 2007)

The hind casting of storm surge of Sidr shows surge level of 5.5 to 6m PWD, at the outfall of Baleswar River, 5 m at Sharankhola, Bagerhat (polder 35/1), 3.5m at Hiron point. It is seen that surge level exceeds polder embankments that are at 5m, PWD and surge level does not exceed the sea facing embankment, which are at more than 6m in the Barguna, Barisal and Bagerhat districts.

1.3 Preparedness and Pre-Positioning

On 14 November, a meeting of the Inter-Ministerial Disaster Management Coordinating Committee (IMDMCC) was convened by the Honourable Advisor for Disaster Management and later that day a meeting of the National Disaster Management Council was convened under the direction of the Honourable Chief Advisor. Following these meetings all government officials were directed to ensure that preparedness measures were taken as listed in the Standing Orders for Disasters. Leave for all officers were also cancelled. The Armed Forces Division (AFD) was also placed on standby. Several central control rooms were activated by various agencies at national, district and upazila levels while the Disaster Management Information Centre was placed on 24 hour duty status.

United Nations Head of Agencies working under the leadership of the UN Resident Coordinator had begun a series of meetings and arrangements were in place to quickly mobilize staff and resources.

National and International NGOs mobilized their staff and volunteers with a number of pre-positioning staff and relief materials closer to the forecasted impact areas. This action proved to be extremely beneficial given the access problems that arose later on in the post impact phase of the operation.

1.4 Cyclone Shelters

Bangladesh had established 2,400 cyclone shelters in high risk areas. Over 1.5m people were moved to shelters in the lead up to Cyclone Sidr. Some did not seek shelter because there were no facilities

for the cattle and other livestock. A survey conducted in 2004 by the Centre for Environmental and Geographic Information (CEGIS) on 1,705 shelters identified some deficiencies in the shelters.

- § The total number of shelters was not enough to hold the evacuated population.
- § More than 65 percent of all shelters had no provision for the special needs of women.
- § Almost 100 percent had no facilities for people with disabilities.
- § 75 percent of shelters surveyed had no provision for storage of water.
- § 80 percent made no provision for the shelter of livestock
- § 87 percent of all shelters surveyed had some structural vulnerability.
- § Little or no effects were made to preserve drinking water
- § Preparedness measures for protection and restoration of power and telecommunication was inadequate

Figure 1.2: Cyclone shelter in good condition (left); needs repairing (right) [photo: CEGIS]

1.5 Preparedness Lessons Learned

Initial observations on preparedness measures are listed hereunder:

- The warning signals not properly understood by all and some communities did not believe the warnings.
- Difficult for district, upazila officials and communities to translate warning messages into on ground risk scenarios.
- The number of shelters was inadequate and many were in a state of disrepair.
- People were unwilling to take refuge at the shelter leaving their cattle behind
- A number of CPP volunteers lacked resources and training
- Communities had little knowledge of storm surge
- Embankment protection system was not properly maintained
- Risk mapping for storm surge and flash flooding would have enhanced early warning and community response.
- Lack of rigorous response management contingency plans and skills
- Needs improved and coordinated monitoring system to collect information on post disaster damage and losses from field offices.

- Effective role of AFD in coordinating relief and search and rescue activities for large scale crisis events

II. Emergency Response

2.1 Immediate Post-Impact Response

The trail of destruction left behind did not become immediately known as telephone communication and electricity supplies were cut for most of the country. It took a number of days for these services to be restored. Road blockages by debris prevented district officials from undertaking an initial scan of the damages. The Army Chief and the CA were out by helicopter on the following day, 16 November, following which the nation mobilised its response.

The AFD mobilised its planes and helicopters to ascertain the extent of damage, and immediately launched a massive search and rescue and early relief operation. Over the ensuing weeks they also played an important role in assisting communities with the mass burial of their deceased family members and also removal of dead livestock.

By Saturday 17 November 2007 the search and rescue and relief activities had been scaled up considerably. However, access was still a problem. Telephone communication was partially restored, but power supply in many areas was still out. The United Nations launched a Rapid Initial Assessment mission to the affected districts, and working in collaboration with government officials, was able to provide a detailed report within 6 days of the initial impact.

The government identified that out of 30 districts affected, four districts were worst affected, eight districts badly affected and 18 districts are moderately affected. Details are listed at Annex 1.

The Disaster and Emergency Response (DER) subgroup of the Local Consultative Group (LCG) was activated by the Government to coordinate the international humanitarian relief and early recovery planning. A number of coordination meetings were held between the Government, NGOs and donors. Initial two meetings on 18th and 22nd November 2007 were chaired by the Secretary of MoFDM and the third meeting on 27th November 2007 was chaired by the Honourable Advisor for Disaster Management. Later Ministry of Foreign Affairs and Economic Relation Division also organised briefing meeting for development partner countries and organizations.

2.2 Institutional Systems

The Government has an extensive disaster management institutional network that ranges from the National Disaster Management Council headed by the Chief Advisor through to District Disaster Management Committee structures that also include both upazila and union disaster management committees (Annex 2). This mechanism was activated prior to the cyclone's impact with the Chief Advisor directing that District Deputy Commissioners take responsibility for managing preparedness and relief operations in their respective jurisdictions.

Although preparedness operations were well coordinated, a number of deputy commissioners, their key staff and their families were directly affected by the cyclone and this may have had an influence on how well assessments and relief operations were managed in the early stages.

The Government activated control rooms within the Chief Advisor's Office, the AFD, the MoFDM and the Disaster Management Information Centre (DMIC). Information flowed well between these centres and daily situation reports were prepared and disseminated to over 500 recipients through the DMIC.

A forward operations centre comprising AFD, US Marines (joined later) and government information and coordination cells was established on the morning of 17 November, 2007. The government

appointed a Commander in Chief to oversee the entire relief and early recovery efforts. This effectively decentralised the cyclone response operations and relief coordination away from Dhaka.

2.3 Distribution of Immediate Relief Materials and Cash

The Government, national and international agencies commenced relief operations in the devastated areas as soon as the high winds and driving rain stopped. At early stages the relief workers struggled through washed out roads and areas blocked by debris to deliver relief materials to the affected people. In the hardest hit districts like Bagerhat, the people in some villages waited for long hours to get dry food and rice as the relief workers could not reach the area due to disruption of all roads communication.

Figure 2.1: Waiting for food at cyclone shelter (left); carrying relief materials (right)

As of February 05, 2008 MoFDM through Directorate of Relief and Rehabilitation allocated BDT 14.4 million as GR cash, 17,290 MT rice as GR rice, BDT 514.6 million as house building grants and BDT 1181.5 million from Chief Advisors Welfare Fund for distribution in 12 districts. Bangladesh Air Force has delivered 1,300 tons of relief items by helicopter. In addition, total 4,500 packets of dry food, 450 MT dates, 1,200 MT chickpea, 33,000 pieces blanket, 16256 pieces of tent, 13,000 pieces of bed sheet, 24,504 packets of utensils and 13,000 bundles of CI sheet are distributed among the affected people.

2.4 Initial Identified Needs and Priorities

Shortly after the impact of the cyclone, the Ministry of Food and Disaster Management established a preliminary list of immediate needs and priorities to guide relief efforts, which included:

- Search and rescue
- Providing burial services
- Updating death toll
- Provide first aid to the injured
- Disposal of carcass
- Restoration of emergency services such as roads, telecommunication and power services
- Emergency relief – food including baby food, drinking water, Water Purification Tablets (WPT), clothes (sari and lungi), blanket, bed sheet, mosquito nets, tent, etc.
- Cleaning and repairing drinking water sources
- Providing water treatment facilities
- Damage and loss assessment

2.5 Donor Commitments

Although no formal international appeal was made by the Government, foreign assistance was welcomed. The international community was quick to respond and committed approximately **US$ 263** million as of 22 January 2008. By far the biggest contribution was from the kingdom of Saudi Arabia with a pledge of $102.76 million. The World Bank has pledged funding of up to $250 million, and the Asian Development Bank is formulating a relief and reconstruction proposal worth $150 million. Table 2.1 shows summarized information on donor commitments.

Table 2.1: Summarized information on donor commitment

Saudi Arabia	**USA**	**Japan**	**The UN**	**The UK**	**Kuwait**	**EC**	**Netherlands**	**Norway**
$102.76 m	$19.5 m	$18 m	$15.4 m	$14 m	$10 m	$9.08 m	$7.74 m	$3.35 m
Canada	**Australia**	**Belgium**	**Italy**	**Germany**	**Sweden**	**Spain**	**China**	**India**
$3.40 m	$2.75 m	$2 m	$ 1.52 m	$1.73 m	$2.67 m	$1.08 m	$1.05 m	$1 m
Turkey	**Libya**	**Switzerland**	**Denmark**	**Korea**	**New Zealand**	**Sri Lanka**	**Thailand**	**Pakistan**
$1 m	$1 m	$1 m	$0.97 m	$0.50 m	$0.38 m	$0.025 m	$0.015 m	Relief supplies

(In USD millions)

Immediate Response from International Organisations

Both the international and national aid communities responded quickly to the crisis. The International Federation of the Red Cross and World Vision, for instance, launched relief operations in the most-affected districts on 18 November and 16 November respectively. They distributed plastic sheet, blankets and cash, as well as family packages that included rice, lentils and oil. The World Food Programme as of December 3, 2007 distributed High Energy Biscuits and rice through NGO partners to 249,187 families in the affected districts. UNDP, UNICEF, OXFAM, SCF Alliance, World Vision, Care Bangladesh, Islamic Relief, Caritas, Christian Aid, Concern Worldwide and Action Aid Bangladesh also distributed relief packages (Table 2.2).

Immediate Response from National Organisations

Several national organisations also launched relief operations. BRAC, for instance, distributed more than 80,000 food packets to families in 11 districts. Total 13 medical teams also treated more than 7,800 patients. BRAC, and ADRA and other national NGOs delivered food and non-food relief items to the affected families. Grameen Bank, BRAC and ASA waived loan payments for members who have been affected by the cyclone. Detailed information is given about immediate response of international and national organizations in Annex-3.

Table 2.2: Summarized information on distribution of food by different agencies

Responding Agency/ GoB	No of Families	No of Beneficiaries	Food (MT)	Food Commodities
GoB	1,126,000	5,630,000	16,890	Rice
WFP	249,187	1,250,000	1,088	HEB, Rice
UNDP	70,000	350,000	420	Flattened Rice, Molasses
UNICEF	46,272	231,360	93	BP5 biscuit
CARE	24,000	120,000	600	Flattened Rice, Molasses, Rice,
				Salt, Pulse, Oil, Potato, Onion
Islamic Relief	80,000	400,000	360	Flatened Rice, Molasses, Salt
IFRC	64,800	324,000	560	Rice, Pulse, Oil, Salt
World Vision	24,400	122,000	456	Flattened Rice, Molasses
SCF Alliance	186,470	932,350	130	HEB
BRAC	148,825	744,125	2,130	Rice, Lentile, Biscuit, Flat Rice, Molasses
Concern	26,000	130,000	810	Rice, Pulse, Oil, Salt, Sugar, Suji
ADRA	3,927	19,635	100	Rice, Lentile, Flat Rice, Sugar, salt
CARITAS	51,000	255,000	1,051	Rice, Pulse, Oil, Salt
ActionAid	17,000	85,000	426	Rice, Pulse, Oil, Salt, Sugar, Suji
OXFAM	30,000	150,000	?	Rice, Pulse, Oil
Christian Aid	19,086	95,430	284	Rice, Lentile, Oil
Salvation Army	3,000	15,000	75	Rice, Lentile, Oil, Salt, Potatos,
Netz Partnership	20,050	100,250	352	Rice, Pulse, Oil, Salt, Suji, Sugar, Molasses
				Potato, Flattened Rice
Total:	2,190,017	10,954,150	25,825	
* Note: GoB no. of families is calculated based on ration size of 15 kgs per family.				

2.6 Emergency Response Lessons Learned

Initial observations on emergency response activities are listed hereunder:

- Many agencies did not adjust to the decentralised relief management system and tended to still manage agency actions from Dhaka. Very few deployed on-site liaison officers to Barisal to enhance information sharing.
- Information sharing between government, AFD and INGOs during the initial stages could have been better. A more rigorous information management system would have ensured that the reporting of agency wise relief distributions was tracked and recorded within the DMIC.
- District disaster management capabilities were overburdened for long periods. A formal backstopping mechanism is required for major crisis events in order to ensure effective coordination and management of response efforts at all times.
- The establishment of a forward command post to undertake relief management and coordination was a very successful initiative and should be adopted as part of future crisis event planning arrangements.
- Early needs assessments were undertaken by a number of agencies, many independent of each other. Very little information was shared in the early stages.
- It was difficult to track donor contributions because they were provided through a number of channels and in a number of forms (cash, in-kind, material support or through NGO). The DMIC can serve an important information management role in this regard.

- Early damage and loss assessments have tended to be fragmented, uncoordinated and single sector focused. There is a need for a comprehensive planning policy on this issue.

2.7 Overview of Priority Activities

Shortly after the cyclone, sectoral ministries and groups began identifying and assessing needs and damages, priority actions and costing. The Overview of Priority Activities (table2.3) captures the top priority interventions over short- to medium-term.

Table 2.3: Overview of Priority Activities in Different Sectors (Indicative)

Sector	Actors	Short Term	Mid Term		
		Dec. 2007	Jan. 2008	Feb. 2008	Mar. 2008
Food					
Emergency food distribution	GOB, WFP				
VGD/VGF programmes	GOB				
WFP and other food programmes	WFP				
Monitor food distribution	GOB, WFP				
Import rice to replenish stocks (1 million MT)	GOB, Int.				
Distribute power tillers	GOB				
Water and Sanitation					
Installation of tube wells	GOB				
Repair public water sources	GOB				
Distribution of fresh water and containers	GOB				
Installation of water treatment plants/units	GOB				
Operation of water treatment plants/units	GOB				
Shelter					
Provide immediate reconstruction cash support	GOB				
Distribute shelter material	GOB				
Identify locations for new cyclone shelters	GOB				
Housing loans to low-income groups	GOB, Banks				
Construction/repair of cyclone shelters	GOB				
Health					
Distribute medicines and medical supplies	GOB				
Provide post-emergency medical services	GOB				
Training of health workers and volunteers	GOB, NGO				
Water safety advocacy	GOB, WHO				
Reactivate damaged health care facilities	GOB				
Disease surveillance	GOB, WHO				
In-depth assessment	GOB, WHO				
Vaccination campaigns	GOB				
Infrastructure					
Restore telecommunications	GOB, Private				
Repair and reconstruct roads	GOB				
Repair and reconstruct culverts and bridges	GOB				
Repair and reconstruct embankments	GOB				
Construction of schools/cyclone shelters	GOB				
Early Recovery					
Cash assistance to fishermen/farmers	GOB				
Distribution of seeds and agricultural inputs	GOB				
Procure agro-machineries (tillers, shellers, etc)	GOB				
Procure/distribute livestock	GOB				
Procure/distribute fish fingerlings	GOB				
Procure/distribute tree saplings	GOB				
Disaster Management					
Consolidate Risk Information	GOB				
Expand capacity building for DMC's	GOB, NGO				
Improve response management contingency planning	GOB				
Strengthen cyclone warning system	GOB				
Improve community warning system	GOB/NGO				
Improve information management system	GOB/UN				
Improve needs, damage and loss assessment system	GOB, NGO, UN				

"BUILD BACK BETTER"

The underlying premise of the Build Back Better strategy is to define what went wrong? Why it went wrong? And then to determine how it can be built back better to prevent it from occurring again. This implies that government, development partners and donors must look beyond brick and cement "replacement solutions" to also include a comprehensive understanding of the risk environments within which people live and work. Only then can the development, social, environmental and economic safety nets to sustain and protect critical infrastructure, life and livelihoods be established.

III. Impacts and Strategies for Recovery and Rehabilitation

Introduction

More than 8.9 million people in 1,950 unions of 200 upazilas under 30 districts were affected by Cyclone Sidr. Official reports indicated an increasing death toll over 3,406 people, with 1,001 missing and 55,282 injured. Total damage is estimated to 2.3 billion US Dollars. The summarized information on damage and loss due to cyclone Sidr is shown in table 3.1.

