

**Water Logging in Satkhira District
An Analysis of Gaps between Needs and Response**

November 2011



Early Recovery Facility, UNDP Bangladesh

Acronyms

CDMP	Comprehensive Disaster Management Programme
DER	Disaster & Emergency Response/Relief (Group of the LCG)
DMB	Disaster Management Bureau
DMRD	Disaster Management Relief Division
DoRR	Directorate of Relief and Rehabilitation
DMIC	Disaster Management Information Center
DRR	Disaster Risk Reduction
DRRO	District Relief and Rehabilitation Officer
DPHE	Department of Public Health Engineering
DFID	Department for International Development
ECB	Emergency Capacity Building Project
ECHO	European Community Humanitarian Office (Humanitarian Aid and Civil Protection)
ERF	Early Recovery Facility
FAO	Food and Agricultural Organization
GoB	Government of Bangladesh
INGO	International Non-governmental organization
LCG	Local Consultative Group
NGO	Non-governmental Organization
NDRCC	National Disaster Response Coordination Committee
NARRI	National Alliance for Risk Reduction and Response Initiatives
SDC	Swiss Development Corporation
SUS	Sabalamby Unnayan Shomity
UNDP	United Nations Development Programme
UNFPA	United Nations Fund for Population Activities
UNICEF	United Nations International Children Emergency Fund
WFP	World Food Programme
WHO	World Health Organization
WASH	Water Sanitation and Hygiene

Executive Summary

Due to perpetual siltation in the rivers and as a consequence of unplanned development interventions on the river system, long-lasting water-logging in the human settlements is taking place in Satkhira resulting in considerable loss and damage to dwelling houses, standing crops, shrimp farms, roads, educational institutions and so on in Tala, Satkhira Sadar, Kolawara, Debhata, Assasuni, Kaliganj upazilas including the Municipal areas of Satkhira district. The floods and prolonged water-logging have caused significant displacement presenting humanitarian challenges in safe water supply, sanitation, shelter and food security.

Following the occurrence, a number of organizations have carried out piecemeal assessments to identify the losses and needs of the community affected. Realizing the gravity of the sufferings of the community due to the slow on-set of the disaster, LCG DER sub-group in its meeting held on 6 September 2011 thoroughly reviewed the water-logging situation and assigned Early Recovery Facility project of UNDP to undertake a desk analysis based on the available assessment reports with a view to identifying current gaps in selected sectors and to suggest appropriate response measures.

Accordingly, 12 assessment reports prepared by different agencies were thoroughly reviewed by ERF team members for the purpose of undertaking the gap analysis. In addition, the 3W data sheet prepared by the ERF Coordinator based in Khulna was consulted to capture the latest position as to Who is doing What and Where and identified the current gaps in five major sectors; namely food and livelihood, non-food, shelter, health and nutrition, as well as WASH. Section-I of the report sets the context, Section-II gives the methodology, while Section-III deals with the key findings and recommendations.

It would appear that the percentage of current response gaps in food and livelihood, non-food, shelter, health and nutrition and WASH sectors stands at 6% , 80%, 75%, 100% and 46% respectively. Section –III also presents a set of short-term, mid-term and long-term interventions aimed at assisting the LCG-DER to decide upon future courses of action to mitigate the sufferings of the water-logged victims and bring about sustainable solutions in their lives and livelihoods.

Part one: Background and Context

1.1 Introduction

In late July 2011 excessive rainfall triggered a massive water-logging in three coastal districts of Bangladesh i.e. Khulna, Jessore and Satkhira, inundating homes and croplands of 200,000 households. Government of Bangladesh (GoB), the UN agencies and NGOs conducted assessments of the situation from various scopes and recommended a number of long and short-term actions. Considerable humanitarian response has already been undertaken since the onset of the disaster. The LCG DER sub-group meeting held in September 2011 requested UNDP to produce a synthesis analysis of the resulting assessment reports and recommend a comprehensive action plan to meet both humanitarian and recovery needs.

This report presents a summary of the findings and a set of actions focusing on the most affected Satkhira district.

1.2 The context and background

Bangladesh experienced heavy rainfall in July and August 2011 (413.8 mm against the monthly average of 332.1). Although it did not cause flooding in other parts of country, massive water-logging was created in the three coastal districts namely Satkhira, Jessore and Khulna. Satkhira being the most affected district was inundated by 5-7 feet of water that caused massive displacement in the population and severe destruction of houses, standing crops, homestead-based livelihoods and the local market.

GoB estimates that the affected number of households is as high as 200,000 (out of 390,000: GoB) in six upzila (sub-district) of Satkhira (see Map 1). Satkhira Water-logging 2011 is an acute problem of the chronic water-logging problem in the south-west coast of Bangladesh. Considerable parts of the region have been experiencing water logging almost every year since 2000 and water can often take up to six months to recede. Entire coastal Bangladesh has been experiencing impacts of climate change in the form of rising sea levels, salinity intrusion and severe cyclonic events. This area has experienced two mega cyclones since 2007.

Water logging in the south west coast is not just related to heavy rainfall and extreme climatic events; it is also related to changes in the built-up areas themselves. Top water expert of the region, the late Ashraf-Ul-Alam Tutu, provides a historical description of the cause and consequences of the water-logging problem in the region which can be accessed www.planotes.org/documents/plan_05117.pdf. According to him, the south west coastal area is part of the tidal floodplain bounded in the north by the Ganges floodplain and in the south by the Sundarban mangrove tidal forest. "The tidal floodplain is strongly influenced by tide, salinity and rainfall. This plain is also crisscrossed by numerous tidal creeks or channels and has high drainage density. Through natural process the rivers carry both sweet water from upstream and tides from the sea. The major portion of the floodplain is low-lying, barely one metre above mean sea level and below high tide level. Homesteads, roads, vegetable gardens and orchards were developed on areas artificially raised by digging ponds and ditches". Daily tides used to inundate the lowlands twice a day. The Sundarban mangrove forest drops an average of 3.5 million tons of waste per year. This is carried by the tides throughout the floodplain".

