

CHANGES IN LIVELIHOOD PATTERN OF INHABITANTS IN  
WATERLOGGED AREAS IN SOUTH-WEST REGION IN  
BANGLADESH



A Dissertation for the Degree of Master in Disaster Management

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**Fall 2006**

Postgraduate Programs in Disaster Management (PPDM)  
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## **Abstract**

The coastal zone specially in South-West part is ever dynamic and changes occur continually due to natural reasons, anthropogenic reasons and at the same time due to management interventions. What ever is the agent of changes have direct influence on the status and quality of coastal dweller's life and livelihood. It is absolutely necessary to understand the development processes and dynamics in this region. Measurement of the conditions of the natural systems functionality, resource bases health, resources flow in one hand and at the same time access of the dwellers in this region to the services and resources are necessary to understand the well being of the dwellers in South-west region.

This document is based on an analysis of existing data, information and experiences accompanied with findings of questionnaire survey conducted for this study.

Study revealed that the region has been subjected to different kinds of environmental imbalance and natural disasters ever since the implementation of "development" projects that are clearly at odds with the region's environmental characteristics, and are ecologically unsound.

No holistic attempt at investigation and research has been made to ascertain the negative impacts of river siltation, waterlogging, salinity and other disasters on the life of the people - especially women and children - and on their economic and family lives, on education, health, and hygiene.

Therefore we need to take a correct approach towards the development of the South-west region. Isolated mechanical and technological approaches that have no consideration for the environment will necessarily fail to address the uniqueness and the problems of the coastal region. Only an eco-technological approach may bring about real development of the region.

Study shows that local people have been trying to take part in decision making processes. Foreign experts come and go but they have no stake in the environment in which they apply their 'superior' knowledge and skills. But the local people have. They have to stay there and survive. Any change in the environment profoundly affects local communities and the lives of the people. Therefore, if local communities have to achieve desired progress, they have to have more power in taking decisions. Abstract facts, data, and debates on different issues should be made simple, so that people can easily understand these issues, and realize their own roles in the development of their region, as well as the consequences that might follow, and what they should do in such eventualities.

## **Acknowledgements**

The researcher would like to thank first the beneficiaries those who participated in this study even living in a grave situation in waterlogged area.

The researcher would like to give his sincere thanks to Mr . Shahidul Islam and other colleagues of Uttaran ( A national NGO working in Jessore-Shatkhira to find out the water logging situation) for their guidance and providing researcher various relevant documents that helped the study a lot.

The researcher would like to express his sincere thanks to Dr. S .I . Khan of BRAC University, course supervisor and resource person for his generous guidance and support which made it possible to prepare the final draft of the study.

The researcher also grateful to Oxfam-GB Bangladesh program to make this Post Graduate Program of Disaster Management as well as for this study finally happen through giving financial support .

Finally lot of thanks to other friends of Post Graduate Program of Disaster Management Course of BRAC University for their sincere comments regarding the study that helped the researcher in keeping right track of the study.

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## CHAPTER-1

### Background of the Study

From the environmental point of view, the south-west coastal region of Bangladesh was quite unique in several ways. Comprising the districts of Satkhira, Khulna, Bagerhat, and the southern part of Jessore, the region is basically a tidal wetland flooded by high tide at least twice a day. Since the land was highly fertile, people in large numbers moved in from other parts of the country and settled in the flood plains suitable for the cultivation of indigenous flood- and brackish-water tolerant varieties of rice. On the other hand, the rivers and estuaries of the region were rich in bio-diversity with hundreds of species of fish. All these factors together made the region abound in rice and fish production and there used to be no scarcity of employment and food in the region. Moreover, Sunderban, the largest continuous mangrove forest of the world, which is also a Unesco World Heritage site, is situated to the south of the flood plains, adjacent to the Bay of Bengal.

During the 1960s, the then government of East Pakistan implemented a Coastal Embankment Project, with a view to cultivating High Yielding Varieties (HYV) of rice. The project was funded by a number of western donor agencies and the Dutch Government provided the technical support. The project was completed in 1973. However, the project design failed to comprehend the environmental and ecological consequences of an embankment construction. Although the immediate impact resulted in bumper crop production in the initial years, the inhabitants started to face severe environmental and ecological problems, well within a decade.

The main objective of the project was to convert the tidal wetland to a dry land suitable for the cultivation of two crops in a year instead of one crop possible earlier. With this view in end, 1556 km of embankment was constructed with a total of 37 polders and 282 sluice gates in the districts of Khulna and Satkhira and the southern part of Jessore district. During the initial 10-15 years, better crops were produced as the period coincided with the introduction of High Yielding Varieties (HYV) of rice. But the people witnessed a downfall in biological productivity of the area, particularly fish production was declining. However, a more serious consequence of the project began to unearth in the mid 1980s as the upper portion of the tidal wetland was experiencing water logging. Almost all the estuaries began to silt up at the upper ends. In the pre-embankment period, the high tides used to deposit silts in the tidal plain during the months of January to June when the people used to breach the temporary embankments build for the period from July to December. In the post-embankment period, as tidal water could not enter into the tidal plain, the silts got deposited at the upper ends of the estuary and gradually the river-beds began to rise. Inside

the polders, the wetlands subsided due to non-deposition of silt and gradually took the shape of lakes and according to government statistics; over 106,000 hectares of land have become water-logged.

This logging has brought about enormous sufferings for the people of the area. The embankment decreased the depth of the estuaries and the area of tidal prism. Salinity has gradually increased due to capillary action and vast agricultural lands have lost fertility. Many rivers are drying up due to increasing level of silt on their beds. Only a very small area of land can be brought under cultivation during the dry months since huge area is under water for about last 15 years. Moreover, due to water logging, unemployment has been on the rise and many people have been forced to migrate to urban areas.

In this context, the people of the area were mobilizing resources to address the problem through their own organizations. While the citizen's organizations like CBOs and rural youth clubs tried to articulate the people's voice, the NGOs, working in the region, also joined the people and the media gave wide coverage. As a result, with a declared view to mitigating the misery of the people, the Government initiated a project namely "Khulna Coastal Embankment Rehabilitation Project (KCERP)". But the community rejected the project, as it was similar to the CEP of 1960s. Subsequent attempt of the Government in the name of "Coastal Embankment Rehabilitation Project (CERP) was also rejected by the community. Finally, the Government undertook "Khulna-Jessore Drainage Rehabilitation Project" (KJDRP) with financial support from the Asian Development Bank (ADB).

KJDRP aimed at draining out water from 106,000 hectares of land of 8 Upazilas in Khulna, Satkhira and Jessore districts. The project proposed construction of some regulators and cross dam on some estuarine rivers through demolition of several small polders and bringing them altogether into one single polder. When the technical options of the project were disclosed, the people realized that those were identical to strategies offered before but under new nametags. Therefore, there was strong resistance from the people and progressive local NGOs under the leadership of Uttaran made an alliance with their apex body ADAB to pursue the matter at the national and international levels.

After a careful deliberation, a team of NGO leaders submitted a representation to the Water Resources Minister on behalf of the community people. The team also submitted an alternative solution, steered jointly by the local NGOs and the people of the area. The Water Development Board (implementing agency of the KJDRP) arranged a discussion with local NGOs in Khulna but that failed to reach any agreement. The KJDRP authority went ahead with the implementation of the project without considering peoples' concern.



In this context, finding no other alternate, the Coalition of NGOs working in the Environmental sector and the local NGOs jointly submitted a petition to the Asian Development Bank. The petition demanded a clarification from the Asian Development Bank with regard to the impact assessment of the proposed project as it was going to be implemented in a highly sensitive environment and eco-system. The ADB was approached for proper Environmental Impact Assessment and Social Impact Assessment prior to the implementation of the project. Apprehending the grievances of the community as a whole, the ADB responded fast and a team visited the area in April 1997. The ADB team discussed the matter with the NGO coalition, local NGOs, Water Development Board and finally an agreement was reached to conduct an EIA and a SIA by independent study teams before the implementation of the project. However, the Water Board, after some maneuverings, tailored the decision in favor of EIA and SIA to be conducted by their own department and engaged CEIGS to carryout the study. The NGOs and the community strongly opposed the idea of engaging any government organization to carry out the study. However, finding no other alternative, the people organized mass gathering at the spots the CEIGS was surveying and tried to bring inclusion of the TRM option as their recommendation. After studying the feasibility and responding to the popular demand, CEIGS included TRM as the 6<sup>th</sup> option in solving the waterlogging problem.

When the study team of the Water Board went to the area, the people strongly opposed the technical options of the project and pressed their demand for alternative solution through tidal river management (TRM). TRM is based on using beel areas as tidal basins and to raise the land progressively by sedimentation, ie, sediments deposit are not removed. No land requisition involved in this proposal and the raised land would return to the owners (SMEC 1999).

But finally the WDB deceived people by implementing the Kedaria Basin idea, ignoring the TRM. Within 3 years of the project implementation, the Hari river became totally silted and dried up. The project failed, because,

- The Kedaria beel is 15 KM away from the main stream of the river and situated in the up north, therefore, during high tide very little amount of water actually reached the basin from the south. This happened due to land alleviation. Basically, north part of the area is higher than the south, therefore, 4 KM per velocity which is a precondition to keep a river alive, was never generated at the north.

- The Bhabadhah sluice gate which has almost non functional due to its faulty design and siltation on its outer portion could not support the optimum quantity of water required to keep the river going, thus prompted siltation on the river bed

This year six upazillas have been badly and five are partly affected by flood in Jessore, Satkhira and Khulna districts. It is the third time of flood after the devastating flood in 2000 in this area. The problem of Waterlogging in the zone this year is fiercer than in the past. This year it directly affected 1,204,159 household of 804 villages in 145 unions and five municipalities under 12 upazilas of Khulna, Satkhira and Jessore districts. The affected people have been suffering from acute food crisis, from August to November at least 15,000 families lived at 215 shelter centers and surviving with inhuman condition. According to field information, 88,288 latrines, 19,927 tube-wells, 670 educational institutions and 144,521 hectares of land are inundated and 45,103 houses have been damaged this year by the water logging that dead colossal lose of resource base. The relief delivered by the government and the non-government organizations met only 8 percent of the actual need of the people.

The affected people also face a complete loss of livelihoods with an absence of income-earning opportunities leading to increased food insecurity. Standing crops, for example: jute, paddy, and vegetable in some areas are under water, which as a result, created severe food crisis. Severe fodder crisis, side by side, for the livestock and the absence of any livestock-shelter have destroyed their last resort to survival.

The people in the areas could not cultivate their crops in last two yeas due to prolonged water logging. All infrastructures e.g. houses, road, markets, culverts, schools etc. are seriously damaged. People started to sell their last belongings for survival. The waterlogged areas might face a famine-like situation soon and see a heavy death too and livelihood crisis unless they were declared distressed areas immediately and treated accordingly. The current study therefore aim to assess the changes in livelihood pattern of the affected areas and find out the possible solution to the water logging disaster in the region.