Table 3.1: Summarized information on damage and loss due to cyclone Sidr (As of 21 January 2008)

Sl. No.	Item	Quantity (No./km)
1	Affected District	30
2	Most Affected District	12
3	Affected Upazila	200
4	Affected Union	1,950
5	Affected Households	2,064,026
6	Affected People	8,923,259
7	Crops Damaged (ha)	
	7.a Fully damaged (ha)	300,940
	7.b Partially damaged (ha)	700,533
8	Damaged Houses	
	8.a Fully damaged house	564,967
	8.b Partially damaged house	957,110
9	Death Toll	3,406
10	Injured persons	55,282
11	Missing persons	1,001
12	Dead livestock & poultry	1,873,694
13	Damaged Educational Institution	
	13.a Fully damaged (No.)	4,231
	13.b Partially damaged (No.)	12,723
14	Damaged roads (km)	
	14.a Fully damaged (km)	1,714
	14.b Partially damaged (km)	6,361
15	Damaged bridge/ culverts (No.)	1,850
16	Damaged embankment (km)	1,875
17	Damaged Trees (No.)	4,065,316

Of the affected districts, the Government has classified four as "worst" affected — Bagerhat, Pirojpur, Patuakhali and Barguna — where human loss and material damage have been particularly severe, with great immediate needs for relief and assistance. Eight further districts have been classified as "badly affected" and they are Khulna, Madaripur, Sariatpur, Barisal, Bhola, Shatkhira, Gopalganj and Jhalakathi districts. Figure 3.1 focuses on the total people died in 12 affected districts. However, more information is available on the 30 districts (Annex 4).

Total 3,319 people are died in 12 affected districts, which is 97% of the total death reported as of 21 January 2008. Highest death toll was reported in Barguna district (1,335) followed by Bagerhat (810), Patuakhali (457) and Pirojpur (400). Official report indicates that 88% of the total recorded death was occurred in four worst affected districts.

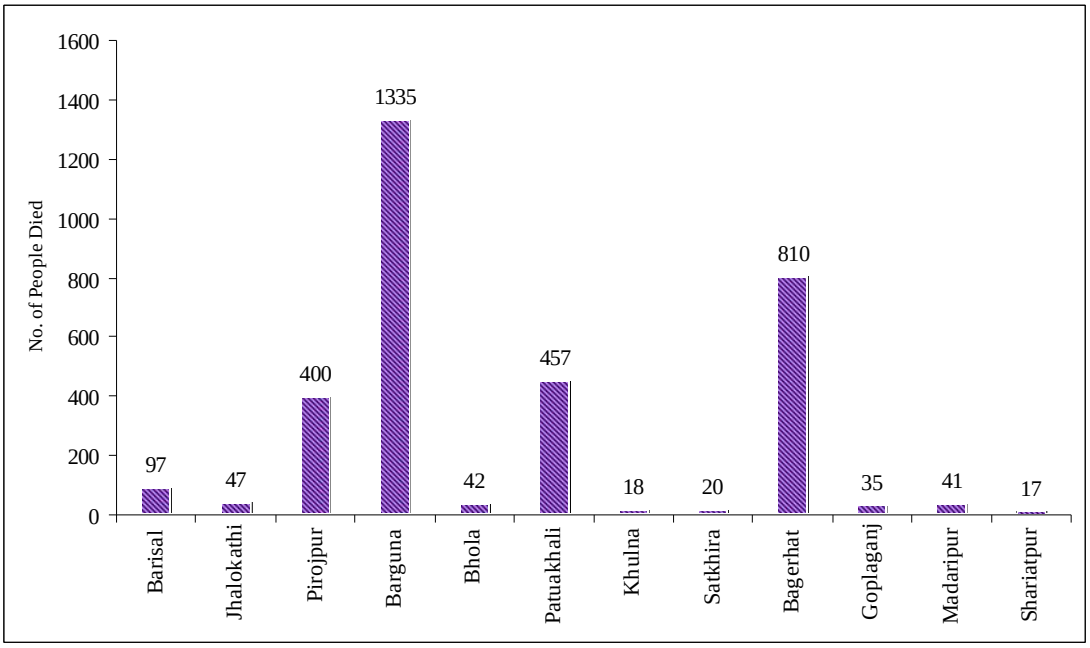

Figure 3.1: No. of people died at worst affected and badly affected 12 districts

Total 7.46 millions people are affected in 12 districts, which is about 84% of the total affected people. Highest numbers of people are affected in Bagerhat (1,221,788) followed by Pirojpur (1,011,359), Barisal (846,076) and Barguna (843,669). It is also reported that 1.75 millions families are affected in 12 districts, which is also 84% of the total affected families in 30 districts.

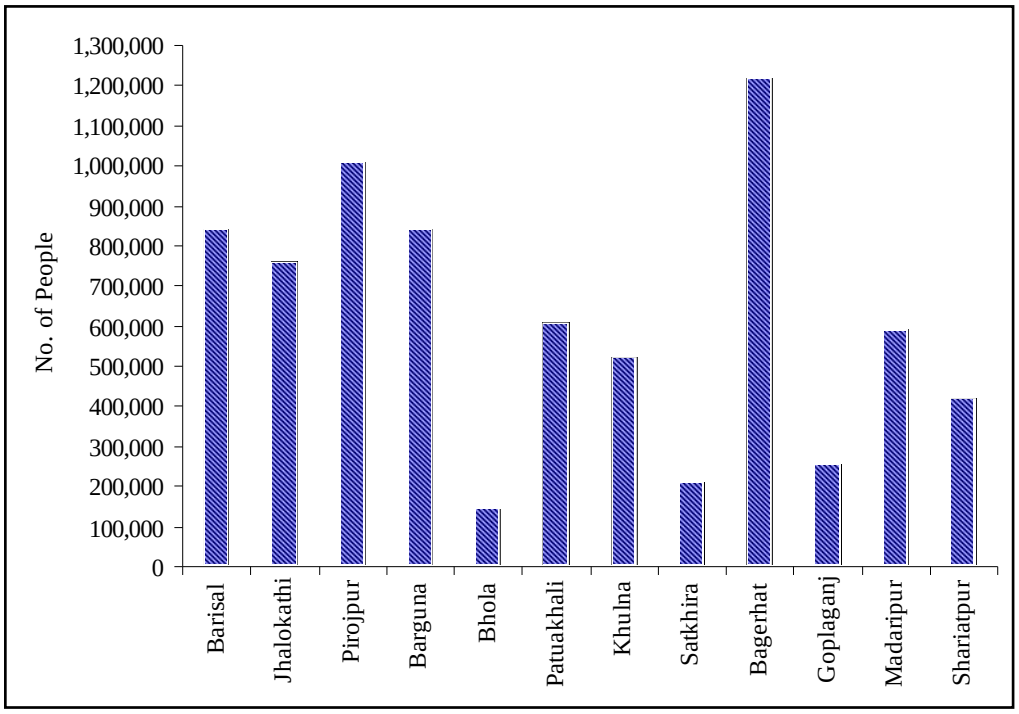

Figure 3.2: No. of people affected at worst affected and badly affected 12 districts

The cyclone's impact varied across districts, with some upazilas being hit harder than others. The below map shows the worst -affected upazilas in Bagerhat, Pirojpur, Patuakhali and Barguna and 'badly' affected upazilas in other eight districts (also see Annex 1).

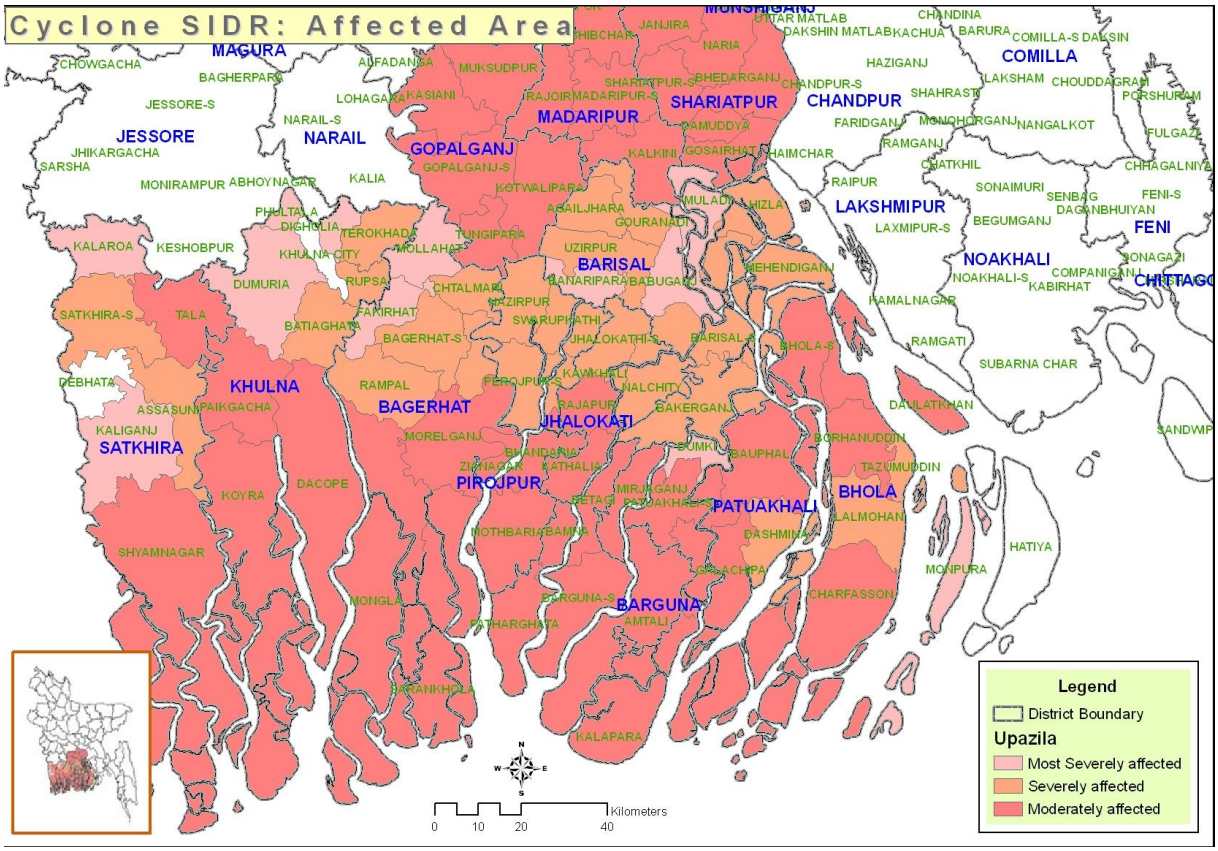

Figure 3.3: 'Worst affected' and 'badly affected' upazilas at 12 districts

The degree of damage and human need should inform sectoral strategies both in the short- and long-term. It is also imperative that relief plans are based on a comprehensive strategy, ensuring that assistance is brought to everyone in need, in particular those in remote and inaccessible areas. The following sections of this consolidated report describes the impacts, needs and strategies for short term and long term reconstruction of infrastructures and recovery of economy to restore the assets and to protect the most vulnerable people of the affected areas.

3.1 Food Security

Impacts

The food security needs, relief and early recovery, are large and present a significant challenge for the government of Bangladesh and its partners. According to the latest government official data (21 January 2008), the cyclone severely affected over 7.46 millions people in twelve most affected districts. On the basis of UN rapid emergency assessment 2.6 million people are found to be in need of life-saving assistance, including immediate food assistance. The UN assessment highlighted the large-scale loss of standing crops, family food stocks and livestock. It said these losses were compounded by the virtual collapse of already meagre wage-earning opportunities in a region that suffers from malnutrition rates above the national average.

The storm surge swept away or destroyed food storages and ordinary people's small stockpiles, killed thousands of animals used for meat and milk, and felled over a million fruit trees. As a result, it had a worst detrimental effect on people's daily subsistence, leaving an estimated 4 – 5 million people in immediate need of food relief across the affected area.

Responses

As of February 05, 2008 the Government distributed 17,290 MT of rice to the affected area by road or via airdrops. As well as, 4,500 packets dry food, 450 MT dates and 1,200 MT of chickpea also distributed among the cyclone affected families. In addition, 27,000 food bags were distributed by the Government in the four worst affected districts. The World Food Programme distributed more than 300 tons of High Energy Biscuits and other food, as well as 430 MT of rice.

Strategies

The identified needs through UN rapid assessment focused on two major aspects: (a) continuation of emergency relief assistance up to boro rice harvesting season and (b) supporting well being and livelihood needs of the worst victims. The government together with UN bodies and NGOs will work together to ensure that the food assistance to the Sidr affected people has a consistency with the national food market stability.

Short-Term

- Continuing food relief assistance to the form of VGF (2.59 million cards) and GR (2.2 million people) up to June 2008.
- The Government will commence a special safety net programme -Vulnerable Group Development (VGD) and Vulnerable Group Feeding (VGF) to address food shortages among poor and vulnerable people in the 12 worst affected districts. Under this programme, 15 kg of rice will be provided against each VGF card on a monthly basis. From a total of 2.59 million cards, 5,000 VGF cards will be distributed in each union or municipality of worst affected four districts. In the remaining eight districts, 2,500 VGF cards will be provided in each union or municipality. A total of 790 unions or municipalities will be included under this programme. Under this programme more than 150,000 tons of rice will be distributed up to end of March 2008.
- Establishing district level monitoring of food security system to ensure that no people is suffering with starving and subsequent malnutrition.
- Quick national surveillance to find out how many children and mothers are suffering in malnutrition.
- Following the nutritional survey, ensuring supplementary nutrition support to children and mothers identified as suffering with malnutrition.
- Special food assistance to ethnic minority, women headed households, female domestic workers, elderly people having no income support, person with disabilities, sex workers, transgender and vulnerable children.
- World Food Programme will initiate a food assistance program worth USD 51.8 million, covering 2.2 million beneficiaries in eight districts for six months.

Mid- to Long-Term

The government has identified the need to acquire 1 million metric tons of rice from external markets as its highest priority. Of this, 500,000 tons are being sought from the international community. In order not to distort local market prices, international partners are being asked to purchase rice from abroad and ship it to Bangladesh.

3.2 Water and Sanitation

Impacts

Water is one of the highest priorities after food assistance. Out of the 12 highly affected districts, it is considered that the four worst hit districts from a water availability perspective are Barguna, Bagerhat, Pirojpur and Patuakhali. People in these districts traditionally use pond water for drinking and other household uses. Some ponds are "damaged" by saline inundation, dead animals and debris and these will remain so until rains start in June 2008. Contamination of safe water sources created scarcity of safe water for drinking, washing and bathing.

In many of the places near the sea, there are difficulties to get drinking water and establish either shallow tube-well or deep tube-well. They are mostly depending on rainwater harvesting or water from fresh water pond/water bodies. The scale of the water problem remains unquantifiable at this point, both because pre cyclone complete baseline data about the extent of coverage is not available and, while the Department of Public Health Engineering (DPHE) knows the damage to their serviced public water points, the extent of damage to crucial supplementary private sources is not known. It appears, however, that the water problems may be less than originally anticipated.

Official reports of DPHE illustrated that total 11,612 hand tube wells and 7,155 ponds are fully or partally damaged in 12 highly affected districts. Highest number of ponds are damaged in Pirojpur (2,836) followed by Bagerhat (1,814). It is reported that highest damage of tube wells occurred in Patuakhali (2,275) followed by Jhalakathi (1,959) and Pirojpur (1,458). Total estimated loss is about 0.4 million US dollars.