According to him, during 17th Century the *Jamindar* used to create low earthen dykes around the tidal flats to prevent tidal intrusion and wooden sluices to drain off surplus rainwater. Once the Zaminder system was abolished the maintenance of the system was hampered. Therefore crop failure became acute and more frequent. To solve this problem, during 1960s a series of polders was built by the government. Although these polders provided some protection from cyclones, they contributed to the water-logging in most parts of the south west coast to varying degrees. On top, expansion of commercial shrimp farming meant that numerous structures were built to keep the saline water which contributed to congestion of the natural drainage and runoff of water. Over the period, the major rivers got silted up and navigation was reduced.

In summary, water logging is a result of a combination of factors that include: excessive monsoon rains; inadequate drainage; mismanagement and a lack of maintenance of embankments; increased sediment and siltation of rivers; restricted river flows due to embankments built for shrimp farming; and the release of water from barrages in India especially Farakka Barrage and Durgapur / Damodar Barrage (Oxfam Public Health Assessment).

Poverty incidence is already high in Satkhira district (55% compare to national average of 49% and costal average of 52%) and there is no doubt that 2011 water-logging hit the poor people most severely. The affected people were already vulnerable due to repeated water-logging over the last 10 years. Both household and local economies were not able to generate enough surpluses to recover from the cumulative impacts of past water-logging. The major livelihoods of the people are dependent on natural resources and climatic conditions. In general, 60% HHs are dependent on agriculture. However, there is a major variation when it comes to the livelihood of the poorest HHs. A sample longitudinal survey on employment status conducted by the DFID funded Shiree project indicates that 36% of the poorest HHs live on agricultural and other daily wage earning, 15% on small business, 7% on fishing and livestock and 10% on transport (like rickshaw pulling).

1.3 Methodology

This exercise adopted a simple framework to determine the gap between needs and response [Gap=(number of affected people/their needs)minus(total/per sector coverage of response)]. Although this only determines gaps in a humanitarian context it also highlights priority recovery support. The following key definitions and processes were used in the analysis:

- A. *AFFECTED PEOPLE*. People directly or indirectly affected by the water-logging in Satkhira district determined by GoB's District Relief and Rehabilitation Officer (DRRO) in Satkhira.
- B. *DETERMINATION OF NEEDS OF THE AFFECTED PEOPLE*. Needs of the affected people were consolidated from the agencies' assessment reports as well as damage report supplied by DRRO Satkhira.
- C. *CONSOLIDATED COVERAGE OF RESPONSE*. Total coverage of the response was determined by adding up the population coverage of the responses of various agencies. In a similar way, sectoral coverage was identified.

D. *DETERMINATION OF GAPS IN RESPONSE*. Three different types of gaps were considered in the exercise. First were the ‘coverage gaps’—both population and geographical coverage were considered. Second were the ‘assistance gaps’ in the sector, determined by subtracting the number of people with particular needs from the total sectoral coverage by agencies. It should be noted that, the determination of gaps in most cases was also qualitative in nature due to the unavailability of quantitative figures. A third consideration was the ‘time gap’ which was, although only indicative, analysed through comparing the persistence of likely needs and the duration of the on-going response.

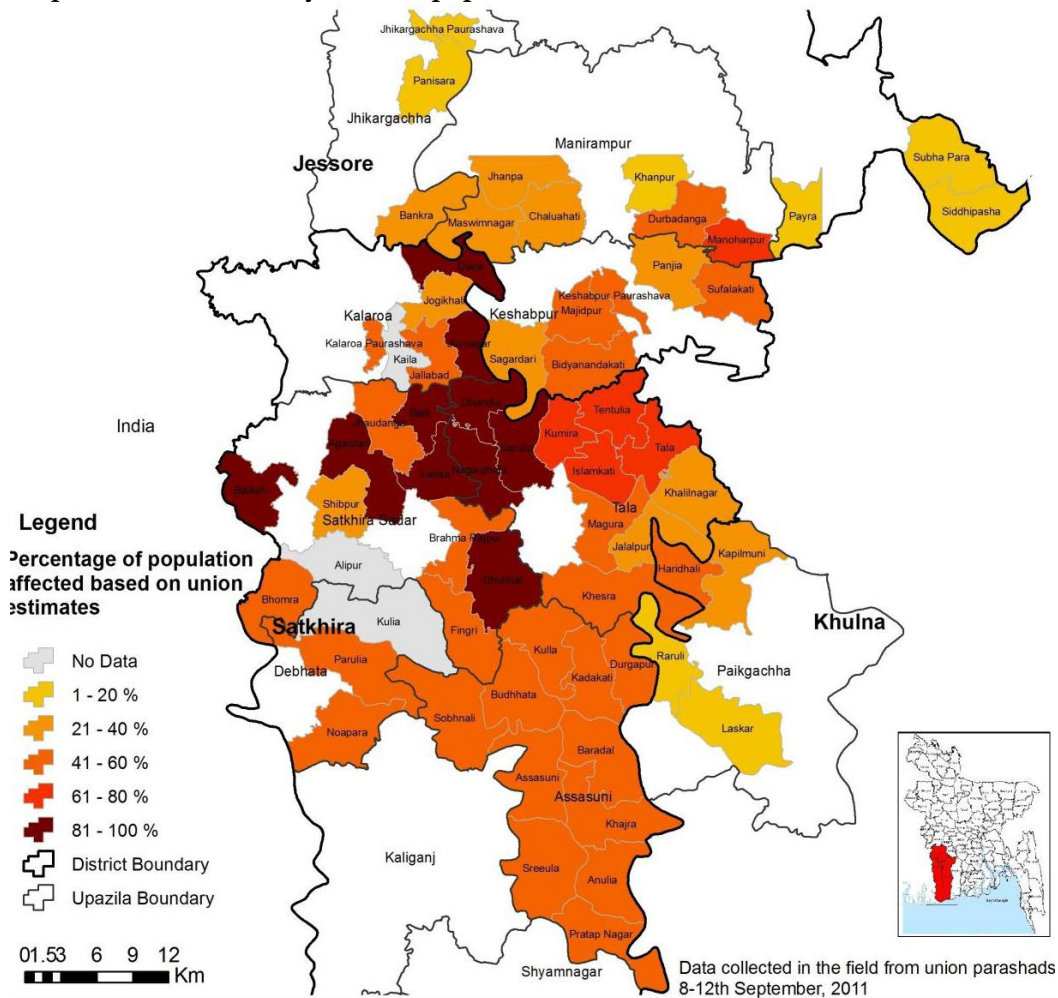
This report is drawn from the 12 assessment reports conducted by various agencies. The first set of assessments was conducted by national NGOs such as Uttaran and Sushilan. The second set was generated through joint assessments done by three groups of INGOs & UN Agencies—one by ECB; one by WFP, FAO, Shushilan; and one by CBHA members. The third set of reports came from individual UN Agencies and INGOs. Information about humanitarian responses was collected by UNDP from various agencies and local government offices in Satkhira—and some agencies voluntarily shared their information with UNDP.