## CHAPTER-2

### 2.1 Literature Review

Southwest coastal region of Bangladesh is a unique brackish water ecosystem comprising the districts of Satkhira, Khulna, Bagerhat and the southern part of Jessore. The region is a tidal wetland, flooded by high tide twice a day in harmony with the lunar cycle. The region is rich in biodiversity with hundreds of species of fish and saline tolerant rice varieties. The local communities have developed an indigenous knowledge system of water and river basin management uniquely adapted to this natural process. Local communities have used to construct temporary earthen embankments, low dikes and wooden sluice gates around the areas to protect the arable land from saline water intrusion. During rainy season, farming communities exchange saline water of their fields with river water when it becomes almost sweet. Sweet water normally minimizes the salinity of the land. Thus, they get good harvest and variety of fish. It is based on a local practice called *doser badh* (embankment construction by community) or *ostomasi badh* (embankment for eight months), and effective and innovative management of tidal flow and sediment for agricultural production and land formation. The process allows the sediment carried by tidal flow to deposit on the *beels* or wetland basins. The deposited sediment raised the land level of the wetlands. Due to this traditional community-based practice, based on "solidarity economy"<sup>1</sup> and indigenous ecological knowledge, there comes a balance between sedimentation and land subsidence in the area.<sup>2</sup> Hence, the ecology has evolved in an area which is in equilibrium. It is a unique system of land-water interface developed over hundreds of years of experience and practice.<sup>3</sup>

In the 1960s, a centralized state water bureaucracy was established according to the report of the Krug Mission setup by the United Nations.<sup>4</sup> Following the recommendations of the East Pakistan Water and Power Development Board (EPWAPDA) report was established, an irrigation department was merged with it. (Kibria, 2005) A Water Master Plan was prepared in 1964. It introduced a compartmentalized polder or enclosure system in the southwest tidal areas. Thirty-nine polders ( 1014100 acres) , 1,566 km of coastal

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<sup>1</sup> The development theoreticians and practitioners have not yet paid adequate attention to the idea of "solidarity economy."

Southwest coastal region is an active delta and land subsidence is a natural characteristic of the region.

<sup>2</sup> The unique practice of "overflow" irrigation and wise use of sediment by the farming communities in the Bengal delta was noted by pioneer

<sup>3</sup> Colonial researcher, Sir William Willcocks. He also noted that the prime issue of river basin management in Bengal delta is effective management of sediment. But water resources planners and engineers neglected this illuminating observation (Kibria, 2006b).

<sup>4</sup> In 1957, the Krug Mission was set up by the United Nations after the severe flooding in 1954, 1955 and 1956. For more details and history of river management in Bangladesh, see Zakir Kibria (Kibria, 2005a).



embankment and 282 sluice gates were constructed (Aftabuzzaman, 1990) in the coastal area with funding from USAID to prevent intrusion of saline water from the sea and “recover” more land for cultivation of high yielding variety (HYV). The compartmentalized polder/enclosure system separated the floodplains from the rivers and turned wetlands into dry lands. (Adnan, 2006) Thirtyseven polders/enclosures were constructed in Khulna, Satkhira and part of Jessore districts. (Ali, Reshad Md Ekram and Moinuddin Ahmed, 2001) A polder is a tract of land, surrounded by dykes in which the discharge and supply of surface water are artificially controlled. The polder/enclosure system has been developed and implemented in line with the “green revolution” paradigms to “grow more food.” The idea has been to promote cultivation of HYV crops in dry lands with controlled irrigation. (Adnan, 2006) In the subsequent decades, several similar projects have been undertaken in the region.

Almost all these projects were undertaken with finance and policy “advice” from aid agencies and international financial institutions (IFIs).<sup>5</sup> Projects undertaken in the southwest region in this period include USAID-funded Coastal Embankment Project (CEP), and the ADB-funded Coastal Embankment Project-2 (CEP-2) and Khulna Coastal Embankment Rehabilitation Project (KCERP). These projects and polder/enclosure model were exported western technology, often implemented with “assistance” of high paid consultants. These projects performed well till the 1980s with increased cropping intensity (mostly HYV rice), but has caused erosion of local crop varieties and biodiversity.<sup>6</sup> The latest project in line has been misleadingly entitled, “Southwest Area Integrated Water Resources Planning and Management,” which was funded by the ADB and the Government of the Netherlands.<sup>7</sup>

Drainage is the main concern for water management in the project area. The construction of embankments in the sixties under the Coastal Embankment Project (CEP) greatly reduced the tidal volumes entering and leaving the project area during the tidal cycles. This resulted in gradual siltation of the drainage networks and drainage congestion began to affect the

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<sup>5</sup> The World Bank (WB) and the ADB policy “advice” (read diktat) formulated bulk of the approaches to water and river basin management in Bangladesh since the 1972 IBRD water sector study, which included flood control, drainage and irrigation (FCD/I) approaches and culminated in the controversial Flood Action Plan (FAP) in the 1990s. Civil society protest stopped the FAP and the WB had to withdraw from the water sector of Bangladesh. The WB has signaled its willingness to invest again in the water sector with the publication of Bangladesh Country Water Resources Assistance Strategy (The World Bank, 2005).

<sup>6</sup> Shapan Adnan (Adnan, 2005) has done a revealing study on links between agricultural paradigm of “green revolution” and water management, flood control and irrigation in Bangladesh.

<sup>7</sup> ADB Loan: BAN 34418-01. The government of The Netherlands is a co-financier in the project. Uttaran and Paani Committee and BanglaPraxis have started monitoring the project. International IFI watchers like Bank Information Center (BIC), based in Washington DC, USA, with a new South Asian office in Delhi, and NGO Forum on ADB, based in Manila, are providing technical and knowledge support in the monitoring process. BothEnds, a Dutch NGO, is involved in monitoring The Netherlands government’s role in the project.

northernmost polders beginning in the eighties. Waterlogging has now taken such dimensions that about 20 percent of the land has been taken out of agricultural production and many income earning household members have been forced to migrate (78 percent of the households). In spite of a continuous maintenance dredging (ranging from about 1.2 to 2.4 million cum. In the last three years), even in the dry period of February 1997, about 28,500 ha was under water. Stagnant water has reduced terrestrial habitat resulting in reduction in the terrestrial plant species. This, in turn, has resulted in a reduction in terrestrial habitat-dependent wildlife. Most of the terrestrial plants in the water logged area have died. Those that have survived are not growing well. In the aquatic frontier, as well, the picture is not any more promising because the water in these areas is stagnant. Drainage and even temporary drying is essential for most aquatic plant species completing their life cycle. Because of stagnant water, the aquatic plant species are unable to aquatic environment is affecting the aquatic wildlife species. In order to resolve the longstanding issues on drainage and sedimentation problem a series of study were conducted. Feasibility study conducted by Huskoning (1991) recommended for tidal basin at Beel Kedaria with an area 2300 ha. Institute of Water Modeling (IWM) carried out hydraulic modeling to evaluate different potential drainage plans for the improvement of drainage condition of the KJDRP area in association with SMEC under KJDRP. The hydraulic modeling study suggested that both TRM and structural option are technically feasible, but the structural option would cause reduction of tidal prism and consequently siltation would take place at the downstream of the structure. On the other hand TRM option would not have any adverse impact on river flow and drainage condition. SMEC study (1994) also recommended for tidal basin on temporary basis for 2/3 years and a structure at Kashimpur on Upper Bhadra river. EIA/SIA carried out study by EGIS recommended a tidal basin at Beel Kedaria with an area of 400 ha and tidal basin at Beel Buruli with an area of 200 ha. SWMC found out the effects on tidal movements, velocity and salinity in the Sundarbans area for the large proposed regulator and compared the impacts of the large regulator with the change of its location as well. EIA study evaluated tidal basin approach as more environmental friendly and socially acceptable.

The ill effects of the polder/enclosure system surfaced. This was exemplified by deposit of silt on the riverbed, drainage congestion and water logging in massive areas creating disastrous consequences for the local communities with inundation of massive areas under stagnant water that seriously jeopardized people's livelihood and the environment. Due to the construction of permanent embankments on both sides of the rivers, tidal flow could not enter into the tidal wetlands. Almost all the estuaries began to silt up at the upper end of the



southwest tidal region. In the pre-polder period, the high tides used to deposit silt on the tidal wetlands during the months of January to June when local people used to breach the temporary earthen embankments (*ostomasi badh*) built for the period from July to December. But the construction of polders sedimentation in river channels has caused very rapid deposition on the river channels. This process ultimately raised the riverbeds in comparison to adjacent *beels* or wetlands. Due to non deposition of sediment, the wetlands subsided and gradually took the shape of lakes and over 106,000 hectares of land became permanently water logged. Water logging has brought extreme suffering to the local communities in the region. Salinity has increased due to capillary action and vast areas of agricultural land lost soil fertility. Many rivers dried up. Many villages have been submerged and communication system has collapsed, surface as well as inland water transport. Many people moved onto embankments and roadside. Educational institutions have been severely damaged and children have been forced to discontinue education. Biodiversity and livestock have been adversely affected. Firewood and pure drinking water have become scarce. Waterborne diseases like diarrhea and scabies have become endemic. Moreover, unemployment has forced many people to migrate to urban areas in search of livelihood.<sup>8</sup> (Uttaran 2005a and 2005b)

Since water logging has disrupted agriculture activities , many people have had to change their main occupation from agriculture to various non agriculture activities . Although people pursued whatever agriculture activities were possible , seeking employment in other occupations became necessary to make a living ( BIDS1994) . Many of the households report a decline in their income following the waterlogged situation, the BIDS study reports that 61 .9% of households experienced a decline in their income . They attribute the decline mainly to the situation of water logging . The problem faced by the local people in terms of employment, occupation, communication, health, education etc for example It is estimated that if farmers could practice present cropping patterns on their reclaimable agriculture land ( about 22800 hac) they could add more than 90,000 ton of paddy to the present annual production of 3 .5 lack tons . In terms of fish production as area is increasing under water contributed to an overall increase in open water fish production ( 8 .6 thousand tons) but the production per unit area has gone down because of conversion of brackish water area into fresh water area . Driven by the miseries caused by the water logging , income earning members of household have had to migrate out of their village quite a often ( 78% households reported such migration) . People in certain badly affected areas get driven out of their homes almost every year because of inundation of homesteads

<sup>8</sup> Jolaboddota o Koronio (Uttaran, 2005b) for detail analysis of water-logging problem in the southwest region.



Scarcity of fuel is also a big problem in the waterlogged area . In certain areas some of the roads got inundated and damaged during the rainy season , thereby creating problems of communication . This has had a restricting effect on the income earning pursuits were closed for months together during the last several years . In the BIDS study 44 .1% respondents were found to report a decline in current employment at school going age . There have also been problems with raising livestock's in the project area . 95 .6% households reported shortage of grazing land . The use of water that has been stagnant for a long time has reportedly caused various health problem like diarrhoea ( 88 .7% of the household reported higher incidence of diarrhoea) , dysentery and skin diseases ( BIDS 1994) .