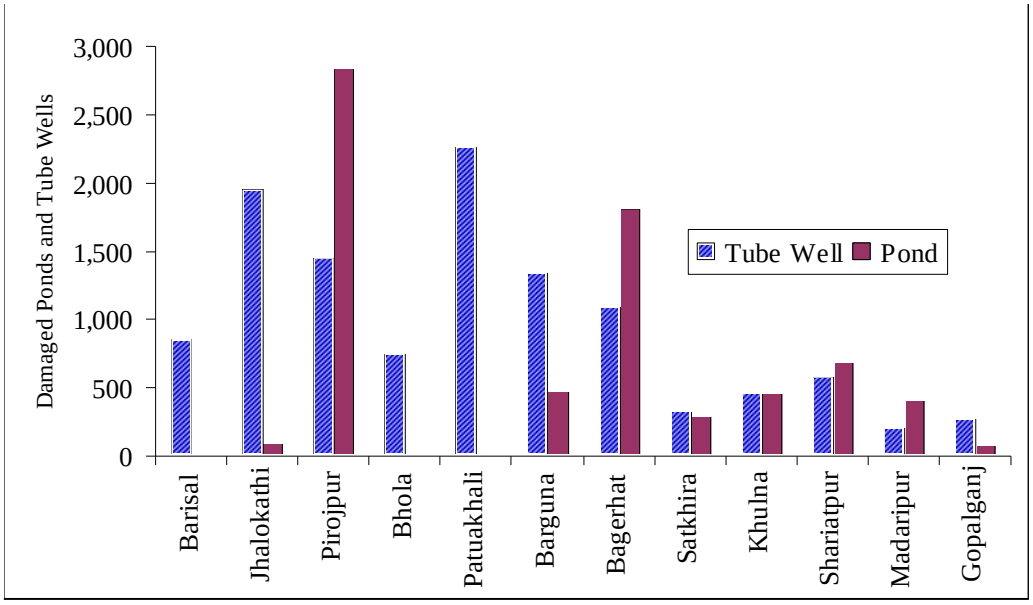

Figure 3.4: No. of damaged tube wells and ponds at worst affected and badly affected 12 districts

Damage to sanitation facilities and infrastructure is also significant in all the worst affected upazilas surveyed. Sanitation needs are significant for an estimated 1.3 million people. For some of the worst affected areas, physical damage to household latrines was fairly common with one estimate putting the percentage of slab latrines damaged or destroyed as high as 70 percent.

According to the official information of DPHE as of 21 January 2008, table 3.2 shows that total 55,279 latrines are partially and fully damaged in 12 highly affected districts. Highest damage of latrines occurred in Bagerhat (22,000) followed by Gopalganj (15,259) and Barisal (5,631).Total estimated loss is about 1.3 million US dollars.

Table 3.2: No. of Damaged Latrines in 12 Affected Districts

District	Barisal	Jhalokathi	Pirojpur	Bhola	Patuakhali	Barguna	Bagerhat	Satkhira	Khulna	Shariatpur	Madaripur	Gopalganj	Total
Latrine	5,631	1,680	1,505	1,300	1,750	1,060	22,000	175	1,912	1,540	1,467	15,259	55,279

Response

According to Department of Public Health Engineering (DPHE) about 12,984 of 221,039 total numbers of mechanised water sources (tube-wells, rain water harvesters, pond sand filter etc.) were affected of which 10,951 (84%) have been rehabilitated. Total 8,082 (82%) out of 9,289 surface water ponds available for safe drinking water have been reported as being cleaned. In addition, 25 mobile water treatment plants are currently operational providing an average 2,000 litres per hour potable water each.

- Total 354 new tube-wells are installed through contracting and WatSan committees.
- A total of 145,831plastic jerrycans have been distributed in worst and badly affected districts.
- Total 6.3 millions of Water Purification Tablets (WPT) distributed among the affected people.
- About 19 thousand kg of bleaching powder and 59,015 kg of lime were distributed for decontamination of water sources.
- About 17 thousand kg of Alum was distributed to purify drinking water.
- About 76 thousand litres of bottled water distributed among the affected people to meet their immediate need of drinking water.
- Some 38 HDP mobile tanks are being used in Khulna district to supply water in the cyclone affected areas.
- US army team purified and supplied drinking water among the affected people using Specialised Reverse Osmosis (RO) process of water purification.
- The supply of water containers appears to be up to 500,000, consisting of 200,000 from the International Federation of Red Cross and Red Crescent Society (IFRC), 100,000 from the United Nations Children's Fund (UNICEF) and around 200,000 from other sources.

Strategies

The official reports of DPHE indicate the estimation of the short term and long term rehabilitation water and sanitation systems. The report shows that about 18 million US dollars are required to excavate and re excavate of ponds including land acquisition and dewatering of damaged ponds. Total 1.28 million USD is required for rehabilitation of Pond Sand Filter (PSF) System, 28.5 million USD for tube well installation and repairing. About 30 million USD is required for the installation of new latrines and repairing of damaged latrines.

Short-term

- Bottled water is a temporary but necessary support.
- Dewatering of ponds and removal of sludge before the monsoon
- Excavation and re excavation of ponds
- Establishment of water quality testing and monitoring system.
- The installation of deep/shallow tube-wells in the worst affected upazillas i.e. Morelgonj, Kathalia, Mathbaria, Bhandaria, Kalapara pourashava, Galachipa, Betagi and Amtali is needed.
- In places where tube-wells are not feasible, water treatment plants need to be installed, especially in the small river ports, near 30 *ferry ghats* (30 plants) of the upazilas of Mongla, Sarankhola char, Kalapara, Patharhata and Bamna.
- Strengthening of hygiene promotional activities and school sanitation programme.

- WASH cluster partners to support community based hygiene promotion to complement sanitation provision.
- Although there are no reports of widespread open defecation, which would constitute a major health risk, the repair and provision of latrines must remain a priority. And this work should be accompanied by strong hygiene promotion activities. The main issue is destruction of latrine superstructure and covering pits with debris.

Mid to Long-term

- Existing and newly built cyclone shelters need to be equipped with drinking water facilities so that the affected people can fetch water from there during and after the disaster.
- People need to be aware and transfer skill of storing water for emergency situation.

3.3 Shelter

(There are two parts to the Shelter: A. Housing and B. Cyclone Shelter.)

Impacts

A. Housing

Over 564,967 houses are fully damaged and 957,110 houses are partially damaged. Bagerhat suffered the most in terms of fully damaged housing (118,899 houses, 22%), followed by Barguna (95,412), Jhalakathi (69685), Pirojpur (63,896) and Patuakhali (53,291).

The MoFDM official report shows that total 537,775 houses are fully damaged and 854,344 houses are partially damaged in worst affected and badly affected 12 districts (Figure 3.5). The data shows that 95% of the fully damaged houses occurred in highly affected 12 districts. Out of 12 districts' fully damaged houses 22% occurred in Bagerhat district.

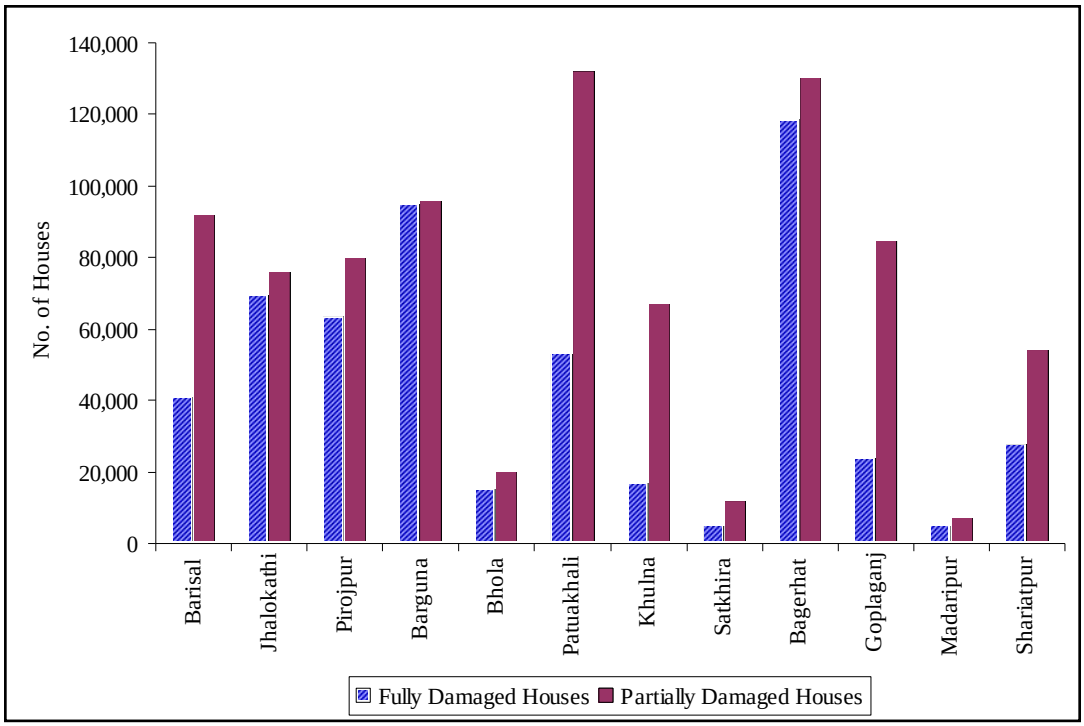

Figure 3.5: Houses damaged at worst affected and badly affected 12 districts

- The overall impact on housing has been significant, with a loss of 11.5% of shelters in some districts.
- Coastal area residents are mostly poor and usually use locally available materials to build their houses. Most of the houses are made by bamboo and *gol* leaf or thatches used for roofing. Some houses are fenced by bamboo and others by a mud wall. Very few houses are semi-*pucca*, made of brick wall and corrugated-iron (CI) sheet.
- Both *kutcha* and semi-*pucca* houses are vulnerable to cyclone. Both types of houses are damaged during the Sidr hit on 15 November 2007.
- Although, some reconstruction has occurred across the affected area since late November 2007, it is also clear that many families remain in makeshift shelter without the apparent resources to rebuild their own. To determine the scale of these outstanding needs, the Shelter Cluster participated in the UNDP/DMB early recovery assessment. The results of this assessment provide the following information
- The government's damage assessment estimations in the housing sector have been confirmed with the finding of the assessment.
- An estimated 66% of affected households with fully damaged houses and 83% of affected households with partially damaged houses should be able to rebuild their homes without external assistance according to community FGDs.
- Approximately 200,000 families or 1,000,000 people remain in need of shelter assistance.
- Roughly one third of this number has completely lost their home and requires complete housing assistance.
- Two thirds require assistance to repair their partially damaged house.
- Strong community reconstruction skills as demonstrated by rapid recovery indicate high capacity for self reconstruction within the community

Estimation of Costs

- On average, a *kutcha* house costs BDT 10,000 and the semi-*pucca* house roofing with CI sheet BDT 100,000.
- It is estimated that a fully damaged semi-pucca house needs repairing costs about BDT 25,000 and for a partially damaged semi pucca house needs about BDT 10,000. It is also assumed that an amount of BDT 10,000 needs to repair a fully damaged kutcha house and BDT 5,000 for partially damaged kutcha house (The cost is quoted from the detailed calculation of damage repair costs per household and house type of Flood Report, Sept. 2007).
- 564,967 houses are fully damaged and 957,110 houses are partially damaged in all districts.
- Both fully and partially damaged houses are mostly owned by the poor and vulnerable families. Therefore, more than 80 percent house owners (1.14 million people) will require reconstruction support from the Government and humanitarian agencies.
- It is estimated that 70 % of housing is *kutcha* and 30 % semi-*pucca* in the affected areas.
- The estimated reconstruction cost of fully-damaged houses is BDT 8,192.05 million (USD 120.51 million). For *kutcha* houses, it is BDT 3,954.8 million or USD 58.2 million (564,967 x 70%x BDT 10,000). For semi-*pucca* houses, it is BDT 4,237.25 million or USD 62.31 million (564,967 x 30% x BDT 25,000).
- The estimated amount of repair of partially-damaged houses is BDT 6,221.22 million (USD 91.49 million). For *kutcha* houses, it is BDT 3,349.89 million or USD 49.26 million (957,110 x 70% x BDT 5,000). For semi –*pucca* houses, it is BDT 2,871.33 million or USD 42.23 million (957,110 x 30% x BDT 10,000). Total value of the loss of housing stock is BDT 14,413.27 million (USD 212 million).

Table 3.3: Estimated cost for short term house reconstruction programme for worst affected and badly affected 12 districts

Sr No	Name of District	Total Household (No.)	Total Vulnerable Household (FHH, Widow) [No.]	Total Vulnerable Population (FHH, Widow) [No.]	Damaged Houses		Vulnerable Damaged Houses		Construction Cost for Damaged Houses for vulnerable people		Total Construction Cost for vulnerable peoples House	Construction Cost for Damaged Houses		Total Construction Cost for Damaged Houses
					Full (No.)	Partial (No.)	Full (No.)	Partial (No.)	Full (Tk. 20,000/HH)	Partial (Tk. 10,000)	Tk.	Full (Tk. 20,000/HH)	Partial (Tk. 10,000)	Tk.
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
							(F*5%)	(G*5%)	(H*Tk.20,000)	(I*Tk. 1,000)	(J+K)	(F*Tk.20,000)	(G*Tk. 1,000)	(M+N)
1	Barisal	475680	23,784	118,920	41,470	92,242	2,074	4,612	41470000	46,121,000	87,591,000	829,400,000	922,420,000	1,751,820,000
2	Jhalokathi	145700	7,285	36,425	69,685	76,108	3,484	3,805	69,685,000	38,054,000	107,739,000	1,393,700,000	761,080,000	2,154,780,000
3	Pirojpur	233160	11,658	58,290	63,896	80,315	3,195	4,016	63,896,000	40,157,500	104,053,500	1,277,920,000	803,150,000	2,081,070,000
4	Borguna	180060	9,003	45,015	95,412	96,245	4,771	4,812	95,412,000	48,122,500	143,534,500	1,908,240,000	962,450,000	2,870,690,000
5	Bhola	328540	16,427	82,135	15,389	20,300	769	1,015	15,389,000	10,150,000	25,539,000	307,780,000	203,000,000	510,780,000
6	Patuakhali	280980	14,049	70,245	53,291	132,369	2,665	6,618	53,291,000	66,184,500	119,475,500	1,065,820,000	1,323,690,000	2,389,510,000
7	Khulna	494800	24,740	123,700	17,323	67,011	866	3,351	17,323,000	33,505,500	50,828,500	346,460,000	670,110,000	1,016,570,000
8	Satkhira	390080	19,504	97,520	5,293	12,245	265	612	5,293,000	6,122,500	11,415,500	105,860,000	122,450,000	228,310,000
9	Bagerhat	321640	16,082	80,410	118,899	130,675	5,945	6,534	118,899,000	65,337,500	184,236,500	2,377,980,000	1,306,750,000	3,684,730,000
10	Gopalgang	217440	10,872	54,360	24,133	85,000	1,207	4,250	24,133,000	42,500,000	66,633,000	482,660,000	850,000,000	1,332,660,000
11	Madaripur	231920	11,596	57,980	4,991	7,509	250	375	4,991,000	3,754,500	8,745,500	99,820,000	75,090,000	174,910,000
12	Shariatpur	213240	10,662	53,310	27,993	54,325	1,400	2,716	27,993,000	27,162,500	55,155,500	559,860,000	543,250,000	1,103,110,000
	Total	**3,513,240**	**175,662**	**878,310**	**537,775**	**854,344**	**26,889**	**42,717**	**537,775,000**	**427,172,000**	**964,947,000**	**10,755,500,000**	**8,543,440,000**	**19,298,940,000**
	Total Cost in USD (68Tk. = 1 USD)								**7,908,456**	**6,281,941**	**14,190,397**	**158,169,118**	**125,638,824**	**283,807,941**

Note: Female-headed households are comprised of 5% of the total population who are the most vulnerable to any hazard risks. It is therefore assumed that at least 5% of the fully and partially damaged houses belong to this vulnerable groups and the development assistance should target them first. In this table the estimation is made to find out how much money would be required to rehabilitate the housing facility of this group. For this it is assumed that to reconstruct a (15 x 15 ft) house with CI sheet roof and CI sheet fence would require on average of BDT 20,000. It is also assumed that to repair a partially damaged (15 x 15 ft) house with CI sheet roof and CI sheet fence needs average BDT 10,000. However, construction of a cyclone resistant house will cost about BDT 100,000.