Part Two: Nature and Scale of the Impact

2.1 Scale of 2011 Impact

The scale of the water logging and its impacts are significant in Satkhira district. Considerable parts of the six Upazilas i.e. Tala, Satkhira Sadar, Kolawara, Debhata, Assasuni, Kaliganj upazilas and the Municipal areas of Satkhira district are inundated and affected (Map 1).

Map 1: Affected Areas by affected population



Source: ECB Consolidate report: <http://www.acaps.org/img/documents/coordinated-assessment-bangladesh-prolonged-water-logging-coordinated-assessment-report-bangladesh.pdf>

The number of people affected by the water-logging is 939514 from 200,000 households including 213,710 children (IFRC). This inundation forced as high as 50,000 households to leave their homes. As of 10 August, around 52,657 people have reportedly taken temporary shelter in schools, on roadsides or embankments.

Table 1: Upazila-wise loss and damage information

SL No	Upazila	Affected Family (No)	Fully Damaged House (No)	Partially Damaged House (No)	Damage of livestock (No/BDT in Thousands)	Damage of poultry (No/BDT in Thousands)	Damage of crops (Acer/BDT in Thousands)	Damage of Shrimp (Acer/BDT in Thousands)	Temporary Camp (No/Family)
1	Tala	52902	19328	12500	-	-	11571/537960	18364/509562	101/10012
2	Satkhira Sadar	43900	4100	14700	30510/5530	35421/2000	10868/321120	16599/611956	68/8096
3	Kolaroa	22420	28	1540	-	-	3038/6900	776/93120	08/156
4	Debhata	24335	552	3200	335/705	15000/1500	395/9402	7954/8845	31/4322
5	Assasumi	26382	865	2975	-	89/28	5180/883320	13400/125001	44/1630
6	Kaliganj	11300	780	5700	72/176	12000/1440	203/8736	8400/10850	-
7	Satkhira Municipal	16500	1560	2475	-	375/70	1600/44800	1200/162000	36/3600
Total		197739	27213	43090	30917/6411	62885/5038	32855/1017238	66693/1521334	288/27816

Source: Office of District Relief and Rehabilitation Officer (DRRO) as on 12 September 2011

2.2. Sector-wise damage and current Needs

The impact of the water-logging was not only massive but also wide-spread. This has destroyed significant parts of the private and public physical infrastructure such as houses, homesteads, water and sanitation, roads, market places and embankments. The impact on the household and local economy was also significantly high. People lost their existing crops and agricultural equipment, business capital and other livelihood tools. This also caused immense sufferings for the people in accessing food, clean water as well as overall secured environment (ECB). The following subsections describe sector-wise losses and related needs.

2.2.1. Housing and Shelter

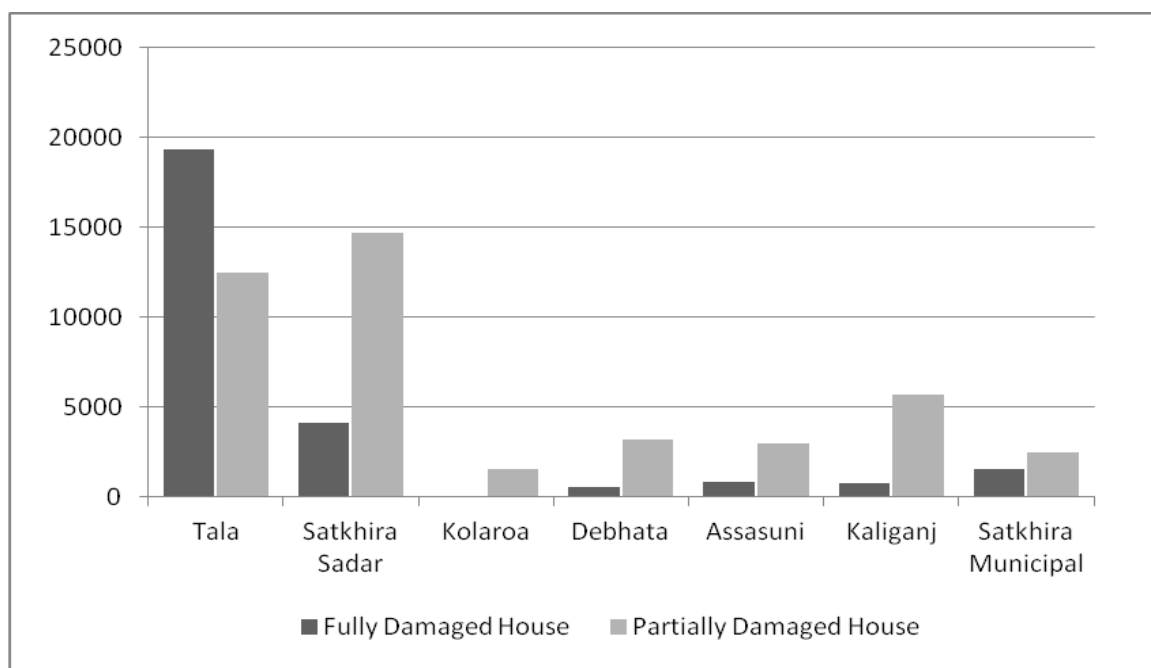
Most houses built with mud and other primary natural materials were damaged by the inundation. These houses were built on raised ground (plinth) one or two feet above the flood level. As shown in table 1, 27,000 houses were completely destroyed with another 43,000 houses¹ partially damaged. It is also important to note that a considerable part of household economic activities in rural Bangladesh take place in the homestead. This means such income stops once a house becomes affected by disaster.