SCF-UK came up with a detailed findings about the children vulnerability in the water logging situation . On the basis of need assessment report of DER regarding the flood 2006 SCF-UK conducted a household survey and came up with the following findings.

- Child malnutrition among the waterlog affected population have been reported by the medical service providers of the surveyed area. Other situation analysis also indicates that there is a high probability of increased child malnutrition among the affected population. DER Need Assessment Report illustrated that "Since 2001, severity of water logging is increasing every year and sufferings of the people are increasing simultaneously"..... "About half of the affected people lands and homesteads under water since 2005. They have not been able to cultivate during the last two seasons."
- A total of 13,306 boys and 9,193 girls have been leaving in various temporary shelters in three Upazillas. During discussion children informed that leaving in road side, particularly those roads where vehicles run is very risky as there is possibility of accidents mainly when young children play on the roads.
- Children who did not move to shelters and are staying at own marooned houses reports that they are feel like contained and confined.
- In the shelters, there is lack of lights at nights as people can not buy fuels (kerosene) for lamps. Thus, students (children) can not read at nights in addition to that lack of light increases insecurity. Some children said that, there is lack of space in the shelter, thus they could not sleep at night.
- Water logging severely affected the child education. There are a total of 137 education institutes fully inundated while another 105 are partially inundated and 53 are at risk of water logging. In addition to that 26 schools are being used as temporary shelter for affected people.

- Total Number 5-14 year children in the affected population 131,725
- National Ratio of total children and school going children of the age 80%\*
- Total number of school going children in the affected population 105,380
- Average school attendance in 10 May 2006 84%
- Average school attendance in 9 August 2006 50%
- Approx. number of children in the affected population not going to school due to waterlogging 35,829

- Schools which are still continuing have a drastic fall in student attendance. Annex-IV shows the number and percentage of attendance in four specific school days in the surveyed area. Following graph shows the percentage of attendance :

## 2.2 History of Disaster

In the study area, crop failure due to saline water inundation and monsoon flooding was common. Since 17th century, Zamindars/ Landlords temporarily constructed low dikes and wooden sluice gates around the area to protect the arable land from above hazards. In the rainy season, farmers exchanged saline water of their fields with river water when it became almost sweet. Sweet water normally washed away the salinity from the land. Thus they got good harvest of paddy as well as varieties of fish. Due to this traditional practice, there was a balance between sedimentation and subsidence of the area. Thus, the environment, eco-system and bio-system evolved in the coastal area were in equilibrium. The problem of crop failure still existed, as dikes were not sufficiently high and strong. Opening of sluice gates were not enough and gates were weak. These were temporary structures and need to be repaired every year.

After abolition of Zamindars/ Landlords system, the maintenance of these structures became disrupted. As a result, the problem related to land-water management became serious and crop failure occurred frequently. In 1959, to solve this problem, a big program of construction and maintenance of permanent polders was undertaken by the then government. In the Khulna and part of the Jessore districts, 39 polders (10,14,100 acres) were constructed (Aftabuzzaman, 1990). The main objectives were to protect the arable lands from tidal inundation and flooding, and to achieve more crop production.

In 1984, Beel Dakatia, a part of polder No. 25 became waterlogged due to rapid siltation of the Solmari, Hamkura and Hari rivers for the first time. Now this problem has spread in polder nos. 36, 25, 24, 27, 28, 17, 1, 3 and 5. Moreover, lands outside the polder in the



greater Jessore district are now under water. This problem is still creeping to the northern part as well as in the southern part of the poldered area.

During the 1960s, the then government of East Pakistan implemented a Coastal Embankment Project, with a view to cultivating HYV of rice. The project was funded by a number donor agency. The project was completed in 1973. However, the project design failed to comprehend the environmental and ecological consequences of an embankment construction. Although the immediate impact resulted in bumper crop production in the initial years, the inhabitants started to face severe environmental and ecological problems, well within a decade.

The southwest region of Bangladesh had been marked as flood-free zone until the time it experienced the deadliest flood on September 2000. Since then, the region has been experiencing flood in *the Kobodak* and *the Betna* basins in particular. These two major in-country rivers working as the major escape route to the Bay of Bengal for the huge water volume in several districts in the upstream. Moreover, 2 major rivers bordering India and Bangladesh, *the Ichhamati* and *the Sonai*, occasionally adds additional flood waters in Bangladesh territory and further aggravate the flood situation in the southwest region of Bangladesh. Therefore, the southwest region is now no exception to the flood-prone northern and northeast region of the country.

Again in September, 2004 heavy downpour submerged huge areas in the southwest part of Bangladesh as well as the adjoining region of India. This has caused massive flood in the regions both in Bangladesh and India. Finally in current year (2006) also area is being experiencing a moderate flood that affect about half million people directly.

**Table-1: Status of Flood in Last 10 Years in South-West Region in Bangladesh**

Year	No . of HH/people affected		Name of Dist & no . Upaz . & Union affected			Estimated losses	Remarks
			Dist	No . of Upaz	No . of Union		
	HH	People					
2000	503,965	2,467,138	Jessore Jhinaida Chuadanga Khustia Magura Shatkhirra	17 Upaz	58 Union	34840 million taka	High rainfall, breaching embankment , water logging are



			Khulna				the causes of flood
2004	215,891	1,079,455	Jessore Jhinaida Magura Shatkhiria Khulna	19 Upz	78 Unions	Official figure not available	High rainfall and water logging are the causes of flood
2006	79,452	397,260	Jessore Shatkhiria Khulna	11 Upz	46 Unions	N/A	Severity in terms of depth, duration and peoples sufferings is higher than that of flood 2004

Source: DFID,DER and Oxfam

### 2.3 Causes of Water Logging

The southwestern region's flood can be attributed to the following causal factors such as *incessant heavy downpour; increased tide height in the rivers; inflow of floodwater from Indian territory; and loss of navigability of rivers in the region.*

#### Incessant heavy downpour

Incessant heavy downpour in southwest region of Bangladesh, West Bengal and Bihar of India has caused flood. Normally the water flow of Meherpur, Kushtia, Jessore and part of Jhinidaha use Kapotakho and Betna river as drainage channel.

#### Increased tide height in the rivers

The level of high tide of the sea is raised because of deep low pressure in the sea. For this reason, the drainage channel face with navigational problems and embankments are breached. For example, because of breach of embankment along the Kobodak river, village Chargram and Srimantakati under Tala upazila and village Kurikahunia and other villages under Assasuni upazila have been inundated by flood.

#### Inflow of flood water from Indian territory

We all know that the major reason for flood in southwestern region in Bangladesh was the inflow of floodwater from adjoining border States of India. Due to pressure caused by

flood, the Government of India released water from water reservoir. The release of water inundated the border areas of West Bengal and southwest region of Bangladesh.

#### Loss of navigability of rivers in the region

The major river of this region is Kapotakho. The water flow in Meherpur, Chuadanga, Jhinaidah and part of Jessore district reach the sea through Kapotakho. Because of coastal embankment, the tidal wetland has experienced severe environmental impairments in this region. For example, the riverbed of Kapotakho has been raised because of loss of navigation capacity. It should be noted from Bakra of Jhikargacha, Keshabpur of Jessore and Taka upazila under Satkhira district. The Kapotakho river has lost its navigation capacity. Because of lack of drainage channels, Monirampur, Kalaroa, Keshabpur and Tala upazilas, which are part of Kapotakho basin, are inundated by floodwater.

If we consider the present situation of Kapotakho river, it could be divided into three major types.

*First*, although from Jhapa of Monirampur to Greater Jessore and Kushtia district, Kapotakho river is now considered as dead river; but very significant portion of it is useful as drainage channel. It is weeded in many places.

*Second*, from Jhapa of Monirampur upto Sagardari of keshabpur the river has another section but this part has been silted by tidal silts and in some places the drainage channel has completely disappeared. As a result, water logging of vast area has taken place.

*Third*, although at the lower part of Sagardari, the river has the cycle of tide and ebbs - it is being silted very fast. Particularly, tidal silts are filling up the dead end of Kapotakho river. According to local boatmen, at some places the riverbed is being raised from two to four feet. For this situation of Kapotakho river, the southwestern region of Bangladesh is facing major environmental impairment. In fact, the environmental impairment of the Ganges Basin did started in the 16<sup>th</sup> century. Mainly it happened because of two reasons: *The course of Ganges was changed and the human intervention into nature.* Before 16<sup>th</sup> century, the major water flows of Ganges run through Bhagirothi and being divided into eight types of flow, it met the sea over the 24 Porogona and Khulna.

Basically, Jessore, Khulna, Kushtia, 24 Porogona, Murshidabad, Krisnonagar, Faridpur and Barishal were formed by alluvial soil from the flow of Ganges and the soil was very fertile. In the 16<sup>th</sup> century, the Ganges changed its course from south to east and the above districts, which were dependent upon the flow of Ganges faced shortage of sweet water. At this backdrop, the tidal pressure over Khulna, 24 Porogona and southern part of Jessore did increased and salinity also increased. Severe disruption in agriculture in this region took



place. At the same time because of unlawful activities of mob and pirates in these areas, the region became almost no-man's-land. On the other hand, in the 19<sup>th</sup> century, to reduce the severity of "Mathabhanga" river (a major distributory of the Ganges) the then British government filled up the source of "Mathabhanga" river. For this reason, the flow of sweet water in Kushtia, Jessore and Khulna has had reduced.

Earlier the Bhairab river served as the main source of sweet water for Jessore, Khulna and western part of Kushtia. "Jolangi" flowed over Murshidabad and two distributories of "Mathabhanga" river, which flowed over Kushtia district met together, and consequently Bhairab river was born. In the mid nineteenth century, the source of "Mathabhanga" became closed and the section of Jolangi river, which met the distributory of "Mathabhanga" river, was closed.

As a result, the flow of sweet water into Bhairab river became completely disrupted and the area dependent upon Bhairab river for sweet water was severely affected. In 1872, Doctor Jackson blamed the death of Bhairab river for malaria, epidemic in Jessore and Khulna.