Key Considerations

- Providing cyclone-resistant or cyclone-resilient housing model will be a significant challenge.
- To build a cyclone-resistant house may require more than BDT 100,000. An amount of USD 284 million would be required to reconstruct the damaged houses in 12 highly affected districts (Table 3.3). This estimate assumed that to reconstruct a fully damaged house is required BDT 20,000 and for a partially damaged house BDT 10,000).
- Technical assistance is required to help vulnerable communities with the design and development of affordable resilient housing that uses local materials and can be easily maintained.

Response

- The government decided to compensate the housing damages for the poor and vulnerable families.
- Chief Adviser's fund provided an amount of USD 19.9 million for reconstruction of houses for the people who lost their houses during the cyclone. Together with Ministry of Food and Disaster Management distributed an amount of USD 7.57 million for repairing of partially damaged houses among the people of worst affected and badly affected 12 districts (Table 3.4).
- In addition, 13,000 bundles of CI sheets, 13,406 pieces of tent and 15,000 pieces of plastic sheet are distributed among the affected people in 12 districts.
- Kingdom of Saudi Arabia has agreed to fund reconstruction of about 21,000 houses.
- Government of India has offered in rehabilitating 5 villages.
- Engineering cell of Directorate of Relief and Rehabilitation (DRR) has designed a cyclone resistant housing model which costs about BDT 100,000.

- Donor partners and NGOs have begun providing temporary shelter materials in the affected areas. USD 1.94 million has been disbursed for housing purposes through the NGO community in the cyclone affected areas.

Table 3.4: GoB distributed amount for repairing of damaged shelter in 12 affected districts

Sr No	Name of District	DRR (BDT)	Office of CA (BDT)	Total (BDT)
A	**B**	**C**	**D**	**(C+D)**
1	Borguna	31,925,000	435,000,000	466,925,000
2	Patuakhali	184,500,000	130,000,000	314,500,000
3	Pirojpur	181,900,000	110,000,000	291,900,000
4	Bagerhat	34,500,000	435,000,000	469,500,000
5	Barisal	15,300,000	45,000,000	60,300,000
6	Bhola	16,000,000	35,000,000	51,000,000
7	Jhalokathi	16,000,000	75,000,000	91,000,000
8	Satkhira	10,500,000	13,396,000	23,896,000
9	Khulna	6,000,000	32,500,000	38,500,000
10	Shariatpur	6,000,000	12,500,000	18,500,000
11	Madaripur	6,000,000	17,500,000	23,500,000
12	Gopalgang	6,000,000	12,500,000	18,500,000
	Grand Total	**514,625,000**	**1,353,396,000**	**1,849,521,000**
	BDT (million)	**514.63**	**1,353.40**	**1,868.02**
	USD (million)	**7.57**	**19.90**	**27.47**

Strategies

One concept that has become very popular among member agencies of the Shelter cluster is the concept of "Core Shelter." This concept, broadly stated, is the construction of a small house of very strong Cyclone-resistant materials that can latter be added onto by beneficiary households with storage spaces, verandas and extra rooms. This progressive approach to shelter provision ensures that it acts as a stepping stone to strong, cyclone and flood-resistant housing that will reduce households' vulnerability to future storms. It is important also to consider salinity during selection of housing materials as salinity is one of the persistent risk factors for strong houses in the area.

Short-Term (next four weeks)

- Immediately the most vulnerable beneficiaries — widows, female-headed households, the elderly, the handicapped and the extremely poor — need to be identified and provided with cash support to rebuild their houses.
- The priority would be given housing assistance to the vulnerable people. If the homeless do not have shelter soon, they may suffer further in the next monsoon.

Mid- to Long-Term (up to four months and beyond)

- Bangladesh Bank has a housing programme for poor communities. This programme needs to be scaled up in the cyclone affected areas to help the lower income group access financial support for building cyclone-resistant houses in the affected districts.
- Other organisations must encourage channelling low or interest-free loan for housing in the affected area.

B. Construction of Cyclone Shelters

The cyclone confirmed that there were not enough shelters available to the high risk communities. Many people had to walk long distances and still could not find safe haven. People in remote areas or on islands and chars may have had no means of moving to shelters.

A survey undertaken by CEGIS in 2004 revealed that very few shelters provided facilities for the special needs of women, while almost all of them did not cater to people with disabilities. Seventy-nine percent of the shelters inspected provide no facilities for sheltering livestock, while about 87 percent had some form of structural vulnerability.

Further, it seems logical that the larger shelters be complimented by community specific smaller shelters that have the capacity to store a quantity of relief items for the critical period immediately after the cyclone.

Strategies

The construction of "Model Shelters" can be an effective solution when a large portion of the target community is able and is in the process of rebuilding their own shelters. In the construction of the model shelter, skilled and unskilled members of the community that will be involved in the construction of future houses are invited to learn new construction techniques that improve the structural strength and disaster-resistance of the houses they construct. This program can be combined with small scale material assistance or loan programs to provide impetus to spur the rebuilding.

One of the most striking findings of the Shelter Cluster's early recovery assessment was that only 12% of respondents took shelter in official Cyclone Shelters, despite the ease of access they had to these shelters. Rather they preferred to stay in a strong building located in their immediate surroundings. The Cyclone Shelters for the future, however, should be built more like community centres, closer to population centres and more conducive to being used for regular community activities such as weddings or as school houses. It is also important that all Cyclone Shelters should be approved through government established central committees run in Dhaka that look at approval process of shelter designs and locations.

<u>Short-Term</u>

- Revisit the existing national cyclone shelter plan with a view to planning the construction of new shelters, including community specific shelters.
- DMB, CARE and CEGIS have identified at risk cyclone shelters across the cost, which need to be rebuilt or retrofitted in a way that it will be usable by next cyclone season.

<u>Mid- to Long-Term</u>

- The construction of shelters should take into consideration risk mapping and other prediction models based on an all hazards approach. This means that shelter design would consider such hazards as storm surge, cyclonic winds, flash flooding, tsunami and earthquake.
- People opined that in last Sidr most of the people took shelter in best houses in their neighborhoods. They also recommend that if in a cluster one house is built better and stronger enough to sustain in cyclone and surge, then that is the best approach as they can also take care of their household assets closely during and immediately after cyclone onsets.
- Animal shelters should be built.

3.4 Health and Nutrition

Impacts

There is concern of outbreak of water-borne diseases, such as acute diarrhoea, gastroenteritis, typhoid, hepatitis and communicable diseases like acute respiratory infections and pneumonia because of lack of safe water supply and sanitation facilities damage. Nonetheless, the current health and medical needs are relatively low. Although the storm resulted in a loss of electricity in many places, most hospitals and clinics were able to keep vaccines in cold temperature through the use of generators, cold boxes and other means. The pre-positioning of essential drugs and medicines including Water Purification Tablets was a major advantage in terms of preparedness and response.

According to the UN Rapid Initial Assessment, approximately 1.5 million people in the nine surveyed districts are at risk of communicable diseases — diarrhea, dysentery, acute respiratory infection and pneumonia. Children aged five years or younger are especially vulnerable. In order to prevent an outbreak of diarrhea, emergency medical support needs to be continued, in addition to the provision of drinking water. Some of the hospitals in worst affected upazilas are partially damaged and are in need of immediate repair, as they are the only source of medical care service to those living in remote areas.

Some 55,282 people who got injury during the cyclone may cause further deterioration in the health sector if the do not have proper treatment facilities.

Response

There were buffer medicine stocks available in Barisal, Khulna and Bagerhat headquarters before the cyclone hit. Medical personnel were dispatched to the area in advance to be ready for early response. A Pakistan medical team has been treating people with injuries in Bhandaria. The U.S. medical team at Patuakhali operated a 250 bed hospital. A detailed information about the coordinated responses in medical support activities is given in Annex -5 ("Who, What, Where" for the Health Coordination).

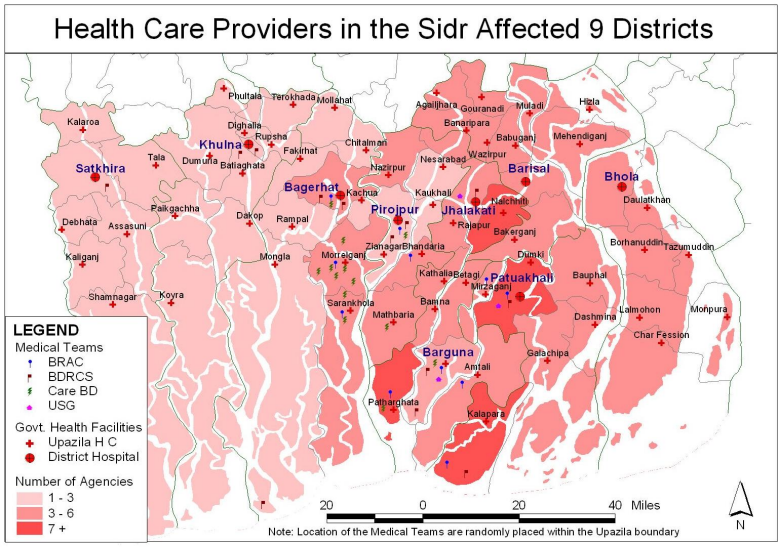

Figure 3.6: Health care provision in Sidr affected nine districts (out of twelve)

Fifty-six hospitals are located in the worst affected Upazillas (Figure 3.6). Each of these hospitals has an average capacity of 30 – 50 beds and serves a population of around 250,000. Some of these hospitals have been damaged. Access to the more peripheral units is blocked momentarily, rendering serious shortage of medical care. It is estimated that the damages sustained by the hospitals of Morelgonj, Sharonkhola and Rampal are affecting at least 700,000 people.

Strategies

An approach of institutional and supply coordination, with special priority to most vulnerable groups, will ensure timely delivery of medicines, reagents and replacement of damaged health and medical equipments at Sadar hospitals, Upazila Health Complex, and Union Sub-centres. Health education and capacity building in the sector is a priority. The followings are the strategies for short term and long term interventions in health sector:

- Reinforce surveillance to identify critical interventions
- Critical Health care management
- Promotion of Health Education
- Immunization in low performing area
- Capacity Building
- Support adequate logistic supplies of emergency medicines & reagents and replacement of damaged health and medical equipment (at district Hospital, Upazila Health Complex, and Union Sub Centre).
- Reduce outbreak of water and food borne diseases and communicable diseases. Restore buffer stock of essential drugs and ensure immediate supply of emergency drugs and equipment.
- Provide front-line health workers with adequate emergency health equipment and supplies to speed up the public health response mechanism
- Strengthen communicable disease surveillance to speed up detection and control of waterborne diseases, particularly diarrhoea and dysentery, enteric fever, hepatitis and skin infections. Reduce outbreak of water & food borne diseases, communicable diseases and save thousands of lives.
- Provide support for essential public health needs such as maternal health and other reproductive health services, newborn health services and immunization in emergency.
- Address the major causes of death, fill gaps in and improve access to health care by:
    a. Supporting vaccination campaigns as appropriate, to reduce mortality risk and improve immunization coverage among the most vulnerable groups.
    b. Providing the district health authorities with medicines and medical supplies for prompt containment of any outbreak.
    c. Reinforcing and widening access to health care for mothers and newborns through the mobilization of nurses and skilled birth attendants.
    d. Conducting crash training of health workers and volunteers as well as educating and mobilizing communities on health promotion, psychosocial support to mental health care, water and sanitation, food safety, and collective and individual hygiene.
    e. Assisting the work of partners in the Water and Sanitation Cluster by concentrating on water supply and sanitation of health facilities, as well as conducting evidence-based advocacy and education for water safety and control of the quality of drinking water for the general public.
    f. Spraying shelters and distributing impregnated mosquito nets to reduce the risk of vector-borne diseases
- Providing operational and logistics assistance to Ministry of Health for the deployment of its human and material resources into the worst affected areas.
- Reactivating damaged health facilities through the provision of medical equipment, clean water and generators, funding minor ad-hoc repairs, etc.

3.5 Community Infrastructures

Social and economic infrastructures have been damaged and needs to be repaired in order to facilitate recovery and rehabilitation efforts. Extensive infrastructure damage has been inflicted on schools, roads, bridges, culverts and embankments. The most damage took place in Barisal, Pirojpur, Barguna, Jhalakathi, Bagerhat and Patuakhali. The main infrastructure damaged or destroyed was roads, bridge/culvert, embankments, inland water transport and school building (Annex 4). Repair will be made through employment intensive public works schemes that maximise the use of local labour and materials.

Roads

Impacts

Sidr impacted on 8,075 km roads in 11 of 30 affected districts. Of the 8,075 km roads, 1,714 km are fully- and 6,361 km partially-damaged. Major damages occurred in Barguna (1,808 km), Jhalakathi (1,808 km) and Pirojpur (1,642 km) and Patuakhali (838 km partially damaged only) districts.

Breakdown of key elements

Roads are mainly damaged in the districts along the coastline or on the bank of estuarine rivers. Most of the damaged roads are embankment-cum-roads and were destroyed by high tidal surge during the cyclone. Of the total damaged roads, Roads and Highway owns 1,172 km regional and national highways, LGED owns 3,746 km (carpeted 2,075.87 and earthen 1,670.20 km) roads. Table 3.5 shows that at LGED owned roads highest damage was occurred in Bagerhat (922 km) followed by Pirojpur (626 km) and Barguna (564 km).

Table 3.5: LGED owned damaged roads in 12 highly affected districts.

District	Barisal	Jhalokathi	Pirojpur	Bhola	Patuakhali	Barguna	Bagerhat	Satkhira	Khulna	Shariatpur	Madaripur	Gopalganj	Total
Roads (km)	387	173	626	126	471	564	922	32	115	30	0	35	3,481

Estimation of Costs

As reported by the Deputy Commissioners (DCs) of 46 flood-affected districts during development of Flood Report 2007, average cost per km of carpeted road was around BDT 2 million and average repairing cost per km of carpeted road was around BDT 1 million. Building of other roads coast above BDT 0.40 million for each km of road and repairing costs BDT 0.16 million per km.

However, the average cost mentioned can be used in the calculation. Some roads are constructed on the embankments which are not possible to construct until the damaged embankments are replaced.

Response

- Debris on main roads has been cleared by the concern departments to establish communication facilities.
- Roads and Highways (R&H) identified 35 damaged roads and developed a short-term and long-term plan for reconstruction of the roads.
- The short-term plan cost to an amount of USD 40.50 million and the long-term plan cost to an amount of USD 294 million as estimated by R&H.
- LGED report indicates that BDT 17.0 million is spent under repairing and maintenance of rural roads and culverts programme in 17 districts of Sidr affected areas.

Strategies

The key design features of the public work programmes will be guided by basic principles derived from international best practices. The most important of these principles is that wages are not set above the prevailing market wage for unskilled labour to ensure that those who are able to work and have lost their livelihoods among the communities 'self select' into the programme. Other important aspects are the inclusion of vulnerable groups and the implementation of disaster mitigating measures by adopting minimum design standards.

Short-Term

Debris on main roads has been cleared. Earthen roads in the rural area need to be reconstructed for reinstating the rural communication network, as well as to create employment opportunity for the jobless people.

Mid- to Long-Term

Most of the roads damaged during the cyclone are either on the embankment or behind the embankment. Embankments are crucial in protecting the roads. Thus, the embankments need to be rebuilt considering the tidal surge during the cyclone.

Bridges/Culverts

Impacts

A total of 1,850 numbers of bridges and culverts damaged during the cyclone in three districts. Highest numbers of bridges/culverts (1,797) damaged in Barguna district followed by Pirojpur (33) and Jhalakathi (20). Besides, numbers of bridges/culverts in 11 districts those are owned by LGED were damaged during the cyclone.

LGED calculated the length of those damaged bridges/culverts to 23.13 km. LGED reported data indicates that highest damage of culverts and bridges occurred in Bagerhat district (6.6 km) followed by Patuakhali (2.04 km) and Barguna district (1.7 km).

Breakdown of Key Elements

Most of the bridges and culverts were destroyed with the roads. Some of the bridges and culverts were constructed by the Bangladesh Water Development Board (BWDB) and some by the Local Government Engineering Department (LGED). These structures are usually constructed to drain out monsoon water and to facilitate tidal actions of the estuarine rivers. These structures are small in size but imply high costs in the coastal area, especially if they are within the polder area.