According to the government, the number of internally displaced households now stands around 70,303. However, this refers only to people who took shelter in schools, mosques and government buildings and does not include the thousands who are taking shelter on roads and those staying with relatives or friends.

¹ These houses are at risk of falling within 1-2 weeks, because of being submerged.

Some displaced people may not return to their homes as their houses were badly damaged. This indicates that many of the people presently displaced will remain so until flood waters recede enough for rebuilding on their homes to start and until they are able to get access to materials needed for repairs and rebuilding. People were very uncertain about how long it would be before they could return home, due to: i) the severity of damage to their houses and property and ii) the length of time it would be before they could resume livelihood activities (ECB 2011). Women and young girls expressed security concerns to the assessment team (ibid).

Fig 1: Impact of the water-logging on houses by Upzila



2.2.2 Livelihood and Food Security

Agriculture, fish farming, fishing and the wage-based labour market are the backbone of the economy of Satkhira district.

- Agriculture Extension Department suggests that a major portion of crop land in seven upazilas of Satkhira district was inundated and standing crops have been fully destroyed. The predominant rice crops in Satkhira are the rain-fed Aman (60%) followed by the winter rice Boro (35%) and Aus (5%). The majority of the agricultural lands in the affected upazilas and unions either had a standing Aus crop in the field to be harvested in August/September or recently planted Aman seed beds (FAO, ECBP, WFP, Shushilan). The rainfall induced floods and water-logging which submerged the agricultural fields with 4 to 6 feet of water for over 20 days. This is considered to be sufficient time to damage the standing Aus crops as well as the Aman seed beds.
- Homestead-based fish and vegetable farms have also been fully damaged. The Uttaran assessment report quoting GoB noted that seven upazilas of Satkhira district (and two upazilas

of Jessore and two upazilas of Khulna districts) lost fish stocks of 9752631 acres ponds and *ghers*. Similarly, household-based livestock suffered significantly. All the homestead vegetables were damaged due to the deep and prolonged flooding/water logging (ECHO & Oxfam GB)

- Once the backbone of the local economy was affected this had a tremendous impact on the labour market, especially people employed in agriculture, fish and shrimp farmers and other daily wage earning activities. The reports highlighted that at least three to six months would be needed to restart farm-based livelihoods. The alternative employment opportunities available in the area are predominantly pulling rickshaw vans and some ad hoc type labour-intensive activities. The surplus of labour has already substantially reduced wage rates (to one third of pre-water logging wage).

The displaced people do not have any regular income and rely on income derived from the sale of assets. Communities reported that most people now are without any livelihood at all. There is very little work available in shrimp cultivation, agriculture and fisheries because these areas have been so significantly affected by the water-logging. Agriculture will be affected until the soil dries up sufficiently for planting and this could take a further three to six months. The influx of available day labourers on the market has reduced wages significantly (ECB, consortium of NGOs)

2.2.3. Health and Nutrition

The major concern for health and nutrition lies in the deterioration of food security. Due to production and income loss people reduce their food intake. There is also a high risk of waterborne diseases when water starts to recede. The women and elderly-headed households are in the worst condition. As displaced people are living in congested places there is always a risk of disease outbreaks, violence, rape, etc (Oxfam GB, UNICEF)

The current assessment portrays a deteriorating food security situation for the population affected regardless of socio-economic status. The assessment report indicates that the overall nutrition status of the people is most likely to go down (ECB, Consortium of NGOs).

The consumption of main meals is now 1 - 2 meals a day, down from an average of 2-3 meals before the floods. The adult members of the family often consume 1 meal to let the children and the elderly eat 2 times a day. The quantity and quality of meals has reduced significantly. After the floods, an average of one kg of rice is consumed in 2 days by a family with five members. This equates to one person consuming around 100 grams of rice a day. In normal times, rice consumption by an adult in rural areas is 300- 400 grams a day. Effectively they are consuming only 25-33% of their normal consumption. The major food items consumed are mostly rice and either dal or potato, often with Kolmi shak, a leafy green vegetable available on the road sides. Before the floods, many households had a small amount of animal protein intake such as small fish once/twice a week in their regular diet (FAO, WFP, Shushilan, ECHO, ECB)

2.2.4. Water, Sanitation and Hygiene (WASH)

The water-logging has a considerable impact on the overall water and sanitation status of the population. The reports highlighted three important aspects of the water and sanitation situation. Firstly, the destruction of the water and sanitation infrastructure. An estimated 70-80% of water

pumps have been submerged (FAO, WFP, Shushilan report & Oxfam GB). The second problem is related to polluted water that may contaminate food and drinking water causing diseases among children and adults. The third problem is related to increased hardship and insecurity among women and young girls relating to water collection and use of unsafe sanitary latrines.

Drinking water has become a significant priority as recovery begins and many families will go home to areas where water sources have been damaged. Additionally, access may become increasingly difficult when boats can no longer be used to access more distant points and transport water. The situation in relation to drinking water is likely to deteriorate as water recedes (ECB, consortium of NGOs).

2.2.5. Children and Education

A number of assessment reports provide in-depth analysis on children and the overall education situation. The first point is related to the closure of education institutions due to damage in their infrastructures. The second is related to damage to education and learning materials. And the third is related to the risk of drop-out that is likely to be caused by increased poverty and the demand for unpaid labourers for household farms and enterprises.

Uttaran assessment report indicated that around 980 education institutions were under 3-4 feet of water in the month of September.

Part three: Needs, Response---and Gaps

3.1 Summary of the Needs²

The assessment reports documented an array of humanitarian and recovery needs of various groups of the affected people. The following is a generalised summary of these needs:

A. *HOUSEHOLD'S LIQUIDITY NEED.* Household incomes and expenditure patterns have been changed due to the water logging. Expenditure increases not just due to the price hike of food items but also increases in incidental costs such as education, health etc. On top, each household needs cash to cover the recovery expenses. Cash needs top the priority of affected people listed by the ECB 2011.

B. *ACCESS TO CLEAN WATER AND SANITATION.* The displaced HHs require an uninterrupted supply of clean drinking water. When people start to go back there will be high level of insecurity about the collection of drinking water and accessing safe sanitary facilities. Rebuilding resilient water and sanitation facilities is an urgent priority and an important part of the recovery process.