The political process is formulated on the working discourse of Bangladesh Water Development Board. A group of people is categorized as "Pro BWDB" and another group is categorized as "Anti BWDB". However, this difference becomes very distinct during KJDRP implementation. The main political questions around the issues are: stakeholder, participation, legitimacy, representation, and opportunism. Bangladesh Water Development Board has its existing working model in Southwest Bangladesh, where they form Water Management Group (WMG) by the direct beneficiaries of the water bodies (historically, in each *beel* areas there were a traditional *beel* committee who represents the owners of the *beel* land). Water Development Board only considers the landowners, dependent landless, fisherman and women as the stakeholder of the programme. The WMG, elected Water Management Association (Zone Wise, 9 zone in the KJDRP areas) and a central Water Management Federation (WMF) are the three tier peoples organizations who are registered under Cooperatives Department are the legitimate entity to BWDB. Uttaran and their *Pani Committee* opine that the water problem affect the whole community, therefore, BWDB should not only consult WMG/WMA/WMF but also Local Government (union parishad and pourashava), NGOs and Civil Society in a multi-stakeholder framework. They also opine that WMA/WMF virtually serve the purpose of BWDB and work as pocket committee of the board. On the contrary, WMA/WMF opines that *Pani Committee* of Uttaran represents elite society members of the areas, they are not the poor people of the areas and not the real affected people. They also raised question of their legitimacy and opined that this committee is a pocket committee of a NGO. Virtually, UP representatives



are found in the both groups. Now a days, contractors are implementing the projects of BWDB, but previously UP had implemented the projects before 1996 in this area, therefore UP in general are not very supportive to the existing modality of BWDB and take stand against the agencies working modality. This conflict situation is creating more egoistic problem in the areas and more personalization and narrow regionalization is becoming dominant than coming to an objective solution for the areas. We have found that regarding solution, there is very little difference among the groups, but lot more propaganda mercenaries are very active to personalize the problems. Beside this, many people opined that as the affected areas are politically Awami League dominated and Hindu population density is comparatively higher than other areas, the ruling alliance is not much willing to solve the problem. However, this popular discourse is very strong in the mindset of the suffering people. Some UP representatives and influential people have economic interest in the problem areas: ownership of large-scale fish farm and loan money. Some people opined that these people in many cases, take stand against greater interest of the people only to serve their narrow interest.

#### **2.4 Effect of Water Logging on Livelihoods**

Some areas of located at the bank of Kapotakho river are still considered as flood prone and waterlogged area from Jhikargacha, Keshubpur and Monirampur under Jessore district, Dumuria under Khulna district to Tala and Kalaroa under Satkhira district. In the paddy field, there are not at all any crops because of flood. For this, the unemployment situation is very high there. They have been forced to migrate to other places. Some families are being dislocated and disintegrated because father goes to one place, mother goes to another place for getting a job and children are forced to work at other people's houses as servant as common scenario in the area.

During the flood season, many houses are collapsed. The families, whose economic situation is comparatively better, can reconstruct their houses. However, the female headed or hard-core poor families cannot start to reconstruct their houses, due to absence of money.

Some areas are found as water free areas. But the sharecroppers and marginalized farmers cannot cultivate the Rabi crops and Boro rice due to lack of financial resources. On the other hand, the poor people are forced to sale their domestic animals, trees and land in a least price. Most of the flood-affected people are facing lack of safe drinking water because of arsenic contamination and submerged tube wells. The maximum children of hardcore poor and poor families have dropped out. Now they have become working children. As a

result, disruption of schooling has taken place elsewhere in these flooded and waterlogged communities.

Only an insignificant area of land is being made cultivable in the high season by waterlogging. Mostly, it is destroying houses, disrupting communication and the rhythm of daily life, drying up coconut, palm, and date palm trees and reducing the number of domestic animals. Because of water-logging, fuel crisis is becoming acute, the collection of wood fuel and drinking water is becoming increasingly more difficult; human waste is being thrown into water in the absence of dry land and farmers are turning into fisher-folks as agricultural lands are submerged. Many have migrated to other areas as life is becoming difficult to support.

A very simple checklist was used to identify the different vulnerable aspects of different people; especially person with disability, women, elderly, children and farmers. This was very quick grasp of 60 person's opinion. The result of the compilation of vulnerability is described in following table.

**Table-2 : Vulnerability Aspect of Different People in Water-Logged Situation**

Sectors	Flood 2006				
	Male (Farmer, Day laborer)	Female	Children	PWD's	Elderly
Food Availability	H	H	M	E	H
Income and Employment	E	M		E	M
Safe drinking water	H	E	H	H	H
Sanitation (Defecation, Cleaning, Washing, Urination, )	H	E	H	E	E
Personal hygiene	L	E	H	E	H
Mobility	M	H	E	E	E
Life	L	L	H	H	L
Security	L	L	H <sup>9</sup>	L	L
Livestocks	E				
Makeshift places	L	E	E	E	E
Fooder	E	E			
Housing	E	E			
Communication	H	E	E	E	E
Fuel	H	E			

<sup>9</sup> Security of adolescent girls seemed at risk and in most cases, adolescent girls are send to the relatives' house that are living outside affected areas.

Health/deasease	M	E	E	E	H
Household Assets	E	E			
Settlement (confidence to stay )	M	H	H	H	H
Food Market Prices	H				
Savings (Loan is vulnerability)	E	E			
Pest and Insects (including snake)	H	E	E	E	E
Seasonal migration	E				
Trees and Plants	E				
Food Preparation	L	E	L	E	E
Cultural and Social Ceremony/Recreation	H	H	E	E	E
Electricity	L	L	L	L	L
Agriculture	E				
Fisheris	H				
Family peace	H	H			
Education			E		

Note : E= Extreme; H=High; M=Moderate; L=Low

Sources : AAB(2006) Oxfam-GB (2006)

It is observed during reconnaissance visit that sanitation, drinking water and health is very emergency issues to the affected people of all areas. People from Biddanandakathi, who took place in the roads of keshobpur demanded food and shelter but people of Monirampur has not demanded food rather they emphasized the permanent solution of the problem. We felt that the humanitarian situation in the areas are extremely bad where women, children, person with disability and elderly people need immediate sanitation and drinking water support as well as medical support to save from skin diseases and other water borne diseases. Food support could be provided by work, not as traditional relief. Some temporary shelter might be offered to those who took place in roads and other areas and become displaced.

Flood protection schemes bring about overall improvements, through the reduction of flood depth to ensure more secure environments for living as well as for agriculture. However, they can also bring about drastic changes in the natural water regime, which may result in an imbalance in aquatic environments and ecosystems. For example, structural interventions disrupt the free flowing environment of the floodplains. Moreover, continued congestion, or stagnation can prevent natural flushing and lead to the spread of water-borne



the waterlogged area initially thought water-logging to be a temporary problem, and petitioned the authority to solve it. Gradually, however, with the realization of its severity, solving water-logging became a people's demand. As the authority paid no heed to their grievances, people themselves took the initiative to organize and mobilize the community, and devise plans for solving the problem. From their own experience and observation, people could identify the polders as the main cause for water-logging and began to present their reasoned arguments for breaching or cutting away polders to allow unrestricted tidal flows for solving the problem. Their logic was that if tidal flows can be made free, the navigability of the rivers will be restored, the beels will be free from water-logging, alluvials will accumulate inside the beels, and as a result the bed level of beels will rise. The first manifestation of this logic was seen in September, 1990, when the polder of Beel Dakatia was breached at four places. This concept is called Tidal River Management (TRM) system.

The consequences of the people's action and the value of popular wisdom :

Through one of the four cuts made in the embankment. Beel Dakatia was again connected with the river Hamkura. Through regular tidal actions and the accumulation of alluvials, the land formation process of the beel resumed. In two years from 1990 to 1992, 2500 acres of char (newly risen) land emerged. We saw paddy being cultivated in the char lands in October 1992. The logic which worked behind direct intervention by the local people was based on their experience and popular wisdom. The disaster that the polder caused was mitigated to an extent by the people's action. Popular wisdom was reflected in the fact that the resumption of tidal action restored the balance that was lost when the supply of alluvials was cut off from the beel by the polder. The experience has proved that if people take initiatives to face their problems, they can expose the faults of any large engineering work that concerns their lives and livelihood.

Social Impacts of Beel Dakatia Movement :

The success in draining out water of Beel Dakatia encouraged people of adjacent waterlogged areas. They organized themselves and formed committees at different levels and took initiative to turn their waterlogged land into agricultural land again. Madhukhalir beel and Patra beel are examples of such collective efforts. However, these efforts could not achieve desired results at every stage because of a lack of proper organizational structure and planning. However, the initiatives and innovativeness of people drew attention of the policy makers and donor agencies and they began taking people's involvement in solving the problem of water-logging quite seriously. In the mean time, Bhabadaha (Jessore zone) area started to experience widespread waterlogging. The people

of the area organized themselves to solve the problem. They removed the accumulated silt in front of the Bhabadaha sluice gates every year with their own hands, and opened a narrow drainage channel. Thus, each year, they retrieved some land for agricultural production.

Deciding on an appropriate approach to the solution of waterlogging problems:

It is important to decide on a proper approach to the management of natural resources and eco-systems, especially for a region like the south-western coastal region with a complex and fragile environment and ecology. An appropriate technology for a permanent solution of the water-logging problem should be realistic and consistent with the environment and ecology. Large scale structural projects under traditional engineering is expensive both in terms of construction and maintenance. Besides, if the project is not consistent with environment and ecology, it causes irreparable losses in the long run. Instant solutions to water-logging like dredging of rivers or any other large scale scheme that reflect mechanical-technological approach are very costly and have more far reaching effects on nature, necessitating newer plans to correct them, and newer costs. This leads to a vicious cycle. Therefore, projects to solve the waterlogging problems of the south-western coastal region with a complex and sensitive ecosystem should be taken up from a eco-technological point of view.

Tidal River Management (TRM): Lesson learnt from people :

People have developed Tidal River Management concept (TRM) to mitigate waterlogging problem of this region. On the basis of Tidal River Management option waterlogged area and areas susceptible to water-logging can be converted into tidal basins on rotational basis with modification of existing structures and allow sedimentation under planned way. This is a non-regulator/ non-structural type of solution. The main theme is deposition of suspended load gradually under controlled system from tidal channels up to the mean high tide level in the waterlogged and susceptible waterlogged areas. This planned way means deposition will be in a certain site or sites by a specific tidal channel or channels. Later depositional site will be shifted to other sites according to the topography of the area. This main difference of deposition under planned condition in waterlogged and susceptible waterlogged areas are; in case of waterlogged areas, deposition will be started from the nearest site of the feeder channel or channels. In case of susceptible areas, deposition will be started from the distant part of the feeder channel/ channels. In some cases, the position of cuts need to be shifted for proper and maximum siltation in a basin. Depending upon the



position of the waterlogged areas, different methods of TRM must be adopted for different types of basins.

#### Practical Examples of TRM

This is still a conceptual idea developed by NGOs later supported by EGIS and formulated by SMEC but still it has some practical bases based on the experience gained from beel Dakatia, Bhaina beel and other small beels.

##### i) Experience of Beel Dakatia

In mid September 1990, after prolonged hardship the people of beel Dakatia made public cuts in the embankment at four locations. For public cuts nos. 1 to 3 no significant sedimentation was recorded near the cuts. For public cut no. 4 appreciable sedimentation took place. Deposition that took place in the beel Dakatia area through Sundar khal during 1990-92 over an area of about 900 ha. As a result of deposition, about 200 ha. of land are now absolutely above water and within 1-2 years there was no soil salinity problem at all. At a distance of more than 3.3 km. no significant sedimentation seems to have occurred. The volume of materials deposited upstream of the public cut could not be accurately measured due to lack of data. This deposition took place under natural condition. If this deposition could take place under planned way, the result would have been more and more satisfactory. Moreover, after the public cuts, the Hamkura river reported to have been a strongly flowing river with a width of 300 ft. and depth of about 30 ft. at the new highway bridge over Hamkura River on the Khulna-Chuknagar Road. On the basis of this satisfactory result, it can be concluded that TRM would be more applicable for small pockets like Paiga beel, Pathra beel, etc. It can be also tested for big beels as a pilot project.