Response

Ministry of Food and Disaster Management, Local Government Engineering Department (LGED) and Roads and Highways Department conducted a rapid damage and need assessment. LGED has started repairing of damaged culverts and bridges under emergency maintenance programme in 17 Sidr affected districts.

Strategies

Short-Term

Need to develop alternative facilities to establish communication facilities and to carry relief and rehabilitation materials in the cyclone affected areas.

Mid- to Long-Term

Old bridges/culverts were not constructed to facilitate the natural drainage system and biodiversity issues. New infrastructure will take into consideration ecologically sensitive zones, the average rainfall, and flooding and tidal surge issues.

Embankments

Impacts

The cyclone Sidr caused massive damage in embankments mostly constructed by Bangladesh Water Development Board (BWDB). The BWDB official report confirmed that around 2,290 km of embankment damaged partially or fully in 15 coastal districts. Of the 2,290 km affected embankment, 362.45 km are fully damaged and rest of the embankment is partially damaged. Out of 15 districts total 8 districts are under worst affected and badly affected districts. Total 303 km embankments are fully damaged and 1,584 km are partially damaged in eight districts. Figure 3.7 shows that highest damage occurred at Patuakhali (665 km) followed by Barguna district (605 km). In addition to that some supporting and related structures also damaged during the cyclone in the coastal areas. The BWDB report also showed that 314 water control structures are fully damaged and 473 are partially damaged. The total damages cost to an amount of USD 70.76 million as estimated by Bangladesh Water development Board.

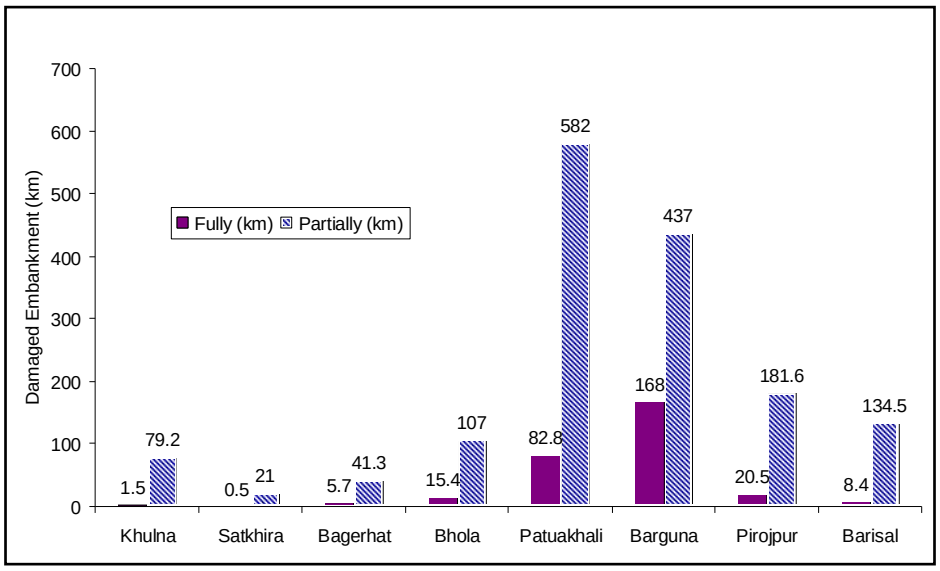

Figure 3.7: Damaged embankment in eight Sidr affected districts (Date source: BWDB)

Breakdown of Key Elements

The embankments are constructed and maintained by Bangladesh Water Development Board. The primary objective of the coastal embankment is to protect saline water and tidal surge. Since most of the embankments are on the banks of big rivers, high risks are involved to rebuild them.

Estimation of Costs

On average, each km of embankment costs BDT 8 to 10 million (refer to district Flood Report 2007). Repair costs of one km of partially damaged embankment are BDT 2 to 2.5 million. The total damages cost to an amount of US$ 70.76 million as estimated by Bangladesh Water development Board. However, the rehabilitation amount as estimated is US$ 104.00 million.

Response

Damages and need assessment done by BWDB.

Strategies

Short-Term

- Construction of embankments needs to start immediately; otherwise the normal high tide may inundate the next season crops with saline water. Immediate start of embankment building will create employment generation for local people which will contribute to livelihood security in the cyclone affected areas.
- Drain out the stagnant saline water trapped inside the embankments and helping community to dewater the contaminated ponds

Mid- to Long-Term

- Embankment is the primary infrastructure which protects other infrastructures, crops and lives. The embankment must be constructed to take account of the height and speed of the tidal surges during cyclones.
- Reconstruction and or repair of the fully and partially damaged embankments and sluice gates before the next monsoon season.
- Rehabilitate the river bank protection works before the next monsoon season.
- Adopt necessary precautionary / preventing measures using the lessons learnt

3.6 Inland Water Transport

Impacts

- Super cyclone Sidr had severe impacts on the inland water transport, damaged pontoon, supporting equipments (such as, boyar, beckon, mark etc.) jetty, gangway, auto-gaze, dredger and dredger related supporting equipments etc.
- The official report of Bangladesh Inland Water Transport Authority (BIWTA) indicates that out of 475 pontoons total 128 are affected, in which 14 are fully and 11 partially sunk, 2 pontoons are missed and 101 pontoons are dislocated.
- Ten lighted boyars, 60 tower beckon, 15 spherical boyars, 80 concrete & iron poles and 2,500 bamboo signs (marks) either damaged or displaced.
- Of the 255 jetties and 55 gangways, 23 jetties/gangways damaged during the cyclone.
- Eight gaze stations and 2 dredgers are damaged. 1,020 feet floating pipe, 19 pair floaters and 9 roof sheets of 2 dredgers are also affected. Apart from these, one antenna of wireless set was taken off by the cyclone.

Breakdown of key elements

- The inland water transport consists of ferries/launch/steamers, dredging units, pontoon, jetty, gangway, auto-gaze, boyar, beckon, mark etc.
- Most of the elements are vulnerable to salinity and their maintenance cost is comparatively high.
- Precautionary measures are taken before the cyclone but it is not possible to take all of them out of risk zone of the cyclone since some the infrastructures are permanent.

Estimation of cost

- Major cost involved for restoration and reconstruction of inland water transport infrastructures and equipments with searching and labour. Bangladesh Inland Water Transport Authority (BIWTA) has been working for repairing the damaged elements.

Response

- One pontoon in Barisal district rescued and restored. Alternative options created for rest of the pontoons (13 numbers) as restoration will take time.
- Decision was made to call auction for 3 sunken pontoons as those were seems not profitable to rescue.
- Locations of the missing pontoons are identified by BIWTA immediately after the cyclone.
- Out of 101 dislocated pontoons, 43 are brought back to their place (reinstated) for normal functioning. BIWTA is working to reinstate the others displaced pontoons.
- BIWTA is working to reinstate the affected/displaced supporting equipments and expected to be accomplished by the end of February 2008.
- The rescue team of BIWTA identified some of the missing elements of dredging units and they are working to make it functional within a short span of time.

Strategies

Short-Term

- Keep continue of search and rescue activities of the missing and dislocated elements.

Mid- to Long-Term

- Complete the repair and replacement work of the damaged ferries/jetties and landing stations for the launch/steamer/ships to restore normal service.

3.7 Electricity

Impacts

The cyclone Sidr severely affected transmission and distribution system of Bangladesh Power Development Board (BPDB). The most affected areas is the southern part of the country which is under west zone of Bangladesh Power Distribution Company (WZPDCO). The impacts compounded to hampering of industrial productions and irrigation for boro cultivation. The electricity operated saw mills and rice husking mills in rural areas of the affected districts were not functioning due to cut of power. This has affected the production of those small businesses as well as affected the livelihoods of the people those are dependent on it. The WZPDCO estimated the lost for their area about BDT 57.0 million.

The official report of Rural Electrification Board (REB) showed that total 7,774 electrical poles were broken and 35,207 poles were inclined due to high wind speed. In some areas the poles were broken due to falling of trees on the distribution lines. It was also reported that total 154 towers and 27,361 meters are damaged. The REB estimated total damage is about BDT 3.9 million.

The officials of REB at Gopalganj opined that the distribution lines were severely affected by falling of trees as these are established alongside of the roads with huge numbers of tress. The officials

recommended that if the main lines are installed a bit away from the road sides the damage will be less due to falling of trees.

But executive engineer of BPDB of Sariatpur opined that their main lines are at bit far from the road sides, which took a bit longer time for repairing due to inaccessibility immediately after the cyclone.

Strategies

The official report of REB indicates that all the partially damaged sub stations are repaired within one month after the cyclone. But in many cases the equipments need to be replaced or repaired in short term or long term for supply of electricity uninterruptedly.

The official reports of BPDB showed that the overhead lines needs to be replaced in different locations. The distribution towers and sub stations needs to be repaired. The retrofitting of equipments and procurement of spares for buffer stock at district levels would an important step for long term recovery strategy.

3.8 Telecommunication

Impacts

The official report of Bangladesh Telegraph and Telephone Board (BTTB) indicates that the infrastructures of telecommunication systems had severely damaged at worst affected and badly affected 11 districts. It was reported that microwave backbone link, frequency distribution tower and antennae were severely damaged in Pirojpur, Jhalakathi, Bagerhat and Barisal districts. It was observed that in most cases the damages occurred due to high wind speed and fallen of tress on the distribution lines. Other infrastructures such as transformers, generator of exchange offices, staff quarters, distribution cables, and cabinets were damaged fully or partially in most of the highly affected districts. The estimated loss was about BDT 2,006 million (USD 29.5 million).

Strategies

The BTTB has repaired and restored the telecommunication systems functioning in most of the affected districts immediately after three days of the cyclone. The full repairing and rehabilitations of the partially and fully damaged systems will take short to long period. The official data showed that for short term repair and rehabilitation will include replacement of underground cable, drop wire, repair of solar cell generators, mobile engine generators, cabinets and electric lines. The total estimated costs about BDT 118.0 million (BDT 1.735 million).

The mid to long term repairing and rehabilitations of the telecommunication systems will include repairing of office buildings, establishment and upgrading of long range wireless communication system including phone, fax and internet facilities. The CDMA system will be installed for the coastal upazilas with a capacity of 200 subscribers for each unit. The total estimated cost for mid to long term rehabilitation is about BDT 1,888 million (USD 27.76 millions).

3.9 Education

As a result of Cyclone Sidr, an estimated 4,231 school/college buildings were totally and an additional 12,723 partially damaged in the affected districts. The highest numbers of school building fully damaged were in Pirojpur district (2,061), followed by Bhola (665), Barguna (413) and Patuakhali (351), districts. In both cases (full and partial damages), more school buildings were affected in Barisal district (4,434).

More recent rapid assessment data of the affected districts indicates that 69 percent of 11,155 educational institutions were affected of which 1,373 (12%) schools were totally damaged, and 6,306 (57%) schools were partially damaged. Affected children were estimated at 1.5 million (49% girls) of which more than 90% regained access to schooling in permanent or temporary spaces. Institutions surveyed include pre-primary, primary, secondary and madrashas in the government and non-government education sectors.

One of the most severe effects of the cyclone is undoubtedly on the education of the children. In addition to the emotional strain of disrupted routines and normalcy, Sidr destroyed educational infrastructure and swept away children's books and school supplies making it difficult for them to resume educational activities even when facilities reopen. The Government of Bangladesh estimates that 4,182 educational institutions were totally destroyed and an additional 12,009 were partially damaged in 12 worst and badly affected districts as a result of the cyclone. The districts least affected in terms of education were Khulna and Satkhira.

A. Primary Education

Impacts

Total 4,489 primary educational institutes which included government primary schools, registered primary schools and community primary schools are fully or partially damaged in 19 districts of 30 cyclone affected districts.

According to the official report of the UN rapid assessment team that 73.5 percent of primary education institutions were affected by the cyclone though the percentage was much higher in some districts, such as Barguna, Patuakhali and Pirojpur with more than 80 percent of primary institutions affected. For government primary schools, 9.6 percent were destroyed, whereas a number percent of madrashas (16.9 percent) and NGO institutions (14.9 percent) were destroyed.

Total 784 primary educational institutes are fully damaged and 3,705 are partially damaged in 96 upazilas under 19 districts. The highest numbers of school building damaged (fully) in Barguna district (230) followed by Pirojpur (149), Patuakhali (98), Barisal (91) and Bagerhat (68) districts. The highest number of primary schools are partially damaged in Barisal districts (632) followed by Patuakhali (550), Pirojpur (401), Barguna (335) and Jhalakathi (340). In both cases (full and partial damages), more school buildings are affected in Barisal district (723).

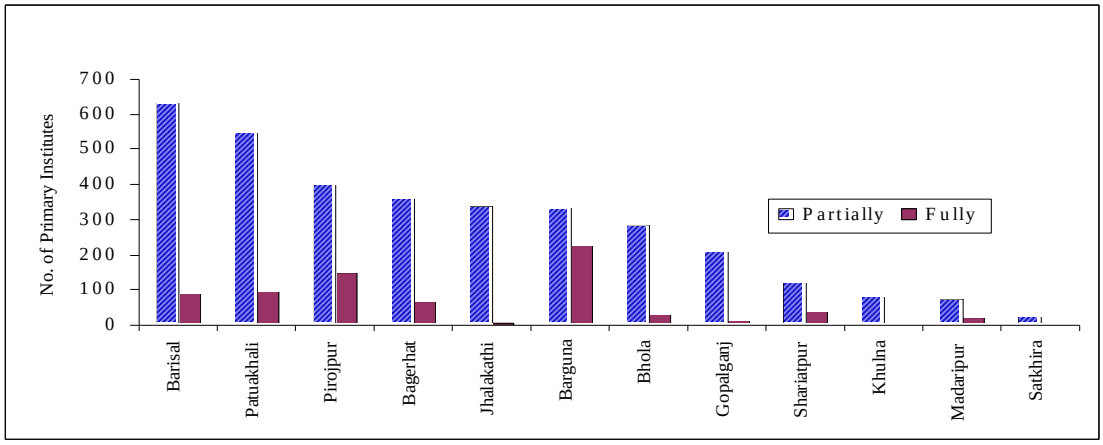

Figure 3.8: Damages of primary educational institutes at worst and badly affected 12 districts

Breakdown of key elements

Most of the primary school buildings constructed by GOB are *pucca* construction. The *pucca* buildings are almost saved, but the *semi-pucca* buildings were destroyed during cyclone Sidr. The

semi-pucca buildings are made of brick wall and CI sheet roofing which are vulnerable to cyclone and storm. Some of the *pucca* school buildings may have been washed out during the high tidal surge but no specific data is available.

Estimation of Costs

The official reports of the concerned department indicate that cost of damages (fully and partially) is around USD 52 million. Total USD 23 million will be required to reconstruct the fully damaged primary school building.

However, new school buildings may be constructed with new designs that can have multipurpose use. The schools need to build in way that they can be used as cyclone shelters in addition to the normal schooling. In that case, the cost may rise higher than that of the calculated amount. The partially damaged school buildings need construction soon to start next year educational activities within shortest possible period.

Response

Damage assessment done to take necessary actions for rehabilitation and reconstruction of the affected school buildings.

Strategies

In an effort to 'build back better' MoPME/DPE and the MoE, in close collaboration and coordination UNICEF and Save the Children Alliance, will coordinate within and across sectors to ensure that children's needs are addressed in a holistic and complimentary manner. Ensure that vulnerable children's access to education and rights to education has got priority.

Short-Term

- Repair and reconstruction of non-government supported schools

  While the partially damaged government supported schools have been repaired with the funds made available by the government, similar support has not been available for other types of schools especially most NGO supported schools. These schools are likely to start the new school year in facilities which are not adequate for proper teaching learning process. Besides, if external support is not provided, construction of such learning spaces is going to add additional burden on the already stressed communities. Hence, there is a need to support rehabilitation/ reconstruction of NGO supported schools and community learning centres. As such facilities have a simple structure by design; construction of permanent structure is not expected. This activity needs to be completed as soon as possible and not later than March 2008 when the temperature rises significantly.