C. *FOOD AID.* The food security situation will be normalised once people have their next harvest and the local labour market is normalised—which may take up to four months. During this period food is a need among affected people, either to be supported with food aid, employment generation or by cash grant.

D. *REBUILDING SUPPORT FOR HOUSE.* People will have a difficult time during the winter without a proper and adequate housing facility. Two important needs should be considered. The first is provision of housing materials so that people start living in comfort. The second need is for resilient housing that can withstand future water-logging and climate change impact.

E. *QUICK RECOVERY OF LIVELIHOOD.* Cash is the most appropriate form of livelihood support which would have multiple impacts. Risk resilient livelihood skills can also be promoted through cash for training. Many people need also support for livestock feed to prevent distress-selling.

F. *EDUCATION.* Education needs were not properly assessed in the reports. A separate assessment should be undertaken to understand the needs in education. However, a number of needs indicated include support for education materials, waiving of school fees and support for the schools to repair their damage facilities.

G. *PHYSICAL INFRASTRUCTURE.* Community infrastructure that facilitates the local market to recover is also a priority need.

H. *HEALTH.* This is a priority need mentioned by all reports but no details were given.

² The listing (A to D) is done according to the priority of the people documented by ECB 2011.

3.2 Response to Date

There has been considerable humanitarian response provided by GoB, Donor agencies through INGOs and National NGOs, United Nations (UNICEF and WFP).

GoB provided large scale immediate support with cash, food and clothes to the affected people. A considerable number of local and national NGOs working in the area also provided immediate support with food and non-food items. Among the UN agencies, UNICEF and WFP assisted their local partners with support for food and nutrition.

DFID's Consortium of British Aid Agencies (CBHA) supported its member agencies i.e. HelpAge, CAFOD, Christian Aid, Tear Fund, SCF-UK and Islamic Relief with emergency food, WASH and Shelter to 10,000 HHs. The work has been completed. The ECHO supported ActionAid, Islamic Relief, Concern World Wide, Oxfam and Solidarities International, MuslimAid, ChristianAid, DanChurchAid, ACF, SCF-UK with a large scale cash based programme to be completed in January 2012. USAID through support to SCF-USA and CARE (through MuslimAid and Uttaran) to 38,000 people with food and non-food items. AusAid also provided support to 35,000 HHs through Shushilan.

Most of these assistances are made up of Food, non-food items, support for shelter, WASH and cash. Annex 2 provides a list of agencies working in the affected area and their ongoing response programme.

3.3. Analysis of Gaps

The following table presents an overall scenario of humanitarian and recovery needs and response highlighting gaps for immediate actions:

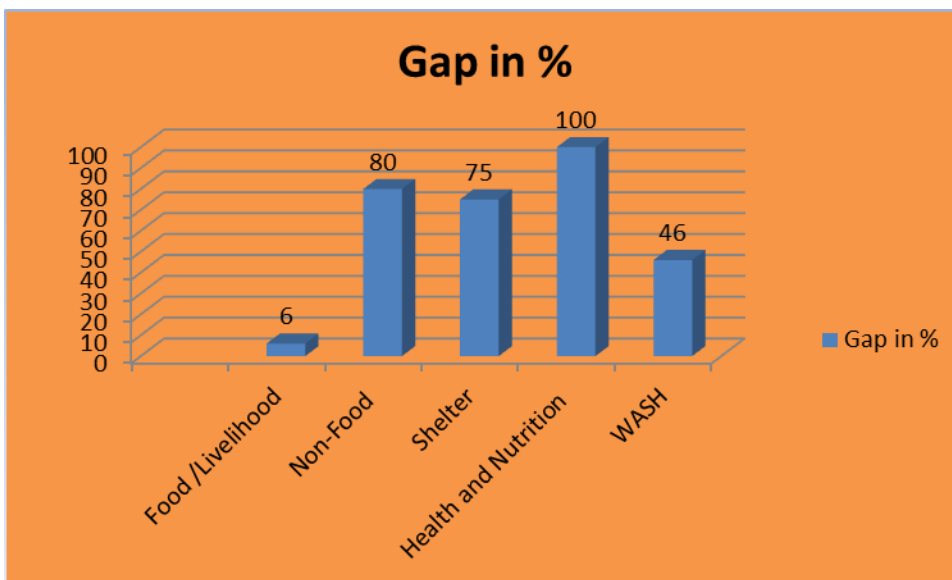
Humanitarian and Recovery Needs	Quantification of Needs	Statement on Response and Gaps
Household's liquidity need.	197,739 HHs for recovery and consumption need	ECHO supported partners providing support to 45,000 families up to January 2012. Gap period is January to April (Harvesting time).
Access to clean water and sanitation.	Humanitarian: all affected HHs Recovery: at least 13,300 water systems and sanitary facilities for all affected HHs.	Humanitarian: 106,408 HHs covered with (hygienic support , safe latrine, shallow and deep tube well, safe drinking ,hygienic kits, Family kits , water supply facility) Recovery: 100% gap
Food aid.	197,739 HHs in both humanitarian and recovery process.	133,200 families covered with GoB food support for four months. 52,495 families have had one-time food assistance.
Rebuilding house.	70,303 HHs need support.	17,420 HHs received some support for T-Shelter. Significant support gaps remain for T-Shelter

		and resilient housing.
Quick recovery of livelihood.	All affected HHs	Some temporary livelihood support was also provided from NGOs.
Education.	Not assessed.	No substantial support provided
Physical infrastructure.	Not assessed.	ECHO partners will restore some physical infrastructure through cash for work scheme.
Health.	197,739 families	Response data not available

A number of key issues emerged from the exercises:

- Firstly, although humanitarian needs were addressed fairly well in food and livelihood; non-food, health, housing and nutrition remain significant areas with gaps. In terms of timing, most humanitarian operations will be planned to be over by January 2012 but people need further external assistance until the next harvest (due in April 2012).
- Support for rebuilding livelihood can take place in the humanitarian context. There is a significant gap in rebuilding livelihood.