##### ii) Bhaina Beel experiences

On 29 October 1997, the public cut on the right embankment along the Hari River a short distance above the Sholgati to allow the tide to freely enter and leave beel Bhaina. The objectives of the public cut were to improve downstream drainage in the Hari River that would ultimately drain water from the Kedaria and Bokar beel areas of Kesabpur and Monirampur thanas and to raise the level of the beel by sedimentation. Interview with the local people and field visit indicate that about 30%-40% of the Bhaina beel has already silted. More siltation is in front and west of the cut, north and north-west there is very little siltation. Local opinion is if siltation is now allowed from cut 2, instead of cut 1, north and northwest of the beel would be filled rapidly. This type of shifting of silt feeding channel according to the configuration of the beel will be the manner in which TRM should be implemented. River bed profile survey of the Hari River was not conducted in March 1998, but in August 1999 after field visits it can be stated that the average width of the Hari River



downstream of the cut is now three times greater than before the cut. The depth of the Hari River near Solgati Bazar is about 35 ft. Another important observation is upstream of the cut there is no silt in the water and water from the upstream beels drain out easily and became partly free of water-logging.

iii) Bharter Beel experiences

The location of Bharter beel is south of the Bhaina beel along the west bank of the Hari River in Kesabpur thana. About 16 years ago due to poor operation and maintenance of a wooden sluice gate, this beel became open naturally. Through this natural cut, this beel silted up rapidly and later people closed the cut. The total area of Bhaina beel is about 200 ha. now free from water-logging problem. This is a unique example of sustainability of TRM option. There is no water-logging problem in this area for the last 15 years.

iv) Golnar Beel experiences

The location of Golnar beel and its adjacent Bahadurpur beel, Magurkhali beel and Mesagona beel are in the Dumuria thana. These beels became open by a natural cut in July 1990, and silted very rapidly within 4 months. Later, local people closed the natural cut and now free from water logging problem. Total areas of these beels are about 150 ha. Local information is, here 4-5 ft. siltation took place within 4 months. This is another example of TRM.

b. Government Projects to Solve Waterlogging

*i) Khulna Coastal Embankment Rehabilitation Project -- 1 (KCERP). and Coastal Embankment Rehabilitation Project -- 2 (CERP).*

After water-logging emerged as a problem, and to solve water-logging problem of Beel Dakatia, "Khulna Coastal Embankment Rehabilitation Project - I" was approved. The project aimed at rehabilitating about 78,793 acres of land under Dumuria, Fultala and Batiaghata thanas of Khulna district. But the people within the project area rejected the plan and the donor agency also found the technical aspects of the project faulty. As a result, the project was withdrawn after a year. Later, a new draft plan, 'Coastal Embankment Rehabilitation Project - 2 (CERP)' was prepared that also included polder no. 24 of Beel Dakatia area within its design.

Khulna-Jessore Drainage Rehabilitation Project (KJDRP) :

Although a draft plan for CERP project was prepared for solving the water-logging problem, it could not be implemented for different reasons. Later, with financial and

technical assistance provided by Asian Development Bank (ADB), Khulna-Jessore Drainage Rehabilitation Project (KJDRP) was taken up in 1993-94. With an initial estimated expenditure of 62 million dollars (Tk.229 crores and 50 laks), it was the largest project of its kind taken up so far. The six year project is being implemented by Bangladesh Water Development Board, with assistance provided by Agricultural Extension Department and the Department of Fisheries. The aim of the project is to 'solve the water-logging problem to increase agricultural production and alleviate poverty of the area through farm-based employment generation.' The project implementation authority hopes that if the project is implemented in time, about 100,600 hectares of land of 68 unions under 8 thanas of Khulna and Jessore districts will become free from water-logging; as a result, about 800,000 people will benefit from a poverty free and healthy life. The project area lies within the coastal embankment project, to the south-west of the main Khulna-Jessore highway. Fultala, Metro, Batiaghata and Dumuria thanas of Khulna district, and Sadar, Abhoynagar, Keshabpur and Monirampur thanas of Jessore district are included in the project area.

The project has the following components:

- a. Involvement of the target population at every stage of the project;
- b. Physical infrastructure rehabilitation programme;
- c. Agricultural development;
- d. Fisheries development.

Brief description of successive proposals :

During the planning stage of the Second Coastal Embankment Rehabilitation Project Haskoning (1993) designed a drainage plan.

This plan was divided into two parts - the Khulna part consisting polders 25.28 and 27. and the Jessore part or the north-west part.

The planners' observation was that "the drainage plan of the Khulna part was found satisfactory, but the drainage plan of the north-west part was not acceptable to the people. Three alternative proposals were initially made for this part."

The problem is with Jessore region. Huskoning drainage plan was formulated first. The people opposed this plan. Afterwards five drainage plans were formulated in succession and presented before the people. All these were abandoned in the face of peoples resistance. A brief statement of the plans and the apprehended resultant negative impacts are furnished below.

The drainage plans were -

CERP proposal, also known as Huskoning plan: FAP-4 proposal, also known as Halcrow plan; the plan proposed by the engineers of Bangladesh Water Development Board (BWDB); The plan proposed by the consultants of Khulna-Jessore Drainage Rehabilitation Project (KJDRP proposal).

Later, KJDRP proposal was modified and enlarged, and came to be known as KJDRP-1 and KJDRP-2 plans.

Command area of the drainage proposals

Huskoning Plan -- 1006 sq.km.

Halcrow Plan -- 1306 sq.km.

BWDB Plan -- 1306 sq.km.

KJDRP-1 Proposal -- 1006 sq.km.

KJDRP-2 -- 1126 sq.km.

[120 sq.km. more area than in the Huskoning Plan]

Estimated cost of the Drainage Plans (in Taka)

Huskoning Plan according to the first drainage plan -- 229 crores 48 lakh

Modified Huskoning Plan -- 238 crores 27 lakh

FAP - 4 Plan -- 286 crores 29 lakh

BWDB Engineers' Plan -- 274 crores 16 lakh

KJDRP-1 -- 216 crores 23 lakh

KJDRP-2 -- 233 crores 22 lakh

Review of the above proposed drainage plans under Khulna-Jessore Drainage Rehabilitation Project (KJDRP).

The proposed drainage plans under Khulna-Jessore Drainage Rehabilitation Project has been reviewed in three sections.

1. Review of the concept;
2. Review of activities so far implemented by KJDRP;
3. Review of the effectiveness of the proposed drainage plans.

#### *1. Review of the concept of proposed drainage plans under KJDRP :*

The geo-characteristics of the region had not been considered. The positive role of the alluvials in the process of the land formation had been ignored. The main thrust had been to prevent tidal water from entering the project area and to confine the alluvials outside the project area. The navigability of a few selected rivers were expected to be maintained, allowing smaller rivers to silt up and die. The plans aimed to keep water levels outside the main proposed regulators during the ebb tides lower than that of the waterlogged polders.



As a result, the navigability and the water level of some rivers would be maintained at the cost of other smaller rivers, which would be allowed to die. This, in effect, overlooked the interconnected nature of the rivers and the overall drainage system that the rivers have built up through an intricate network, were ignored. Rivers were seen as isolated, not interconnected entities. The ecological features of the project area had not been considered at all. That is, the ecological changes that might take place if any of these drainage plans would be implemented had not been given any consideration. The aquatic life cycles had been neglected and organic production and bio-diversity have been ignored. For, once the project is implemented, the project area would be changed into a one-way sweet water eco-zone from the current brackish tidal flow region. The whole area will thus turn into a controlled, drained off area. The land subsidence will not be compensated. The 'project life' will be maximum '25/30 years'.

## *2. Review of Activities :*

Activities employed by KJDRP revealed the following limitations :

1. There had not been a proper investigation at the feasibility phase. Although studies had been made for Haskoning, Halcrow, PWB, KJDRP plans and proposals, these had proved to be inadequate.
2. The project area had not been identified properly, necessitating a subsequent enlargement. The proposal to construct sluiceways at Ghangrail, 30 km downstream of the project area indicated that the main problem had not been properly understood.
3. There was no coordinating forum among the four constituent bodies of KJDRP. (Component A, B, C & D)
4. The voluntary organizations were not being included properly : ADAB was being side-tracked (although ADAB is the main coordinating agency for NGOs in Bangladesh).
5. The project work was going on although the Master Plan was yet to be approved.

## *Emergency Action Plan :*

The activities conducted under the emergency action plan so far have yielded some positive results. The emergency action plan was prepared before the six year long KJDRP project as a "partial interim arrangement" to ameliorate the sufferings of the waterlogging of Beel Dakatia; and in 1994-95, it was to "remove water-logging of Bhabadaha area on an urgent basis" by freeing Beel Dakatia unit, including Paira beel, Ruiar beel, Damukhali beel from

water-logging. According to the implementation report "the overall progress of emergency action plan was 87%." The main success that the action plan claims is the drainage of Beel Dakatia. The process through which Beel Dakatia was drained off was by filling up the places where people had breached the embankment and channeling all the water through the Sholmari river, which was dredged to attain the desired navigability. The repair of the breached spots of the embankment has resulted in the silting up of Hamkura river. This, in turn, has resulted in water-logging of the adjacent beels (in some cases for the whole year). Consequently, people of 35 villages were faced with unimaginable hardship (In 1997-98). After the dredging was stopped. The Sholmari river began to silt up, although the entire drainage of Beel Dakatia depends on regular dredging of the Sholmari river. For solving the water-logging problem caused by the Bhabadaha sluice gates, a cross dam was erected on the river Bhadra for dredging up the river. This activity has resulted in an increasing rate of siltation in front of the Bhabadaha sluice gates (about 2 metres). Rainfall during the middle of '97 caused water-logging in large part of Abhoynagar. Monirampur, Keshabpur and Dumuria thanas. All the attempts taken so far by Bangladesh Water Development Board to remove water-logging on emergency basis have turned into failure. What it means in reality is that the implementation of the action plan has not only failed to alleviate people's suffering, it has created new problems of water-logging, and silting up of rivers. This only substantiates apprehension and misgivings about KJDRP.

### 3. The effectiveness of the above drainage plans :

In all the proposed drainage plans of KJDRP the total water logged area was divided into two zones:

- a) South east zone - Beel Dakatia
- b) North west zone - Jessore Zone.