- Reconstruction of Registered Non Government Primary Schools (RNGPS) and Community Schools

  Although the government provided funds for the repair of the RNGPS and Community Schools, it will not provide funds for the reconstruction of fully damaged RNGPS and Community Schools. There is a need to conduct a technical assessment of these facilities to establish that they provide reasonable security to the children and teachers. Based on such assessment, support needs to be provided to schools where such reasonable facilities are not available. There is also a need to look at the longer term needs of these schools.

- Provision of water and sanitation facilities

All transitional schools and rehabilitated schools will need to have safe drinking water and child friendly latrines.

- Supply of teaching/learning materials

  The GoB has replenished the supply of textbooks for most or all affected schools that have reopened. However, there is a need for teaching and learning materials for transitional schools both GoB and NGO/Community supported schools to be set up. These packages include student and teacher/classroom materials such as notebooks, pens, pencils, blackboards, school bags and other instructional materials based on the needs expressed in the analyzed assessment data.

Mid- to Long-Term

- The school building design and construction must be followed by the risk reduction issues. The location must be beyond the high risk zone.

- With support from the PEDP II donor consortium, MOPME is planning to construct the completely damaged Government Primary School. A certain percentage of these schools will be constructed as school / cyclone centres. As the construction is likely take almost two school years, transitional schools that will provide reasonable teaching learning spaces need to be constructed for these schools. These temporary schools will be constructed with locally available materials, ideally near original school sites. The exact need for such facilities will be identified getting the result of a technical assessment conducted by the DPE and the LGED. It is expected that approximately 500 transitional schools will need to be constructed.

- An emphasis will be given for capacity building in Disaster Risk Reduction (DRR) and Preparedness within the education sector in the medium/ long term. This activity will include GoB, UN, and NGOs/ CBOs education personnel at national, district, upazila and school levels. Consideration should be given to incorporate/develop academic courses on disaster preparedness and response.

B. Secondary and Higher Education

Impacts

As reported, 750 secondary school/college buildings are fully and 3,000 are partially damaged in 12 out of 30 cyclone affected districts. On average, a higher percentage of secondary education institutions were destroyed than other institutions, 17.3 percent. Overall 80 percent of secondary education institutions were affected in the target districts of the assessment.

As a result, the GoB postponed annual school examination in December and gave district level officials the authority to determine when primary schools should resume operations.

Breakdown of key elements

Most of the school/college buildings constructed by GOB are *pucca* construction. The *pucca* constructions are almost saved, but the *semi-pucca* constructions were destroyed during cyclone Sidr. The *semi-pucca* buildings are made of brick wall and CI sheet roofing which are vulnerable to cyclone and storm. Some of the *pucca* school buildings may have been washed out during the high tidal surge but no specific data is available.

Estimation of Costs

The cost of a new school/college building ranges from BDT 500,000 to 2,000,000. The average cost may stand at about BDT 750,000. The repair cost of a damaged building is estimated at BDT 100,000 by district level authorities.

Based on the average value of the school/college building and repairing costs, the value of fully damaged school buildings is BDT (2,240 x BDT 750,000) 1,680 million (US$ 24.70 million) and partially damaged BDT 1,149 million (US$ 16.90 million).

An equal amount is required to replace and repair the totally and partially damaged school buildings. However, new school buildings may be constructed with new designs that can have multipurpose use. The schools need to build in way that they can be used as cyclone shelters in addition to the normal schooling. In that case, the cost may rise higher than that of the calculated amount.

Response

The government has allocated BDT 255.40 million for repairing of 554 fully and 2,050 partially damaged secondary schools and colleges.

Strategies

Short-Term

Construction of school building-cum cyclone shelters need to start immediately but there should be alternative space to run the school during the interim period. Construction must be completed before the next monsoon start.

Mid- to Long-Term

The school building design and construction must be followed by the risk reduction issues. The location must be beyond the high risk zone. Total 375 academic building cum cyclone shelter will be constructed in first phase. Total 200 will be three storied building with open ground floor. The remaining 175 will be two storied building with elevated plinth level.

3.10 Livelihoods: Agricultural and Non Agricultural Activities

Damage to Livelihood Resources

Of the estimated 4.7 million people affected in the nine assessed districts, more than half — or 2.6 million people — were suspected to be in need of immediate life saving relief assistance for a period of two to three months. Despite the fact that assessment teams witnessed many communities and households already engaging in self help shelter reconstruction and repair but for livelihood there is almost none. It is very clear that external assistance to this sector is desperately needed as many of the poor simply do not have the economic means to engage in these types of self help activities. Cash supplement to livelihood recovery would be a great assistance options.

FAO in close collaboration with the Ministries of Agriculture, Fisheries & Livestock and Forestry & Environment carried out an evaluation of the impact of the cyclone on on-farm livelihoods, with a view to emergency response and short term needs. In a separate assessment, ILO carried out an evaluation of the impact of the cyclone on off farm livelihoods, with a view to short term recovery.

The assessment team conducted their survey in worst affected 4 districts: Bagerhat, Patuakhali, Barguna and Pirojpur although nine highly affected districts (out of twelve) were visited and assessed by the FAO led assessment mission. The mission visited several upazila of nine districts and

interviewed a range of key informants that included government officials, business communities, farmers, NGOs, individual household heads.

A. Agricultural Activities:

Agricultural Crop

Impacts

The combined effects of the August floods and the cyclone Sidr have worst disrupted agricultural production in Bangladesh. The official report ministry of Agriculture confirmed that total 1.51 million ha agricultural crop lands were damaged; out of which 1.12 million ha was fully and 1.39 million ha was partially damaged. The report also showed that total 1.08 million ha of cropping lands were damaged in worst affected and badly affected 12 districts, which is 71% of total damaged cropped area. Total 96,535 ha were fully and 979,887 ha were partially damaged in 12 highly affected districts (Figure 3.9). The damages caused loss of production of 1,295,315 metric tones of crops and these further affected 2,224,462 families in the coastal areas.

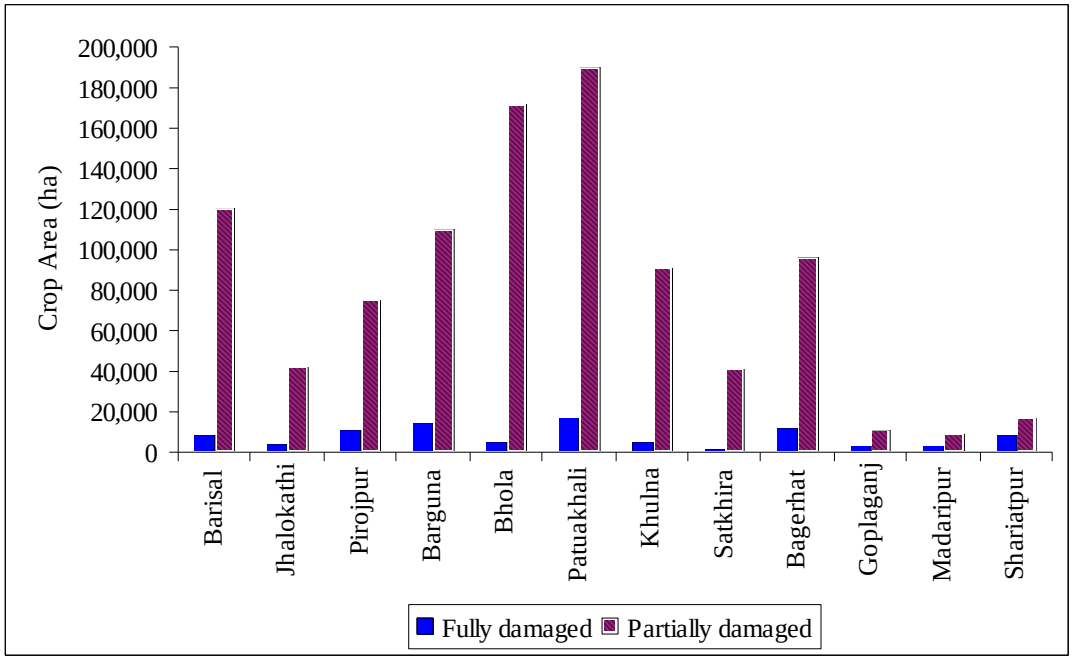

Figure 3.9: Damages of crops area (ha) at worst affected and badly affected 12 districts

Sidr inflicted huge damage to the rice crop and worst affected other cereal crops, including pulse (lentil, Kheshari), banana and seasonal vegetables. As the storm surge inundated croplands with saline water, large areas can now only support salinity-withstanding crop varieties. Sidr may cause of a loss of aman rice production of about 1.3 million tonnes and also in the boro seedlings.

On average, each hectare of fully damaged crops costs BDT 40,000 to recover, while recovery of each hectare of partially damaged crops is estimated to cost BDT 20,000.

After the floods earlier this year, the Government decided to compensate poor and marginal farmers (cultivating 40 percent of the damaged crop area) with BDT 15,000 for each hectare of land. A similar compensation scheme may be adopted for cultivation of the crops damaged due to Cyclone Sidr. The total cost for such a programme would total about BDT 5 billion.

The FAO led assessment mission reviewed detailed data that had been gathered by the DAE officials at upazila and district levels. The overall mission observations are as follows:

- About 15 – 20% of the cereals (aman paddy) were completely washed out by tidal waves. In areas close to the epicentre of the cyclone, much of the crops were shattered by strong winds and tidal waves, with fewer grains in panicles than expected.
- About 70 – 80% of the Boro rice still stand to be harvested with often unfilled and half filled grain except the 10% matured grains.
- Bananas, betel leaf (pan boroj) and papayas were almost completely damaged in some areas, while farms and households further inland have suffered less. On average, damage of the betel nut and other trees has been estimated at about 40 – 50%.
- While vegetable crops seem to be damaged by 80%, pulses were reported to have been damaged fully in most areas.

Strategies

Short-Term

- Procurement and distribution of seeds and agricultural inputs (fertilizer, pesticides, cash loans) should begin immediately. As large areas have suffered salt water inundation, priority should be given to the procurement of salinity-withstanding seeds. Provide quality boro rice seed/seeding, maize seed, different types of winter and summer vegetable seeds, fertilizers and irrigation support so that the farmers (300,000 farm family) can have boro crop cultivation in March–April and subsequent seasonal crops.
- Small agro-machineries (3,000 power tiller, 5000 corn Sheller, 10,000 weeder, 10,000 reapers) can be procured and distributed to the marginal farmers of the 9 districts for their livelihood support.

Mid-Term to Long Term

- Provide agricultural loan to the marginal farmer at low interest to support them for agricultural crop production.
- Rescheduling of agricultural loans and interest-free new loans.
- Give subsidies in inputs to the farmers for up coming Boro and vegetables cultivation.
- Quality seeds, fertilizer at reasonable prices, irrigation and diesel have to make available to the farmers in appropriate time.
- Take immediate steps to import quality seeds under public and private arrangements.

Livestock

Impacts

Cyclone Sidr had huge impacts on livestock, killed 106,189 cattle, goat and sheep along with 2,527,880 poultry birds. Apart from the death of livestock, some 4,884,503 cattle and 31,510,839 poultry bird in 112 Upazila of 17 cyclone affected districts were affected as an adverse effect of the cyclone. Besides, 5,934 diary and poultry farms and 19,900 MT of fodder and poultry feeds were damaged.

The government has made a sound estimate of livestock losses by enumerating the number of losses in most of the affected districts. In four worst affected and one badly affected district some 18% of the poultry, 11% of goats and sheep, 7% of ducks and some 3% of the cattle and buffalos have been lost. The losses are significantly high in some of the severely affected upazilas, exceeding 80% of the total livestock population.

A large number of the livestock have been injured from falling trees and collapsing sheds and almost all large animals are visibly very weak and susceptible to diseases. Most of the crop residues the main sources of feeding are non edible due to inundation and the spread of fungus following the cyclone. Feeding is a major issue and some farmers have begun washing up rice stems, which may be partially edible but certainly not sufficient to feed the remaining cattle and buffalos. Goats and poultry usually scavenge and require little additional feed. The death of cattle and buffalos has also reduced the amount of draught power available to farmers in the ensuing season.

Breakdown of key elements

- Livestock mainly covers buffalo, cow, goat, sheep, chicken and duck. However, some people have pigeon and some professional group rear pig as livestock.
- Livestock are raised by the common people as domestic animal both for meeting the protein demand and as an asset.
- Buffalo are important asset to the farmers to cultivate their lands, whereas, the cows are important for protein supply and to give birth of calf.
- Poultry birds are important to rural people for ready protein supply (egg and meat) and get cash support from sell proceedings of eggs and poultry birds.
- Goat and sheep are very important assets to the rural people because of their low rearing cost but high sale value.

Estimation of cost

- Losses in the livestock sector due to the cyclone calculated to an amount of BDT 12.78 million.
- As of January 2008, average unit price of cow was BDT 12,000; goat and sheep BDT 1,200; duck BDT 80; chicken BDT 92; dairy farm BDT 15,000; poultry farm BDT 10,000, and fodder & poultry feed BDT 20,000/MT.
- Mentioned unit price was used to calculate the total losses in the livestock sector.

Response

- A control room was opened in the Directorate and a Focal Point was assigned to collect damage data on emergency basis;
- Control room was also opened in the cyclone affected areas;
- A 4-member Medical Team formed in each cyclone affected upazila to run vaccination programme for livestock;
- Inspection team formed with the membership of officers at Deputy Director level and deputed to coordinate field level activities along with medical support and for detail rapid assessment of damages;
- Some 90,036 cattle and 872,752 poultry birds have been vaccinated as of 6th December 2007; and some 98,090 cattle and 485,211 poultry birds are provided with treatment services;
- A team led by the joint chief of the Ministry visited the coastal districts and submitted their proposal for mid to long term rehabilitation;

- A proposal submitted to the Finance Ministry to allocate BDT 37.40 million for distributing free fodder and seeds of fodder grass among the worst affected farmers in 240 unions of 28 upazila in 4 districts;
- Another proposal also submitted to Finance Ministry to allocate BDT 24.70 million for free vaccination and treatment services to livestock;
- The third proposal from MoFL also submitted to Finance Ministry to allocate BDT 1.86 million for distribution of free semen for artificial reproduction in the cyclone affected area.

Strategies

Short-Term

- Need to lunch programme for free distribution of fodder and seeds (different types of pulse and maize) in the cyclone affected areas;
- Initiate programme for free distribution of cattle, goat/sheep and poultry birds among the highly affected poor farmers;
- Continuation of vaccination programme in the cyclone affected areas.
- Dairy cattle/buffaloes (50,000), sheep/goat (100,000) can be procured and distributed to the affected families in order to livelihood generation and support biodiversity. Day old chicks (2 million for 50,000 farms) can be given to the affected poultry farmers. For these livestock support programme special emphasis could be given to female headed households.

Mid- to Long-Term

- Provide the farmers with interest free loan for establishing their Livestock farms;
- Build killa (safe heaven) for livestock in the cyclone prone areas.

Fisheries

Impacts

The official reports of Department of Fisheries (DoF) indicate that total 17,700 ha of water area for fish culture in 42 upazilas of 11districts are affected due super cyclone Sidr. Around 139,478 ponds, water body, fish and shrimp farms are severely affected and huge amount of fishes including carp, shrimp and fingerlings washed out. In addition, fishing equipments like fishing nets, fishing boats are also affected due to Sidr.

The FAO led assessment team visited eight highly affected districts and made spot checks in fishing settlements, fish landing and processing centres as well as fish ponds and shrimp ghers. The outcomes of the field visits were cross checked with estimates of damage done by DoF.
The FAO mission concluded that extensive damage and loss have been occurred in fishing vessels and fishing gears for capture fisheries. The analysed data showed that total 2,761 fishing vessels are affected in 11 districts. The most affected categories of vessels are non motorized fishing boats 25 – 30 ft and the smaller range of motorized boats, 35 – 40 ft. It is not possible to accurately estimate the total number of fishing vessels operating in the affected areas at the time of the cyclone. It is also concluded that there is need for updated data on number of fishers, fishing vessels and fishing gear in coastal districts.