Figure 2: Gaps in coverage of the response by selected sector



Part Four: Required Actions

The assessment reports proposed an array of short and long-term actions and guiding principles for both humanitarian and recovery support for the affected people. The first principle that was highlighted was to consider the chronic nature of the water-logging problem together with predicted climate change impacts. Any recovery operation should enable people to cope with future water logging problems. The second principle suggested was related to adequate recovery; that past response to water-logging paid limited attention to recovery, and the reports emphasize that inadequate recovery increases people's vulnerability to future but predictable risks.

The following are the actions proposed:

A. Scaled up humanitarian support until the next harvest.

1. Addressing cash and food needs of the HHs and local economy keeping in mind three expenditures: i). ongoing consumption, ii). increased HH incidental costs and iii). costs of recovery. This can be achieved through various cash-based approaches already tested in Bangladesh and beyond. Food assistance should be continued until the next harvest in April 2012, either in the form of cash or food.
2. Protection of the vulnerable: Create child-friendly spaces, temporary learning centers, support for education and nutrition support to the students. Education and safe spaces for children should be used to address safety issues (road, water and other accidents related to limited space) that have resulted in deaths and injuries of children. Nutrition interventions in order to support children under the age of 2 to counter the reported reduction in breastfeeding and to monitor the nutritional situation.
3. Support for damaged school infrastructure should be a priority action.
4. Distribution of warm clothes during the ensuing winter season.
5. Rehabilitation of water sources and latrines as well as emergency sanitation and hygiene responses should be expanded to minimize the high risk of disease, including cholera.
6. Shelter assistance in the form of emergency shelter kits needs to be provided to the affected families for protecting them from the forthcoming winter.
7. Restoring homestead-based livelihoods: Support for livestock or provision of livestock in coming weeks. Immediate support for homestead gardening.

B. Recovery support for HH and local economy based on DRR and rebuilding better principles.

8. Adequate investment in resilient housing that may include increasing plinths and use of resilient materials. Planning should consider space for household-based livelihood activities. Moreover, support should also be planned to recover homestead-based livelihoods with recovery principles.

9. The recovery should include capacity building of the household members, local government and service providers to sustain local livelihoods. Studies should be conducted to understand major risks to and opportunities for resilient livelihoods.

C. Development of a long-term solution to the problem.

The following approach could be taken by the LCG-DER to address the waterlogging situation on a long-term basis:

1. Initiate formulation of a comprehensive actionplan for the sustainable recovery of the affected people;
2. Conduct a series of consultations with experts and local communities to identify resilient habitats within the current context (and the context of major change in the physical infrastructure);
3. Initiate advocacy with GoB and donor agencies to mobilize resources to implement the actionplan.
4. Encourage GoB to find a permanent solution to the water-logging problem in the area. Tidal River Management (TRM) intervention as a community-based climate adaptation and the river basin management option can be scaled up and replicated to bring about a sustainable solution and mitigate the future water-logging crisis in South-West coastal region of Bangladesh. Please refer to Annex 3, for further information on TRM.

Annex 1:

List of documents Reviewed

1. A Rapid Food Security Assessment of Satkhira district by WFP, FAO and Shushilan, August 2011.
2. Concern Flood Report, August 2011
3. ECHO Crisis Report, August 2011
4. NDRCC Situation Report, August 2011
5. DMIC Report, August 2011
6. ECB project report on water logging in southern Bangladesh released on 5 September 2011
7. Initial Assessment on Floods and Water Logging in South-West Bangladesh in August 2011 undertaken jointly by Concern worldwide, Christian Aid, Islamic Relief, Muslim Aid, Save the Children, Solidarities International and Denmark Act alliance
8. DRRO (2011). Loss and Damage Assessment Report produced by the office of District Relief Rehabilitation Officer, Satkhira
9. Oxfam (2011). Initial Assessment Report on water logging. OXFAM GB. August 2011
10. WASH Assessment Report, UNICEF, August 2011
11. ECB (2011). Flooding & Prolonged Water-logging in South West Bangladesh: Coordinated Assessment Report, ECB, September 2011
12. Uttaran (2011) Report on Water-logging, Uttaran, October 2011
13. IFRC (2011). Emergency appeal: Bangladesh: Monsoon Floods. 26 August 2011. Dhaka. Bangladesh.
14. Tutu, Ashraf-Ul-Alam (2005). River management in Bangladesh: a people's initiative to solve water-logging.

Annex 2:

3-W (Who is doing what and where) data sheet on water-logging response in Satkhira³

Implementing Agency	Type of intervention	Area targeted/ covered	# of family targeted/covered	Implementing partner, if applicable	Funding Agency	Amount budgeted/ spent
Food Items						
GOB	GR Cash (BDT 1815000)	Tala, Satkhira Sadar, Assasuni, Debhata,Kolaroa,	41000 Families			
GOB	GR Rice (1675MT)	Tala, Satkhira Sadar, Assasuni, Debhata,Kolaroa, Kaliganj, Shyamnagar				
GOB	VGF410MT	Tala, Satkhira Sadar, Assasuni, Debhata,Kolaroa, Kaliganj				
GOB	Especial VGF for EID 922MT	Tala, Satkhira Sadar, Assasuni, Debhata,Kolaroa, Kaliganj, Shyamnagar	92200 families			
Uttaran	Food Items per family(Rice 30 Kg, lentil 6Kg, Potato 12Kg, Oil 4L, ORS 15 Packet,	Tala	1200 Families	Self	Self	
WFP	Fortified Biscuit(105 MT, 3 Kg/HH)	Tala, Satkhira Sadar, municipal, Kolaroa, Debhata, Assasuni	23500 families	Shushilan	-	
Islamic Relief	Food Items in per family(Rice 15kg, lentil 3kg,Oil2L, Salt 1Kg, sugar 1Kg and Sujee	Kalaroa, Tala, Satkhira Sadar	1300 families	SSS, Mukti Foundation	-	

³ **3-W Data Sheet has been compiled based on information collected from various sources including ERF Coordination Office at Khulna in addition to the reports included in Annex 1.**