#### *A. Beel Dakatia Drainage Plan*

A drainage plan was prepared by Huskoning (in 1993) at the time of the preparation of the second coastal embankment project. "The planners believe that in the main project plan, the effectiveness of the drainage plan of Beel Dakatia at the south-east part of the project, polder no. 28 and possibly polder no. 27, is satisfactory". According to authority the expectation that the plan would be successful arose from the following logic. Lower Sholmari-Shalta river are quite deep. It was expected that these river will maintain their navigability in the next 30/35 years. The water level of the river during the ebb tide would remain lower than the level of Beel Dakatia. Attempts would be made to keep the difference at one metre. In order to maintain this difference in the water levels of Beel Dakatia and the Shalta river, Sholmari would be channeled into one direction, and a 10 vent



regulator would be constructed. The 12 sluice gates on both sides of the Sholmari river would be closed, and a 7 vent regulator at Tiabunia on the Shalta river, and a 10 vent regulator at Ramdia on the lower Sholmari river would be constructed. The water of polder 27 would be drained through Tiabunia regulator and the water of polder 28 would be drained through Ramdia regular. The Hamkura river would be allowed to die in order to keep the navigability of the Sholmari. A canal would be dug up to Tiabunia to carry the water of the drainage area (of polder 27/1) now dependent on the Hamkura to the Shalta river for drainage.

#### *Comment*

The effectiveness of this drainage plan depends entirely on the navigability of the lower Shalta river. The planners have proposed to maintain this navigability through constant dredging. However, if dredging cannot be done for some reason, the whole plan would be jeopardized and a much larger area would become waterlogged.

#### *B. Review of the plans for the drainage of Jessore*

KJDRP authority had developed some alternative plans to drain the waterlogging of this part. The main concept of these drainage plans was to construct some regulators in the down stream part of the project area.

#### *Probable effect of these plans in the context of Region*

In the context of the western part of south-west coastal region, the probable effects of those drainage plans would be quite extensive. If this plan is implemented, the flow of rivers upstream of the regulators will come down to a trickle, and the rivers will silt up to become narrow canals. That will lead to silt accumulation downstream of the regulators, and create fresh water-logging. To solve the water-logging problem, and maintain the continuity of these plans, embankments will have to be built at the confluence of the rivers and the sea, so that tidal flow from the seas do not cross into the land. As a consequence of these plans of BWDB, flow of water from the rivers to the canals and beels has stopped. At first they tried to seal off the rivers. The next step might be to stop tidal flows from the sea altogether. If KJDRP is implemented in that form, the following areas will witness adverse effect:-

#### *A. Inside the project area*

A.1. Rivers will lose their flow and eventually dry up.

A.2. With the loss of alluvial supply, the land subsidence will be impossible to balance.

A.3. Without the accumulation of alluvial, agricultural lands will lose their natural fertility, affecting agricultural production.



A.4. The entire area inside the polder will turn into a sweet water region from a brackish or slightly saline water region, which will trigger an ecological crisis. Bio-diversity will be seriously upset, and it would be beyond our means to restore the balance.

*B. Outside the project area*

B.1. The rivers outside the polders will be silted up, resulting in the loss of their navigability.

B.2. Thirty thousand hectares of land will come under fresh water-logging. To remove this new water-logging, large polders will have to be built. At one stage, there will be no alternative but to construct polders along the sea coast. This will seriously undermine bio-diversity and pose a threat for the Sundarbans.

B.3. Different species of marine creatures spend at least a part of their life-cycle at the coastal estuaries. The proposed regulators will jeopardize the life cycle of these creatures.

*C. Negative effects on the Sundarbans*

The Sundarbans is an important feature of our coastal topography. We cannot take any steps that could harm the forest, but the proposed projects of KJDRP would seriously endanger the ecology of the forest, water-logging of newer areas and the silting up of rivers will give rise to the following problems :-

C.1. The accumulation of alluvial will elevate many areas in the Sundarbans, which will obstruct the tidal operations and endanger the mangrove forests.

C.2. Salinity will increase.

C.3. Leaves that fall from the trees supply nutrients to the water which is a food source to the sea creatures. Increasing number of polders will hamper the supply of this organic nutrient.

An Asian Development Bank financed 60 million dollar project (The Sundarban Bio-diversity Conservation Project) is being prepared to develop the environment of the Sundarbans. But KJDRP's proposed project, with serious consequence for the forest, will diminish that possibility. The donor agency (ADB) will have to realize that while a project to protect the Sundarbans is being implemented with its funding, another project which it is financing will cause irreparable damages to the environment and ecology of the region.

*D. Negative effects on the estuaries*

The importance of the deep tidal rivers in the coastal region can be compared with that of the arteries and veins of the human body. These deep rivers (estuaries) play a significant role in protecting the environmental characteristics of the coastal region. They provide a natural habitat for many species of sea fish, and other sea species which spend a part of

their life cycle in these deep waters. An important source of food that sustains this marine life are the organic nutrients coming from the Sundarbans. Besides, these estuary rivers play a vital role in the process of land formation through alluvial accumulation, and in increasing the fertility of agricultural land. Scientific research has shown that the coastal region is very fertile, but it is also very sensitive. This should form the basis of any development plan for the region. But those proposed drainage plans of KJDRP would gradually lead to a disruption and destruction of this fragile ecology, by raising the level of land inside the Sundarbans, increasing salinity and obstructing the natural flow of the estuary rivers,. Eventually, the availability of marine fish and aquatic species will dwindle, some species will be threatened with extinction, and the availability of food that sustains marine life will be impaired. The proposed drainage plans of KJDRP will cause grave natural disasters by endangering the ecology and environment of the coastal region.

The above drainage plans were abandoned in the face of peoples resistance and due advocacy of NGO's. Later on new drainage plan was taken up on the basis of the study of EGIS.

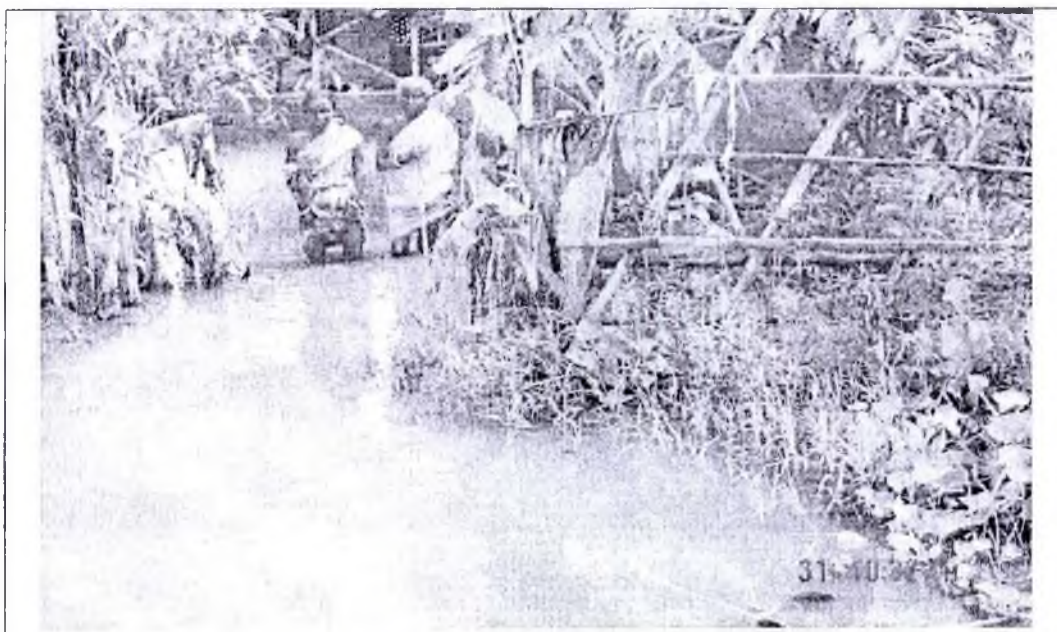


Photo-01: Water logging affect female most



## **CHAPTER-3**

### **3.0 Scope and Objectives of the Study**

#### **3.1 Scope of the Study**

Since 1980s, a vast area in the southwestern part of Bangladesh has been waterlogged. The inhabitants comprehend that the Coastal Embankment constructed during the 1960s is mainly responsible for this water logging. There were a number of popular movements demanding a sustainable solution to this problem of water-logging issue and the people have been expressing their grievances in different ways since long. In mid-90s, the government initiated a project for the drainage of water viz. Khulna Jessore Drainage Rehabilitation Project (KJDRP). This project was identical to that of the Coastal Embankment Project of 1960s. Due to all these type of project it is the third time of flood after the devastating flood in 2000 in this area. The problem of Waterlogging in the zone this year is fiercer than in the past.

This year (2006) it directly affected 1,204,159 household of 804 villages in 145 unions and five municipalities under 12 upazilas of Khulna, Satkhira and Jessore districts. The affected people have been suffering from acute food crisis, from August to November at least 15,000 families lived at 215 shelter centers and surviving with inhuman condition. According to field information, 88,288 latrines, 19,927 tube-wells, 670 educational institutions and 144,521 hectares of land are inundated and 45,103 houses have been damaged this year by the water logging that dead colossal lose of resource base. Apprehending the such consequence, people of this region collectively opposed the implementation of the project and presented their own ideas for the solution of water-logging problem, which is popularly known as 'Peoples' Alternative Proposal'. Local NGOs, in association with their apex body (ADAB), articulated the people's concern and presented the alternative proposal to all concern including the government, the aid agencies (ADB) and the other key actors. Subsequently, the alternative proposal has been considered and it is acknowledged that the proposal is environment-friendly, economically viable, technically feasible and socially acceptable. Therefore this study attempt to assess the changes in livelihood pattern , coping strategy that adapted by the people and come up with a solution to the problem .

#### **3.2 Objectives : Study aims to address the following objectives**

- To assess the social changes made due to water logging situation in south-west region in Bangladesh
- Identify the adaptive capacity and livelihood resilience to disaster faced by the communities living in the study area .



- To identify the action points to solve the water logging problem in the south west region in Bangladesh.