The mission report stated that aquaculture was affected in two ways, through inundation and falling trees. In areas that were inundated, most of the crop escaped. In areas with strong wind speed falling trees and branches physically damaged ponds and de oxygenation killed most of the crop.

The mission estimated that 80% of the *bagda*, 60% of *Golda* and 10% of fish (mainly carp) had been harvested prior to the cyclone. The field survey report confirmed that in highly affected upazilas about 60% of ghers had been affected as well as 85% of fish ponds. In moderately affected upazilas these figures were estimated to 40 and 75% respectively. Physical damage to fish ponds and ghers were limited and repairs would mainly fall in the category of annual maintenance and pond preparation for next stocking. In households with limited labour (for example female headed households, the mission proposed that needs would be linked to WFP cash and food for work programmes.

The mission report stated that the number of affected pond fish farms was estimated approximately 208,000, while 16,000 Bagda and 38,000 Golda farms were affected. Total estimated production loss was about Bagda 2,120 MT, Golda 1,600 MT and carp 51,000 MT respectively.

Breakdown of key elements

- The coastal area is mainly famous for shrimp cultivation but mix culture of carp and shrimp is well introduced in the area.
- Immediately after the rainy season, people cultivate shrimp and carp together. Alongside, they start nursing of post larva of fisheries for the next season cultivation.
- The official reports of DoF stated that cyclone washed out some 5,721 metric tones (MT) of fishes, 799 MT of shrimps and 20.53 million of fingerlings. The FAO mission estimated loss of fishes and shrimp is much higher than the DoF official report.
- Equipments which valued to BDT 227.49 million also damaged during the cyclone.
- Both public and private infrastructure which costs of BDT (13+51.97) 64.97 million damaged as well.

Estimation of cost

- A total of BDT 729.40 million losses calculated in the fisheries sector.
- As of December 2007, market price of one kg fish was BDT 40, shrimp BDT 200/kg and BDT 0.50/fingerling.
- The market price was used to calculate the total losses of fisheries. Cost of fishing equipments and infrastructures also calculated following the standard market price.

Response

- A control room has been opened in the Directorate and a Focal Point has been assigned to collect damage data on emergency basis;
- Control room also opened in the cyclone affected areas;
- Officer in the Directorate and at the District level are instructed to stay in their working station cancelling their leaves;
- Two inspection teams has been formed with the membership of Director/Deputy Director level officials to coordinate field level activities and detail rapid assessment of damages;
- Officers in the Directorate and at local level are working to assist the affected farmers of 6 districts in Barisal Division and Bagerhat district in Khulna Division;
- A team with the leadership of the Joint Secretary (fisheries) already visited the cyclone affected areas and submitted their proposal for mid to long-term rehabilitation;

- The Ministry requested the Finance Division to allocate an amount of BDT 28.4 million on 25th November 2007 for supporting the affected farmers to cleaning up (lime treatment) their ponds and fish farms.

Strategies

Short-Term

- Need to assist the affected farmers to cleaning up their pond/farms through providing them with lime;
- Assist the farmers to reconstruct their pond/farms and to purchase fingerlings;
- Cash support to the fishermen community to repair and purchase their fishing equipments (such as boat, nets etc.)
- Cash assistance for about 2,000 fishing trawlers, 1,000 fishing boats and 3,000 fishing nets for the affected families;
- There was damage to embankments in polders, which require immediate repairs to allow proper water management for shrimp farming.

Mid- to Long-Term

- Provide assistance to affected farmers for re-excavation of ponds/shrimp farms;
- Arrange credit supports at low rate to the affected marginal fish farmers
- Provide fish-feed and fertilizer at subsidized rate to affected fish farmers;
- Provide training to the fish farmers on coping mechanism during disasters;
- Provide disaster management training to the sea going fishermen and provide them with life-saving equipments (such as, life-jacket, boyar, radio etc.).
- Fish fingerling (10 million fingerlings for 50,000 farmers/pond owners) and cash support for the farmers to repair the damaged pond-fisheries sector.

B. Non Agricultural Activities:

Impacts

ILO carried out an evaluation of the impact of the cyclone on livelihoods, with a view to early recovery. It follows methodological guidelines jointly developed by ILO and FAO during 2006 and 2007, as expressed in the Rapid Livelihood Assessment Toolkit for Early Recovery. The ILO-led assessment was carried out in December 2007, about one month after the date of the disaster. By the time the assessment took place, relief operations were well underway, and some recovery was already happening. The assessment was concerned with requirements for early recovery as existing by late December 2007.

The four worst-affected districts were selected for the assessment: Bagerhat, Patuakhali, Barguna and Pirojpur. According to GoB estimates, these four districts represent 88% of all deaths caused by the cyclone and 88% of all livestock losses.

The mission visited several Upazilas within those four districts, interviewing a range of informants that included local government officers, business organizations, labour unions, community organizations, NGOs, individual businessmen, workers and households. It also exchanged information with

the parallel FAO assessment mission, and extensively used government estimates on the immediate impact of the disaster as well as baseline information from censuses and surveys.

It is worth noting that the population census reports about 300,000 households where the main source of income is a non-farm business. Out of more than 130,000 non-farm businesses in the four districts, it is estimated that about 35,000 (26.9% of the total) was still not working by late December, due to the effects of the cyclone, including:

- Destruction of premises
- Breakdown or loss of equipment
- Loss of inventory (raw materials, products)
- Persistent interruption of electricity in some locations
- Roads destroyed in some locations, isolating businesses and impeding flow of inputs and outputs (except through waterways when feasible)

The main types of businesses affected are:

- Saw mills
- Rice mills
- Pottery factories
- Marketplaces and shops
- Others (small hotels, restaurants, blacksmiths, etc).

Since some of the businesses are owned by more than one family, this situation is estimated to severely affect the livelihoods of about 45,000 business-owning families, not counting their employees. Other businesses initially affected by the cyclone have been repaired by their owners, or had electricity or roads restored by the Government, and have resumed their usual activities.

In addition to the loss of wage jobs, this section includes additional supply of labour seeking wage employment upon the loss on some non-wage employment.

- Loss of non-farm wage jobs. It is estimated that about 50,000 wage workers in micro and macro establishments were permanently dismissed or temporarily suspended as a result of damages sustained by their employers.
- Loss of farm wage jobs. By FAO estimates, about 35,000 seasonal wage jobs were lost by the failure of the rice harvest alone. However, this is only part of the picture. Total wage jobs in the agricultural sector are estimated (as of 2007) at about 200,000 (there were 195,000 farm labourers in 2001), and probably half of them are in want of a job in the short term.
- Additional supply of wage labour from non-farm business households. At a modest rate of one person per affected household, it is estimated that 45,000 people are seeking employment as a result of the closure of their usual business establishment due to cyclone damage.
- Additional supply of casual wage labour from farmer and fishermen households. Since some agricultural activities were only slightly damaged (e.g. shrimp), and only some fishing families lost their boats or nets, it is estimated that about 25% of those households, or 9% of all households, will send an average of one person to the labour market in search of casual employment. This amounts to about 95,000 people in the four districts.

Strategies

The comprehensive approach for immediate and medium term livelihood recovery and economic reactivation would entail direct, decent employment promotion and local economic recovery measures as well as policy instruments such as public spending on reconstruction, credit and employment friendly policies, private sector participation and reactivation of the markets.

The strategy for economic recovery should include both short term and medium to long term interventions.

Short-Term

In short term intervention money should be injected into the local economy through cash transfer mechanism as well as labour intensive schemes for public works that would create jobs and stimulating demands.

- Food/Cash for work for casual and unemployed workers.
- Cash grant for promoting alternative livelihoods for special vulnerable groups.
- Interest-free/soft loans to micro and small enterprises and vulnerable groups (GoB's Natural Disaster Risk Reduction Programme).
- Short-term training for small and micro-enterprises and business development for vulnerable groups.

Mid- to Long-Term

In medium to long term, reconstruction of major infrastructure as an opportunity job creation, improvements of livelihoods and livelihoods diversification. Skills development as well as local economic development strategies should be considered.

- Market support/linkages with bigger/national markets.
- Formation of skills and upgrading of existing skills.
- Livelihood diversification, depending on local opportunities.
- Create synergy among the key stakeholders in the livelihood sector as a whole.

3.11 Environment and Forestry

Biodiversity

Cyclone Sidr destroyed the biodiversity in many of the hit areas. It is suspected that recovery efforts may take decades. A report by CEGIS estimates that the impact on Flora and Fauna has been devastating with an estimated 40 species of mammals, 400 species of birds and more than 200 species of fish having fallen victim to the cyclone. The Sundarbans is also home to the Bengal Tiger, already an endangered species, along with other species such as the spotted deer which are on the verge of distinction. Soil and agriculture of cropland habitat, flora and fauna of homestead habitat, newly accreted land, offshore and homestead/strip plantation of green belt habitat of Terrestrial Ecosystem are severely impacted by Sidr. The homestead habitat particularly the homestead garden vegetation is severely affected as most of the plats had less resilience to cyclone.

The MoFDM official report indicates that about 4 million tress are uprooted/ damaged in 30 affected districts. It is also reported that about 2.9 million tress are damaged at worst affected and badly affected 12 districts (Figure 3.10). Highest damaged occurred in Barguna district followed by Pirojpur, Jhalakathi and Barisal.

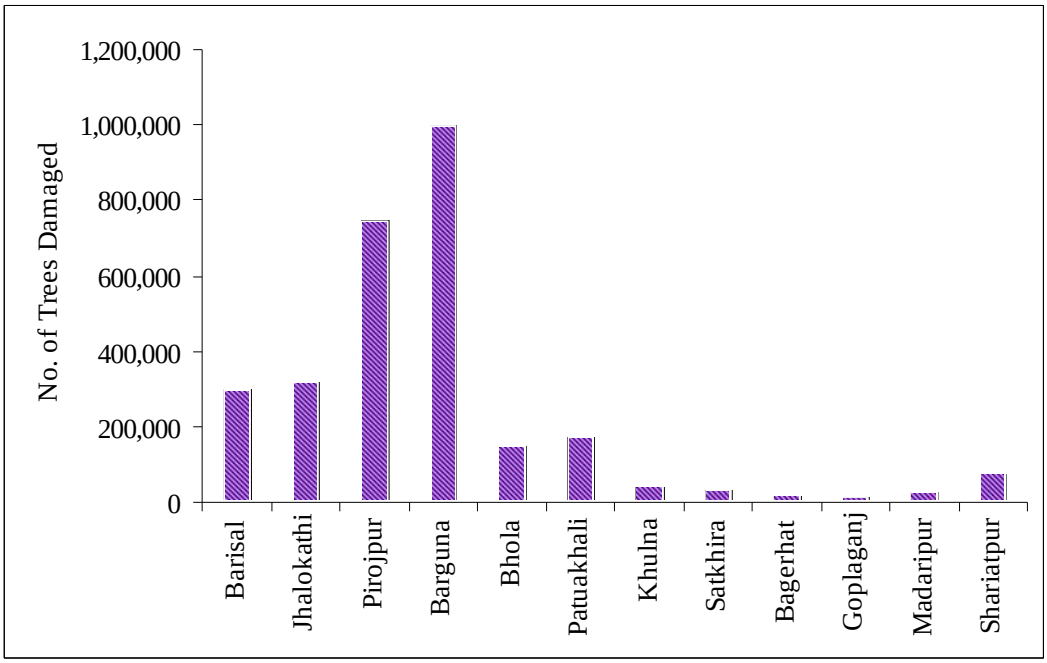

Figure 3.10: Damages of trees at worst affected and badly affected 12 districts

Social-Forestry

Impacts

Other than the mangrove forest, the social forestry sector received huge losses due to uprooting of millions of timber and fruit trees, damaged tree nurseries, erosion of hundreds of thousands km roads and embankments with planted trees on the slobs and barms.

Breakdown of key elements

The social forestry (road side plantation, plantation in the educational and other public premises and bloc plantation by GOB and other private agencies) program has remarkable contribution in minimising the gap between the country's total land areas versus required forest area. The homestead gardens provide great protection against strong winds and cyclones but also are significant source of income. Trees are also a good buffer stock and sold at times of hardship and when social expenditure is necessary. Unfortunately, some alien species planted around houses, along roads, railways and embankments also caused significant damages to lives and properties. It is also observed that mainly two alien species, rain tree and chambal, which are fast growing trees and only the species to grow very big. According to an approximate estimate provided by the Department of Forest that total loss stands to BDT 44.24 million which includes damaged infrastructures like foresters office buildings, dwelling houses, picnic spots and others.

Strategies

Short-Term

- Provide nursing support (tide up with supporting stick, cutting of broken branches, putting earth on the washed out bottom) to immature timber and fruit trees under social forestry program and green belt at the coast.
- Provide protection to fallen trees from stealing and ensure stockpiling them to safer custody.
- Recovery initiatives to public tree nurseries

Mid-to Long-Term

- Rehabilitate the damaged public nurseries and provide usual motivational and technical support to private nursery owners.
- Document the lessons learnt (cause of falling huge number of trees than earlier cyclones) and taking precautionary measures for the future including massive dissemination.
- Strengthening of social forestry initiatives/ movement, plant more trees to road / embankment sides and making the "Sabuj Bestony" (green belt programme in the coastal area) thicker.
- Introduce saline and storm tolerant trees for the coastal areas.

Effects on the Sundarbans

The Sundarbans mangrove forest, one of the largest forests in the world and a world heritage, perhaps saved millions of lives but in the process suffered significant damages as well. Initial indications are that 1900 sq km or 31 percent of the Sundarbans have been significantly affected by the cyclone (see map below). The official report of Department of Forestry indicates that approximately 30,000 ha of forest areas are severely damaged and about 70,000 ha areas are partially damaged.

The FAO led assessment team reported that 4-5 percent (20,000 – 25,000 ha) of the forest area has been severely damaged and nearly 15% (60,000 ha) partially damaged. Some alien species, which had been planted in various parts of the Sundarbans on a pilot basis, have been uprooted while in the severely affected areas a large number of trees have been broken from the stem or uprooted. In the partially damaged areas many branches have been broken but the main trunks of the trees are intact. It was also reported that the infrastructures in the Sundarbans and elsewhere in the affected areas has also been damaged.

It is also reported that *Keora*, *Gewa*, and *Sundari* are major species highly affected in the Sidr. However, *Keora* might restore quickly, but due to the physicochemical impact *Sundari* and *Gewa* restoration might take longer time, and this could be a critical factor for Sundarbans biodiversity.

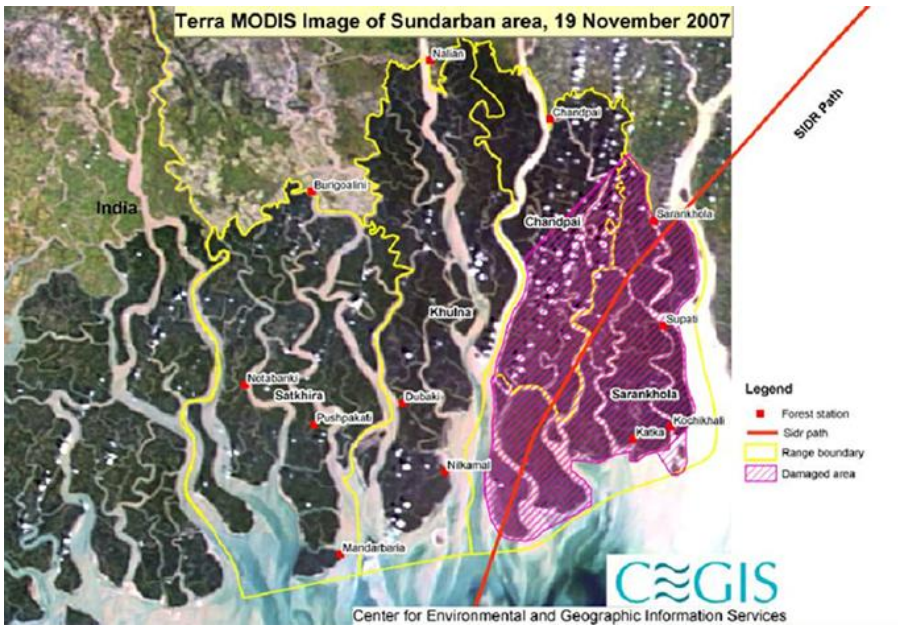

Figure 3.11: Damage of Sundarbans due to affects of cyclone Sidr

Breakdown of key elements

Hundreds of thousands of people's livelihoods depends on this forest. This is one of the primary sources of timber, honey, house building materials like roof making leaves (Gol Pata), poles, raw materials for paper mills, bamboo and so on. Besides it works as the natural protection wall and prevent the coastal people, farm lands, fish farms, cattle, business centres and lots of important infrastructures from storm and tidal surges causes due to seasonal depression in the Bay of Bengal every year.