	1Kg					
Action Contrail Fame(ACF)	Food items- per family(Rice 10kg,oil 1Kg, Salt 1Kg, Potato 3 kg, lentil 2Kg)	Assasuni, Debhata,	2000 families	Shushilan	ACF	BDT 1Cror
Christian Aid	Food Package per family(Rice 20Kg, Lentil 3Kg, Oil and Salt 2Kg)	Tala, Satkhira Sadar	2815 Families	Shushilan	-	
BRAC	Food Items	Tala	2000 families	Self	-	
Bhumija Foundation	Food Items per family(Flatted Rice-2Kg, Salt 1kg, Suger .5Kg, Oil 1L, Bag 1)	Tala	670 families	self	MJ	
Bhumija Foundation	Food Items per family(Rice 10kg, salt 1kg, Lentil 1kg, Oil 1L, Sujee 1kg, Suger 1 kg,	Tala	960 Children	Self	Actionaid	
SUS	Food Items per family(Flatted rice 1 kg, lentil 1kg, salt 1 kg, Potato 2kg, Oil 1L, Soap 1pieces)	Tala, Satkhira Sadar, Assasuni, Kolaroa	1300 families	self	-	
Nabojibon, Satkhira	Food Items per family(Rice 40kg, lentil 1kg, Flour 1kg, Oil 1kg, Suger 2kg, Salt 1kg, Sami 1kg, Khajur 1kg, Powder	Satkhira Municipal	100 families	self	-	

	milk 250gm, Soap 4pieces, Onion 1kg, potato 10 kg					
Agrati Sangasta, Satkhira	Food items per family(Rice 4kg, Potato 2kg, Oil 1/2kg, Salt 1/2kg, Lentil 1kg)	Tala, Satkhira Sadar	500 families	self	-	
Dhaka Ashania Mission	Food items – per family(Rice 12 kg, lentil 1kg, potato 2kg, oil 1 kg, onion 1kg, salt 1kg,	Satkhira Sadar, Kolaroa, Debhata, Assasuni, Kaliganj, Shyamnagar	5800 families	Self	-	
World Vision Bangladesh	Food Items- per family(Rice 15kg, lentil 2kg, Potato 3kg, oil 2kg, salt 3kg, Flatted rice 1kg, Sugar 1kg, ors)	Satkhira Sadar	2000 families	self		
Nijara Shekhe	Food item-per family(Rice 5kg)	Satkhira Municipal	20 Families	Self		
Paritarn, Tala	Food items- per family(Flatted rice 2kg, Gur 1/2kg, Oil 1kg, Salt 1kg, Ors 2)	Tala	1000 families	Self		
Jagorinee Charka	Food items- per family(flatted rice 3kg, Gur 1/2kg, water 5L	Tala, Assasuni and Satkhira Sadar	2400 families	Self		
Selected NGOs	CFW, Food ration and cash training support	Tala, Assasuni and Satkhira Sadar	4930	-	ECHO	

Non-food items

GOB	Lung-550, Sharee-693,	Tala, Satkhira Sadar, Assasuni, Debhata, kolaroa, Kaliganj, Shyamnagar	639			
Uttaran	Non Food Items(Plastic sheet-4610P, Tub-well- 100Nos, Sanitary latrines 201nos,Water pot 270 Pieces	Tala, Satkhira Sadar, Debhata	11100 families	Self	Help Age International, High Commission of Canada, Save the Children UK, ECHO, UNICEF	
UNICEF	Non food items (Plastic pot-1, Plate-2, Glass-1, Gerikan-1, Large spons-2, Cooking pot- 1, Clothing-2, Lungee-1 Gamcha-1, Bed Sheet-1, Cloth hanging rope-1, soap- 4, Plastic sheet-1)	Tala, Satkhira Sadar, Debhata,	10000 families	Agrati Sangasta, Bashara, Uttaran, Poritran, Protic Trust, Bangladesh Vission, SoDESH, IDEAL	-	
Oxfam	Polithan and Plastic sheet	Tala	720 families	Shushilan	-	
Christian Aid	Non food Package per family(Candal- 6p, Saline 10paket, water purified tablet, Gas light 1P, Soap-1, water pot-20L , Plastic sheet- 750 Family	Tala, Satkhira Sadar	2815 Families	Shushilan	-	
NARRI Associate (Concern; Oxfam; Action Aid; Solidarites; Islamic Relief)	Non food Package per family(2 blankets; 2 shawls; 2 children sweaters)	Tala, Satkhira Sadar - Satkhira; Keshobpur, Manirampur - Jessore	14,050 families	Shushilan; Samadhan; Dalit; Bhumij Foundation	ECHO	

Temporary Shelters						
GOB	Plastic Sheet-250, Blue Sheet-250	Tala, Satkhira Sadar, Assasuni, kolaroa			-	
SUS	Temporary shelter-poli-sheet	Tala	500 families	self		
Bhumija Foundation	Temporary shelter-poli-sheet	Tala	500 families	Self	MJ	
Uttaran	Temporary Shelter	Tala	9730	Self	Help Age International, High Commission of Canada, Save the Children UK, ECHO, UNICEF	
Selected NGOs	Temporary shelter	Tala, Satkhira Sadar	3400 families	-	ECHO	
NARRI Associate (Concern; Oxfam; ActionAid; Solidarites; Islamic Relief)	Distribution of emergency shelter kits (bamboo; rope and tarpaulin); repair to damaged shelters	Tala, Satkhira Sadar - Satkhira; Keshobpur, Manirampur - Jessore	3,290 families (2,500 for emergency shelter kits; 600 for shelter repair; 190 new shelters)	Shushilan; Samadhan; Dalit; Bhumij Foundation	ECHO	
WASH						
Selected NGOs	WASH kits	Tala, Satkhira Sadar	3437 unit	-	ECHO	
NARRI Associate (Concern; Oxfam; ActionAid; Solidarites; Islamic Relief)	Hygiene kits (5 bathing soaps; 5 washing soap; 4 washing powder)	Tala, Satkhira Sadar - Satkhira; Keshobpur, Manirampur - Jessore	12,770	Shushilan; Samadhan; Dalit; Bhumij Foundation	ECHO	
NARRI Associate (Concern; Oxfam; ActionAid;	Latrines (emergency and household)	Tala, Satkhira Sadar - Satkhira; Keshobpur, Manirampur - Jessore	total units 896 (710 HH; 186 emergency)	Shushilan; Samadhan; Dalit; Bhumij Foundation	ECHO	