### 3.3 Limitation of the Study

The researcher recognized some limitation for the present study as this is kind of study has been understand taken not so much. Very limited literature was found matching the objectives of the present study. This is identified a important limitation for this. People in the study area still has been suffering from the effect of the water logging disaster that is why in principle they are not in a position to discuss the issue frankly rather they want to have assistance to recover the situation , in the time of data collection researcher face such challenges that he has to convince people in such a grave condition . In the official level there are some dilemma about the solution of the problem . There are two opposing party here , those who are associated with BDDB and project beneficiary of past KJDRP project they tried to draw the attention to solve the problem remain the all construction done by the project but there are other groups in fact members of civil society, NGO's came up with a solution that innovated by the people last couple of years . In the middle of such dilemma researcher had to identify the real situation from different point of view rather depending on any single party . All this different ideas and not making a common consensus also seen as a limitation of the study . Study did not cover all aspect of livelihood rather cover only the aspect those are relevant most in the study area context therefore it is recommended to



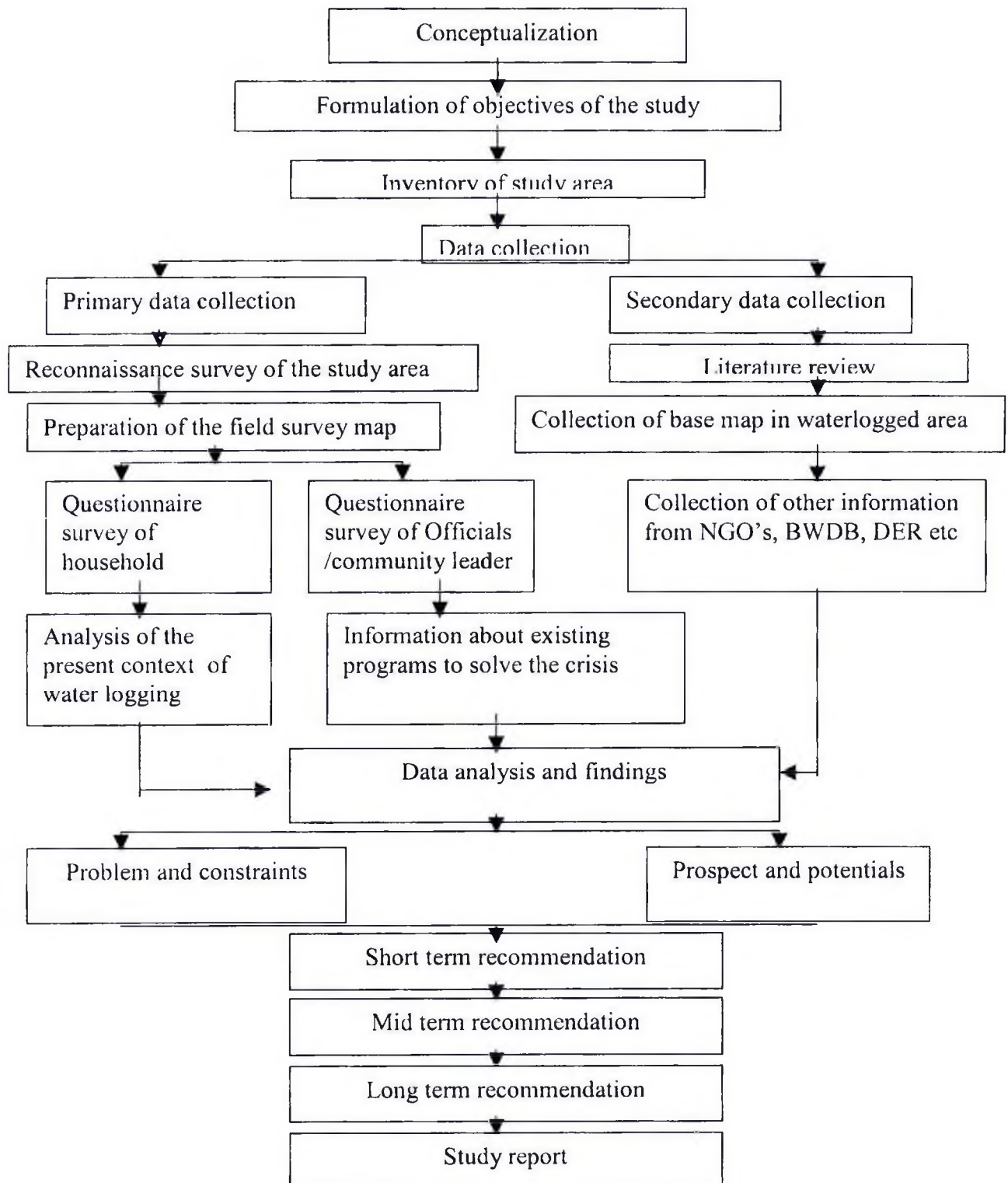
Photo-02 : Livelihood ruined by water logging in the study area

take in-depth study taking all aspect of livelihood to assess the changes due to water logging.

## CHAPTER-4

### 4.0 Methodology and Approaches of the Study

#### 4.1 Activity Flow Chart:



## 4.2 Conceptual Framework of Study Tools

Methodology describes the procedures to be followed to operationalize the research design for collection and analysis of the information data in conformation with research. In order to obtain the objectives a series of activities are performed . Among them literature survey, questionnaire design and conducting survey, data collection and analysis are the main. Following methods are adopted to conduct the present study.

The clear understanding is essential for properly interpreting ,analyzing and new information generation of any subject or problem . The study mainly focused on to assess the social changes have been made due to water logging prevailing in the southwest part of Bangladesh. To know what type of social changes are happening in the study area really depends on the socio-economic, environmental and cultural context of the study area . There are many changes in terms of socio-economic already have been taken places like many people have had to change their main occupation from agriculture to various non agriculture activities. Many of the households report a decline in their income following the waterlogged situation. Driven by the miseries caused by the water logging , income earning members of household have had to migrate out of their village quite a often resulting a decline in current employment at school going age . There have also been problems with raising livestock's in the water logged area. The use of water that has been stagnant for a long time has reportedly caused various health problem like diarrhoea ,dysentery and skin . Apart from that so many areas are unidentified and unrevealed the changes have been taken places specially social aspect that the current study target to look into . The areas the current study have been focused to assess the changes made due to water logging are the following :

- Land use pattern
- Land price
- Occupation
- Household food security
- Food consumption
- Migration
- Public Health
- Water Sanitation
- Livestock
- Asset mortgage
- Marginal group



**4.3 Literature Review** The literature review was undertaken for background study and concept development . Relevant books, papers, article, research work, website are identified for review and getting assistance to develop understanding about the study objectives.

**4.4 Formulation of Objectives** To work with the water logging issue relevant books and research work were reviewed and afterward comprehensive and precise goals and objectives were formulated which are the guideline of the study.

**4.5 Inventory of Study Area** An inventory of population living in the water logging area was made from the secondary sources. The inventory include the following items.

- Selection of the study area ( see appendix-A-1)
- Selection of the waterlogged area (see appendix-A-4)

**4.6 Reconnaissance Survey of the Study Area** Reconnaissance survey is very important to get an overall view of the study area at the very beginning of the study. It gives an outlook to the physical ,demographical ,socio-economic ,geographical extent as well as land use pattern of the area an overall situation of the water logged area alongwith road networks, river system etc can see and revealed from this survey. Following attachment map and table can depict a overall situation of the study area .

- Map of Water logging area ( see map annex-3)
- Demographic information of the water logging district (see table annex-4)

**4.7 Selection and Justification of Study Area:** As the study objectives is to assess the social changes due to water logging therefore study area have been selected from the area where the problem is very serious and recurring. Out of 804 village under 12 Upazila of Jessore-Shatkira and Khulna district all the village not affected all the time since 2000.

**Table-03 Beneficiary Survey Findings Conducted to Identify the Vulnerable People Affected by Flood 2006**

District	Upazila	Union	No. of Village	Category of beneficiary affected by flood 2006 (HH)			Total (HH)
				A*	B	C	
Jessore	Avainagar	Sundali	12	1935	97	54	2086
		Chalisia	07	964	50	19	1033
		Prembagh	06	438	22	10	470
		Paira	04	323	15	00	338
		Noapara poura	03	104	41	07	152
Subtotal		5	32	3764	225	90	4079
Jessore	Keshabpur	Suflakhati	13	657	629	289	1575
		Ksabpur	9	399	443	50	892
		Panjia	14	550	274	34	858
		Pourasova	9	497	308	39	844
		Sagordari	5	444	146	23	613
Sub Total		5	50	2547	1800	435	4782
Satkhira	Tala	Tala	12	1683	221	6	1910
		Kumera	15	730	19	1	750
		Islamkhati	11	934	32	2	968
		Tentulia	16	1938	140	60	2138
		Sarulia	16	1142	25	0	1167
Sub Total		5	70	6427	437	69	6933
G TOTAL		15	152	12738	2462	594	15794

A = Most vulnerable and mostly affected, B= Moderately vulnerable and affected by flood and C=Affected by flood but comparatively less vulnerable

Some of the area specially village close to Hari, kapatakhand and betna basin are severely affected and have experiencing repeated and permanent water logging situation that is why during the area selection of the study this factors have been considered. See final study area in table-12.

**Table-04 : Study Area**

Basin	District	Upazila	Union	Village
		Avoynagar	Sundoli	Dohor moshihati
			Paira	Digholia
			Chelisha	Kuta
			Porashava	Dopadi
			Prembag	Ziadanga
	Satkhira	Tala	Tentulia	Dhalbaria
			Kumira	Raripara
			Islamkathi	Islamkati
			Sarulia	Boorkeshabpur
			Tala	Murakulia
Kapatakha	Jessore	Keshabpur	Panja	Ruz bakobarsi
			Keshabpur	Modhakul
			pourashava	
			Sufalakati	Arua
			Sagordari	Bisnupur
			Keshabpur Sadar	Altapool
02	03	05	15	15

**4.8 Tools of Data Collection :** Primary data has been collected through a structured questionnaire (Sample questionnaire attached in appendix-C-1). Random sampling method have been employed for identification of beneficiary selection for serving questionnaire. Primary data collected from a 15 village under Avaynagar, Keshabpur and Monirampur Upazila of Jessore, Tala Upazila of Shatkhira and Dumuria Upazila of Khulna district . A total of 75 household ( each community 5 household) are identified on random sampling basis . Beneficiaries those have had experience by the water logging flood several times have been given priority. Finally in order to explore community level pattern of risk , vulnerabilities and resilience a total of 05 life stories have been documented through interviewing techniques .

#### **4.9 Questionnaire Survey of the Beneficiary and Relevant Officials in Study Area:**

Questionnaire survey is a direct procedures for data collection which gives a clear opinion of the respondent regarding the subject. As the households of the study area are very large



in number and no list is available therefore random sampling method was used for the questionnaire survey for the household and also for officials.

The main aspect of the questionnaire for household were

- Household demographic, socio-economic and educational information
- Damages and loss at household level by the water logging induced flooding in 2000, 2004 and 2006 .
- Social changes in regards to land use pattern, land price, occupation ,household food security ,food consumption , migration, Public Health ,Water Sanitation , livestock's ,asset mortgage ,micro-credit firewood .
- Coping strategy adopted by the affected people.
- Recommendations for short term, mid term and long term solution to the water logging problem .

The main aspect of the questionnaire for officials were

- Social changes in regards to land use pattern, land price, occupation ,household food security ,food consumption , migration, Public Health ,Water Sanitation , livestock's ,asset mortgage ,micro-credit firewood .
- Recommendations for short term, mid term and long term solution to the water logging problem .



Photo-3: Women forced to search alternative livelihood in the study area

## CHAPTER-5

### 5.0 Conceptual Framework

#### 5.1 Definitions of key terms

**Livelihood :** A livelihood comprises the capabilities, assets ( stores , resources, claims, and access) and activities required for a means of living : a livelihood sustainable which can cope with and recover from stress and shocks , maintain or enhance its capabilities and assets and provide sustainable livelihood opportunities for the next generation: and which contributes net benefits to other livelihoods at the local and global levels in long and short term ( Chambers and Conway,1992)

**Entitlement:** Entitlements include the rights, privileges and assets that a household has, and its position in the legal, political, and social fabric of society. Sen's (1981) theory on food entitlement states that these endowments are derived from a household's own production, income, gathering of wild foods, community support (claims), assets, migration etc.