The Ministry of Environment and Forest calculated the losses of total damaged caused due to the cyclone. The breakdown of damaged elements with their estimated values is described in the Tables below:

Table 3.6: information on fully damaged infrastructures and its costs.
Fully Damaged Infrastructures

SL No.	Name of the Fully Damaged Infrastructures	No. Fully Damaged Infrastructures	Estimated loss in Million BDT
01	Office and residential buildings of the Forest Staff	127	95.00
02	Water transport	55	37.60
03	Jetty/Pontoon	60	17.23
04	Wireless Tower	19	2.60
05	RT Set	14	14.00
	Total BDT		166.43
			US$ 2.45 million

Table 3.7: Information on partially damaged infrastructures and its costs.

Partially Damaged Infrastructures

SL No.	Name of the partially Damaged Infrastructures	No. partially Damaged Infrastructures	Estimated loss in Million BDT
01	Office and residential buildings of the Forest Staff	86	11.26
02	Water transport	04	0.09
03	Jetty/Pontoon	12	0.60
04	Other (Pond, Tree nursery, Solar system power plant, road etc.)		20.00
	Total BDT (million)		31.95
	Total US$ (million)		0.47

Response

- Four assessment teams completed the needs assessment activities and the draft reports are published.
- This is one of the priority areas /sectors of recovery and rehabilitation in which the government has put similar attention like life saving support to human being. This mangrove forest is not only the safe habitat for the animals, birds and others like crocodile and so on, but it is one of the major sources of fish in the several canals and rivers around and inside the forest.

Strategies

The Sundarbans mangroves have acted as the giant windbreaker and have thus reduced the loss of human lives and property. Therefore its rehabilitation back to its natural splendour must be considered

carefully, which could help adapt and mitigate against climate change. The MoFE will study coastal aforestation programmes considering their suitability and resilience to storms and water surges.

Protection of further degradation of the environment should be the priority strategy for short term and long term interventions. The priority will be given to the livelihood rehabilitation and compensation for the Sundarbans-dependent people (mawali, bawali, fishermen, fry collectors, and boatmen). The following strategy could be taken as priority strategy:

1. Accelerate natural recovery process;
    - Transplantation of fit species
    - Cleaning if required and monitoring
    - Sanctuary development
    - Stopping of Post Larvae (PL) collection
    - Seed distribution
    - Offtake dredging
2. Do not disturb the forest;
    - Strong monitoring
    - Awareness building
3. Arresting further degradation
    - § Isolation of sensitive areas
    - § Development of manuals for campaigning
    - § Controlling of Fire
    - § Inhibition of Saline water intrusion

Short-Term

- Replacement of fully damaged wireless towers and sets
- Alternative housing and office space arrangements on a temporary period for the foresters so that they can provide routine works.
- Reconstruction / renovation of partially damaged houses/office buildings, water transports, wireless towers and sets.
- Cleaning of minimum 25 ponds / water reservoir and filling with sweet water for source of drinking water for foresters and animals.
- Impose ban on cutting and collection of trees and other forest assets for the time being; at least up to the end of next monsoon season.
- Impose ban on running the saw mills adjacent to Sundarbans.
- Cleaning of remaining ponds / water reservoirs (confirmed number would be available after the assessment is complete)
- Construction / replacement of fully damaged office buildings and or houses,

Mid to Long -Term

- Protect the damaged forest areas to promote natural generation of mangrove forests. Besides, increase numbers of mangrove nursery for massive plantation of mangrove trees to create and facilitate mangrove forestation.

- Replacement of fully damaged necessary inland water transports and jetties / pontoons.
- Installation of damaged solar power generation system to substitute electricity.
- Making the forest protection system stronger

3.12 Governance

Governance as a broader framework incorporates three crucial aspects: accountability, transparency and participation. The recovery strategy is to address the risk of good governance in planning, operation and monitoring. A main cross-cutting issue within this is to address the gender and diversity issue within the recovery program to ensure their participation.

Participation aspect of the governance framework was also very weak due to overwhelmed number of actors in the areas and very emergency situation. However, this situation could be improved in short term intervention phase, and at lest for beneficiary selection, designing of infrastructure and other key programmes and accessibility. Even in this case, rarely consulted population needs to be consulted first.

In disaster like Sidr, there are issues that are inter-related, issues that are depended on each other and are under different sectors. For example, risk reduction activities for women and children. This is an issue that should be covered by risk reduction part, however also a part of gender issue. Moreover, the gender issue is again a part of every other activities such as governance, livelihood etc. Just like 'gender', there are many issues that are common in every aspect and they also can be treated as different sectors.

During disaster and emergency period, it is wise and desirable that these common issues are incorporated with each other so that the activity list is reduced and the development work can be managed efficiently. The issues are mostly

- Gender and diversity (women, children, elderly, disable, ethnic minority groups)
- Risk Reduction
- Livelihood (of women and socially excluded groups)
- Environment
- Beneficiaries Accountability
- Conflict Sensitivity
- Sustainability

The cross cutting issues has been ignored severely in the Cyclone Sidr operation, at lest the rapid assessment indices the proposition that the minority and socially excluded people further excluded and forgotten. The Un led assessment team mainly considered the gender and diversity issues and how livelihood options and other issues have affected them. The findings suggest that the sector is more vulnerable now, right after the disaster, as of any other time. The rehabilitation program of government is yet to be implemented. The relief program is still going in different places. However, the other sectors are yet to be worked out by government or other organisations. The situation is very difficult, particularly for women, children, elderly, and disable, and socially excluded groups.

The strategies to ensure their participation within the development activities are:

Inclusion: Including the vulnerable groups (women, children, disables, socially excluded groups) into the development activities. They need to be ensured with food and housing security. This would allow them to have alternative occupational options.

Positive Discrimination: Making sure that they get the priority in every aspect. For example, giving them preference in recruiting for government jobs or they are the first one to be enlisted for development activities.

Mainstreaming: Ensuring the cross cutting groups' involvement in early recovery development works and in every other cases. A national level policy can ensure that the groups' involved in livelihood, governance, risk reduction etc. However, the government has to take initiatives for mainstreaming the cross cutting groups.

Strategies:

- All the activities regarding disaster preparedness, emergency response, recovery and rehabilitation should be carried out through proper planning by the local DMCs.
- To ensure proper accountability and assigned activities of the DMCs specific yearly allocations of funds and resources against the local DMCs have to be ear-marked.
- Proper distribution and transparency have to be ensured and communicated to the people as and when resources and fund are received (domestic and external).
- A specific volunteer team can be formed to face the pre, during and post disaster situation in the local level involving the local GO, NGO representatives, scouts, students, youths, and Ansar-VDP in the Sidr affected areas.
- Short-term training and awareness raising program regarding the overall comprehensive disaster management approach of the government have to be taken in the SIDR and other disaster hit areas on urgent basis.
- Short-term open communication projects with skilled manpower (preferably IT-based) can be taken for proper planning, information dissemination and feedback from bottom to top and vice versa to ensure accountability and transparency in the programs.
- Development and Gender and Social Exclusion Operational Guideline for each sector going to operate in early recovery including training and sensitization of policy and implementing personnel of the sectors.
- A disaster guideline can be developed for the cross cutting issues.

3.13 Special Considerations

Special measures are needed for particularly vulnerable groups such as infants, children, the elderly, female headed households and the disabled. For example, a national policy on feeding infants and children during emergencies needs to be implemented (Annex 6). Counselling for trauma-struck persons will also likely to be required by those families and individuals most affected.

IV. National Coordination System

The Government has an established disaster management committee system that ranges from the National Disaster Council through to Union Disaster Management Committee. District Disaster Management Committees have responsibility for coordinating relief operations within their respective jurisdictions. In addition, the government established a number of additional mechanisms to aid coordination.

The following diagram shows the national coordination system of Sidr response and recovery.

Cyclone Sidr Response and Recovery Coordination System

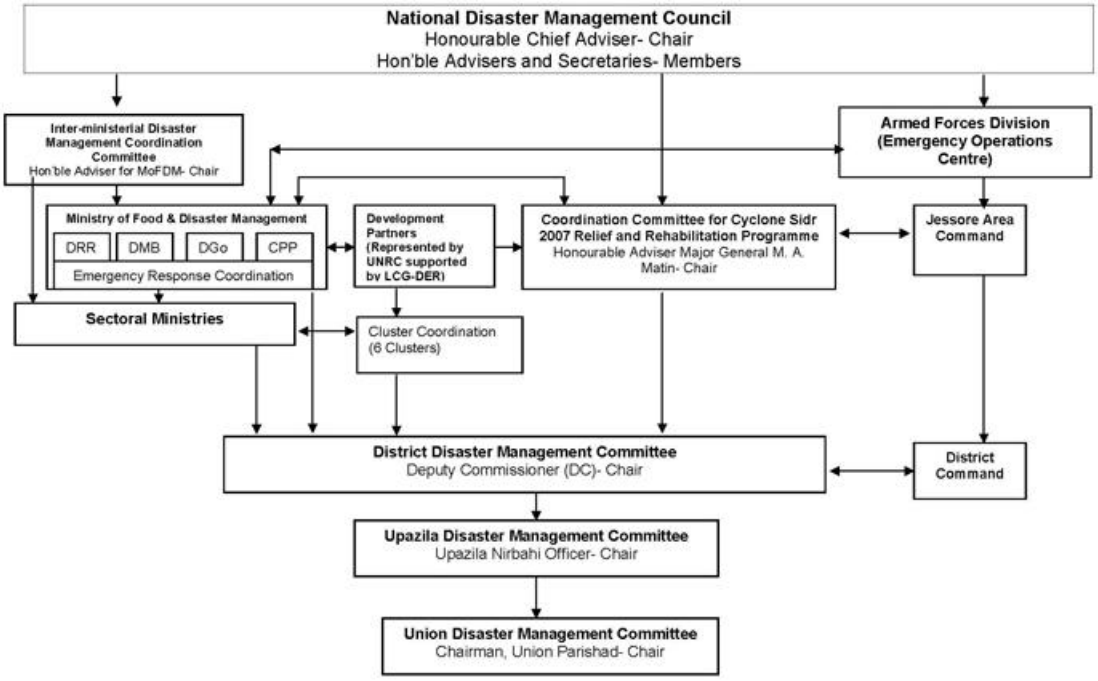

Figure 4.1: Cyclone Sidr response and recovery coordination system

In addition to the normal disaster coordination system, the Government established the following additional coordination mechanisms in the aftermath of cyclone Sidr:

- The National Disaster Management Council (NDMC) is the highest committee to deal with the crisis and is responsible for policy making and formulation of strategies for disaster management. The inter-ministerial disaster management committee and emergency operation centre are working under the guidance of NDMC.
- A Coordination Committee for Cyclone Sidr 2007 Relief and Rehabilitation is coordinating the Government emergency responses by working together with the Armed Forces.
- At district level, all Deputy Commissioners of the Cyclone-affected areas are responsible in operation and coordination of relief distribution activities.
- At the Upazila level, the Upazila Nirbahi Officer (UNO) is responsible for execution and coordination of relief operation in the Cyclone-affected upazila.
- The Ministry of Food and Disaster Management and the military have established a formal link through CDMP to enhance information sharing.
- An office at Zia International Airport to receive and dispatch Cyclone relief consignments and dispatch them to the Cyclone-affected areas. The Director General, Directorate of Relief and Rehabilitation (DRR) is the focal point for coordinating international relief materials arriving at Zia International Airport. He works closely with the AFD to arrange air and road transportation of goods to either the military base in Dhaka or to Barisal.
- The Post-Sidr Relief Coordination Centre in Barisal has overall responsibility for coordinating the national relief operations.
- A national NGO Coordination Committee is chaired by the Secretary, MoFDM.

The Post-Sidr Relief Coordination Centre in Barisal

The Post-Sidr Relief Coordination Centre has been operational since 17 November. Its functions are to:

- Coordinate deployment of relief
- Coordinate volunteer efforts
- Coordinate information on relief transport (e.g., helipads)
- Ensure equitable allocation and distribution of relief material

In order to ensure good coordination of relief consignments, all humanitarian actors must complete relief distribution forms and submit them to the Barisal Centre (see Annex 7).

Coordination with Civil Society

- The Disaster and Emergency Response Group is a sub committee of the Local Consultative Group. This group brings together the international community, NGOs and Government officials for coordination. The DER is chaired by the Secretary MoFDM or his nominated delegate.
- The NGO Coordination Committee is chaired by the Director General disaster Management Bureau. This committee brings together government and NGOs for information sharing and coordination.

Coordination with the International Community

- The international community is coordinated through the LCG-DER chaired by the Secretary of the Ministry of Food and Disaster Management.

The DER established six coordination clusters to implement respond to the crisis in line with sectoral ministries: food, water/sanitation, health, shelter, early recovery and logistics. These groups are co-chaired by line ministry officials and UN organisations plus IFRC (shelter). They have been meeting regularly since 28 November (see meeting schedule at http://www.lcgbangladesh.org). For contact information on coordination group focal points (Annex 7**)**.

V. Monitoring and Reporting

The programme monitoring and evaluation system consists of asset of impact/outcome indicators, derived from the programme immediate and mid-term goals and objectives to ensure effective assessment of progress and provide timely feedback for possible changes that might be required in the course of implementation due to unforeseen changes in the socio-economic context, as well as programme strategy.

Input and output indicators in each sub-sector, crops, fisheries, forestry and livestock, community infrastructures, communication systems will enhance regular monitoring and evaluation of programme performance, including identification of potential problems and/or success. The indicators will be also used to assess results during evaluation, including beneficiary satisfaction with results.

There are specific elements of Monitoring and Evaluation that need to be considered during programme/programme formulation for interventions of short term and long term strategies:

- Types and sources of data needed.
- Methods and frequency of data collection.
- Methods of data analysis.
- Who will be responsible for data collection and analysis?
- Who will use the resulting information?

For monitoring purpose, it is essential that programme staff provides regular and accurate data and information at each interval, compared with selected indicators to closely monitor progress and to

prevent any unnecessary diversion from programme plans. Therefore, regular reporting is essential for this purpose and it is, therefore, suggested that weekly/biweekly, reports are submitted during the initial stage of the implementation (first three months), especially during the time critical phase, while monthly reports might suffice thereafter.

With regard to evaluation, the programme will carry out regular internal evaluation, for instance three-monthly; to ensure effectiveness and efficiency of programme design and where required, necessary measures can be take. Internal evaluations will make substantial contribution to avoiding total develop diversion in due time, provide a platform to collect lessons learned and best practices applied.

One of the basic characteristics of monitoring and evaluation system is to include measures to track systematically the key interventions and process over time and space and to see how they change as a result of the programme strategy and its activities. These will include:

- Measuring and analysing the sustainability of the intervention.
- Monitoring the implementation of the programme strategy.
- Evaluating the results of the strategy.
- Reporting and analysing the findings.

Another important element in monitoring and evaluation system is the roles and responsibilities of stakeholders, the donors, the government and, more importantly the target communities/beneficiaries. While their inclusion in the system is vital, it is also important to feedback key messages to stakeholder groups, through regular reporting and dissemination of findings, to enable them to continuously improve their role in the effective implementation of the programme, the programme itself and its component activities. Regular feedback and dissemination of findings will also enable all stakeholders to improve the quality of the programme delivery and to make informed judgement about the programme and to improve future programme designs and implementation processes.