Solidarites; Islamic Relief)						
NARRI Associate (Concern; Oxfam; ActionAid; Solidarites; Islamic Relief)	Water supply	Tala, Satkhira Sadar - Satkhira; Keshobpur, Manirampur - Jessore	Water supply facility for 10,500 families	Shushilan; Samadhan; Dalit; Bhumij Foundation	ECHO	
NARRI Associate (Concern; Oxfam; ActionAid; Solidarites; Islamic Relief)	Female bathing corners	Tala, Satkhira Sadar - Satkhira; Keshobpur, Manirampur - Jessore	86 units	Shushilan; Samadhan; Dalit; Bhumij Foundation	ECHO	
Selected NGOs	WASH kits	Tala, Satkhira Sadar	35,500 women and adolescent for hygienic support	-	UNFPA	
Selected NGOs	Family kits	Tala Satkhira Sadar Debhata	Family kits for 13655 families	-	UNICEF	
DPHE	Water supply	Tala Satkhira Sadar Debhata	Water supply facility for 16964 families	-	UNICEF	
DPHE	Sanitation	Tala Satkhira Sadar Debhata	Sanitation for 6200 families	-	UNICEF	
Uttaran	Family kits	Tala, Satkhira Sadar Debhata	6400 families		High Commission of Canada, HelpAge International, MCC USA, Trocaire Ireland, JOCS Japan, ECHO, Save the Children International	

Annex 3: Tidal River Management (TRM) concept in brief

The Southwestern Region of Bangladesh, in the vicinity of the bay of Bengal and Sundarban has been subjected to a plethora of hydro-geo-morphological hazards historically including cyclonic storm surge and moisture stress during dry season. The Satkhira-Khulna-Jessore triangle is in the Ganges Dependent Area (GDA) and Gorai catchments. Most of the areas are between one to three meters above mean sea level and have a southward regional slope. The average tide difference is about two meters. The area is mainly drained by a number of north-south flowing rivers. From east to west, important rivers are the Gorai-Madhumati-Baleswar, the Bhairab-Pusur, the Bhadra-Gengrail, the Hari-Teka-Mukteswari, Sibsa, the Kabadak- Betna system and the Jamuna-Ichamati-Kalindi Rivers. Most of the rivers are tidal in nature and tides used to inundate the lowlands twice a day.

Bangladesh is a densely populated agrarian country and staple food is rice. To meet increased need of staple food rice, during late 50's decision was taken to create artificial protection against the natural salinity front excursion to bring the tidal flat under rice cultivation. Accordingly in early 60s a total of 39 polders (1,014,100 acres) were constructed.

As mentioned the area is blessed with upstream flow through Gorai, a major tributary of Ganges and historically bringing huge fresh water and the silt. During last couple of decades upstream water flow has been reduced significantly due to withdrawal of Ganges water by the upstream country. Historically when there were no polders, tidal waters used to inundate the tidal floodplain and the silts were deposited in to the tidal plains raising the elevation which again were adjusted mostly due to subsidence maintaining the topography. While the polders were obstructing these natural flow and the sediment load started depositing in the channel and river beds silting up the water courses. This has been fostered by significant reduction of water flow during the dry season from the upstream. The combined effect of these resulted in to serious congestions and turned entire area in to water world! In 1984, Dakatia *beel*, a part of one polder became water-logged for the first time, due to rapid siltation of the Solmari, Hamkura and Hari rivers. Later this problem spread to even more polders. Moreover, lands outside the polders in the greater Jessore district went under water. This problem is gradually creeping to the northern part as well as in the southern part of the embankment area.

Fifteen years after the construction of the coastal embankments, water-logging began to emerge in the polders. Historically, people cultivated rice in the area putting temporary embankment for eight months of the year and removed the embankment after harvesting allowing the natural flow of the system. People realized from experience and observation, people identified the polders as the main cause of water-logging and in October 1997, the people to get rid-of-the problem wanted to bring back old good days in their mind! they breached the right embankment along the Hari River a short distance above the Sholgati to allow free access of tides to Bhaina beel.

People were successful in reducing water logging in that specific area and the water board and the experts also realized the old good and natural system of trapping silts in to the tidal plain and allow the channels to drain water. So the terminology, Tidal River Management (TRM) emerged accommodating the indigenous process. The high tides bring in muddy water flow with a thick concentration of sediments and allow them to enter a tidal plain, leaves a part of the sediment to be deposited on the tidal plain and the rest goes back to the ocean through the channels. Over time the deposition of sediments raise land level in the tidal plain and enriches the soil. Since this process does not allow

sediments to be deposited on river-bed, the depth of the river-bed also increases due to water velocity and makes the river congestion free.

Bangladesh Water Development Board with the financial assistance from ADB, demonstrated an indigenous-knowledge-based “tidal river management” (TRM) approach in 1993, which was later found as technically feasible, economically viable, and socially acceptable. The water management groups at the village level were formed at a much later stage and had little contribution to project design and implementation.

National level scientific and knowledge institutions like Institute of Water Modeling (IWM), Centre for Environmental and Geographical Information Services (CEGIS), and multilateral development finance agency Asian Development Bank (ADB) have acknowledged the concept to be an effective way to mitigate the water logging crisis that has been plaguing the region since the 1980s (ADB 2007; CEGIS 1998; IWM 2007, 2008)⁴.

Local communities, national and regional NGOs and scientific institutions think that planned management of sediment carried by the river is possible through Tidal River Management (TRM). Studies and community consultation has shown that Tidal River Management (TRM) can be scaled up and replicated on river basins throughout the southwest coastal region. It is the most effective method to raise land and make it cultivable, mitigate water logging crisis, increase navigability of rivers, reduce salinity and is used as the most effective climate change adaptation strategy to protect the region from sea level rise (Uttaran 2011)⁵.

⁴ Asian Development Bank (2007), Project Performance Evaluation Report on Khulna-Jessore Drainage Rehabilitation Project, Operations Evaluations Department, Manila, The Philippines

⁵ Uttaran (2011), Peoples’ Plan of Action: Management of Rivers of Southwest Coastal Region in Bangladesh