**Food security:** When all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life (USAID 1992). Food security takes into consideration the physiological needs of individuals, the complementary and trade-offs among food and other basic necessities that households make, the dynamic nature of HH food security over time and the levels of vulnerability and response to risk (Barrett 1999).

**Household Livelihood Security Assessment (HLSA):** HLSA's employ a set of data collection techniques and analytic tools adapted from social science interviews and survey methods. First used in farming systems research in the late 1970s and early 1980s and later in nutritional diagnostic work, HLSAs provide comprehensive socio-cultural, economic, and ecological assessments of a given area for planning and project implementation (Molnar 1989). They bridge the gap between formal surveys and non-structured interviewing.

**Livelihood Security:** The adequate and sustainable access to income and other resources to enable households to meet basic needs (Frankenberger, 1996). This includes adequate access to food, potable water, health facilities, educational opportunities, housing, and time for community participation and social integration.

**Livelihoods Strategies:** A livelihood comprises the capabilities, assets (stores, resources, claims and access), and activities required for a means of living (Chambers and Conway



1992). More specifically, livelihoods can be seen to consist of a range of on-farm and off-farm activities that together provide a variety of procurement strategies for food and cash.

**Livelihood Systems:** The activities that households engage in to earn/make a living. Livelihoods can consist of a range of on- and off-farm activities or procurement strategies that together provide food and/or cash. These strategies include assets and other resources the households possess, as well as the utilization of human capital and accessing of social capital (i.e. social networks or safety nets) in times of need. Livelihood systems of the poor are often quite diverse. Households often use their capabilities, skills, and know how to diversify income sources and off-set risks.

**Participatory Rural Appraisal (PRA):** Participatory Rural Appraisals use the same methods as RRAs, however the emphasis is on community empowerment and not the acquisition of data within a short time-frame. The process involves intense community participation and assumes an open research agenda. Because PRAs tend to focus on one community rather than a region, they are best used in a complementary way to RRAs to further the design process once the RRA diagnosis is completed.

**Rapid Rural Appraisal (RRA):** The major objective of an RRA is to gain maximum knowledge of the target area with the minimum amount of time and resources (Eklund 1990). The major advantages of RRAs are that they are: (1) Rapid- Results are made available to decision makers quickly; (2) Interdisciplinary; (3) Eclectic in techniques aimed at capturing a holistic picture of the local situation; (4) Rely on more open-ended interview techniques that reduce non-sampling error; (5) Allow for valuable interaction between investigators and the target population (Molnar, 1989).

**Rights-Based Approach (RBA) to Household Livelihood Security:** The rights-based approach to HLS recognizes that poor people and poor households live and interact within broader socioeconomic and sociopolitical systems that influence resource production and allocation decisions. The approach works to expose the roots of vulnerability and marginalization and expand the range of responses.

## 5.2 Causes of the Water-Logging in South-West Region

The main causes of water-logging as identified are:

- i) Existence of permanent polders and their mismanagement.
- ii) Construction of ill planned polders.
- iii) Decrease of upland flow.
- iv) Anthropogenic factors.



i) Existence of permanent polders and their mismanagement

Due to construction of permanent embankments on both sides of the river, no water is able to enter into the tidal flat. Sedimentation only takes place on the channel bed, causing very rapid deposition on the channel bed and no or very limited sedimentation on the tidal flat. These processes ultimately upraise the river's beds higher than the adjacent tidal flats, effects of which ultimately cause inundation in tidal flats and drainage congestion. This is the main cause of water-logging and siltation problems in this region.

ii) Construction of ill planned polders

Polders constructed without considering the morphodynamics, geological conditions and tectonic of the area. The land and water management of each geologic and geomorphic unit is different from other units. Moreover, the morphodynamics of the boundary zone of two or more units is very complex. During construction of the polders, authority did not consider these units. There are overlapping of units in one polder (Examples, polder No. 24, 25, 1, 2 etc.). In overlapped polders, morphodynamics become very complex. Ultimately, it causes different types of problems specially, in the boundary zone of different units of the polders (Water-logging, siltation, etc.) Normally, peat areas require special type of land and water management when empoldered. So, improper management systems may cause water-logging earlier in peat polders than other polders as happened for polders nos. 36, 25, 1 and 3. Moreover, subsidence is greater in the peat area. This subsidence is not only due to tectonic reason but also due to shrinkage of top layers and oxidation of carbonaceous materials (Egglesmann, 1982).

iii) Decrease of upland flow

In the study area, the Matabhanga and the Gorai rivers are the main distributaries of the Padma river. About 160 years ago, the Matabhanga river began to silt up at its mouth (Mitra, 1914) and now completely silted. Due to siltation of this river, all its distributaries are now receiving practically no water from upstream region (Kumar, Chitra, Bhairab, Kabadak, Nabaganga, etc.). Only the Kumar river is receiving very little water in the rainy season. Similarly, the mouth of the Gorai river, about 140-150 years before, began to silt up. Later due to construction of the Gorai railway bridge near Kushtia city, the rate of siltation increased tremendously (Mitra, 1914). Now this river is receiving almost no water in the dry season. Moreover, construction of Farakka barrage on the Ganges river caused a sudden decrease of flow below the Ganges river known as the Padma river and its

distributaries. Local information are just after withdrawal of the Ganges water by Farakka barrage in 1976, the rate of siltation on river's beds increased tremendously specially, in the Ganges tidal plain.

iv) Anthropogenic factors:

Recently, the communication networks of this region developed tremendously. Most of the roads are in east-west direction whereas the regional slope and drainage directions are in the north-south direction. These east-west roads are obstructing the natural drainage and are enhancing drainage problem in this region. Mismanagement of sluice gates and willful misuse of land and water by the influential people are also important causes of water-logging. For example, each tidal channel has its own catchment area and if anyone closes it for pisci-culture, it will cause inundation to its upstream. This way, in many polders there is conflict of shrimp farming and paddy cultivation, which causes water-logging in many cases.

### **5.3 Main Livelihoods in South-West Region**

A household is the basic social institution that also performs as an economic unit. It draws on a set of assets or capital it possesses. Besides, it may (or may not) have entitlements or access to other resources that constitute the local resource base. Ownership and access to these assets, entitlements and resources provides a household with the basic infrastructure to make choices, which are translated into concrete activities for living. These activities then generate some income, which is disposed in various ways. These activities define and differentiate groups or social categories engaging in one or a set of such activities and entering into certain relations of production and modes of exchange. A household can change its resource base by taking certain strategies and decisions. But there are processes and dynamics beyond the control of a household or even of a public authority to which a household may be vulnerable. A household tends to cope with the vulnerability factor using its resource base. If a household lacks resilience or coping capacity, it becomes more vulnerable. Some sections of the population within a seemingly homogeneous group may be more vulnerable than others. It is important to know how the coastal zone looks in terms of resource endowment. Are the people worse than the rest of the country, or better off? An analysis has been attempted in this chapter using selected indicators that are representative for the household assets and for which some disaggregate data is available.

#### **Household assets**



Livelihood conditions of the people largely depend on what resources are available at the household level in terms of ownership and access<sup>10</sup>. Household asset base provides the necessary condition for selection of livelihood option, going for gainful activities and coping with all odds. Table 1 presents an indicative list of such assets.

**Table-5: Livelihood Assets of the Study Area**

<b>Cluster</b>	<b>Assets</b>
Human	Household members, health, education, training
Social	NGO/cooperative groups, UP, network/connection
Natural	Land, water, common property resources (CPR)
Physical	House, tube well, latrine, electricity, cattle, poultry, tools and utilities
Financial	Savings, credit, food/cash assistance (safety nets)

<sup>10</sup> Resources are synonymous of 'assets' or 'capital' used in the "sustainable livelihood framework" (SLF).

## **CHAPTER-6**

### **6.0 Study Area**

#### **6.1 Introduction of the area**

The study area is in the south-western part of Bangladesh under greater Khulna and Jessore districts. It lies between latitudes 22° 30' N and 23° 15' N and, longitudes 90° 00' E, excluding parts of Sundarbans. The total area is about 8,000 sq. km.

Description of waterlogged areas :

There are two types of waterlogged areas, anthropogenic waterlogged areas and natural waterlogged area. Natural waterlogged areas are historic water pockets, the wet lands of this region. Anthropogenic waterlogged areas are the water pockets that formed mainly due to human activities (poldering) together with other factors. Here, problems are due to unperfected permanent or seasonal water congestion. It is hampering the normal land-use, ecology, morphodynamics, economical activities and normal activities of life of the area.

#### **6.2 Climate of the Area**

Climate of this region is the salt laden air throughout the year specially, when winds blow from the sea. The air becomes more and more humid and salty towards south. Four distinctive seasonal weather patterns are: dry winter season, pre-monsoon season, monsoon season and post monsoon season.

Dry winter season starts from December and lasts till February. Rainfall is infrequent, temperature is in the low twenties and humidity gradually decreases during the season. Salinity of the soil and water, specially in the south, is considerably high. Pre-monsoon season is a transitional period between dry winter and monsoon seasons. It starts from March and last till May. This season normally characterised by severe cyclonic storm of oceanic origin. The monsoon season starts from June and lasts till September. This season is characterised by heavy rainfall under the influence of the southwest monsoon. Post monsoon season is another transitional season starting from October and lasting till November. This season is also characterized by violent tropical cyclonic storms of maritime origin. Storms of this season are however, more severe and destructive than those developed in the pre-monsoon season. Moreover, during pre-monsoon season recently, lot of sedimentation took place in the rivers of this region. The maximum and minimum



temperature usually ranges from 29° C to 40° C and 05° C to 15° C (ANON, 1992). Average annual rainfall of the area during period 1965 to 1990 is about 1750 mm (ANON, 1993). The relative humidity percentage ranges from 75 to 64 in the dry season and 75 to 87 in the wet season (ANON, 1991).

### **6.3 Rivers of the Area**

The area is mainly drained by a number of north south flowing rivers. From east to west, important rivers are the Gorai-Madhumati-Baleswar rivers, the Bhairab-Pusur rivers, the Bhadra-Gengrail rivers, the Hari-Teka-Mukteswari rivers, Sibsa river, the Kabadak-Betna rivers and the Jamuna-Ichamati-Kalindi rivers. Most of the rivers are tidal in nature. These north-South rivers are interconnected by east-west rivers. In this region, flows of these east-west rivers are very important for the complete circulation of tide all over the tidal flat. In the rainy season, water becomes fresh to slightly salty and in the dry season, it becomes salty. Most of the river waters carry appreciable amount of suspended load.

The inland rivers represent the remaining channels of the old spill or regional rivers, which have lost their connection to the oldest boundary river, the Ganges. The Kumar, Nabaganga, Kabadak, Bhairab are good examples of such inland rivers. The inland and regional rivers run into tidal rivers or estuaries. In the greater Khulna area, the coastal rivers or estuaries are mainly saline because freshwater discharges are very low, specially in dry season. The flow regimes are driven by high, variable sediment laden flows. The rivers of this region show a continuous process of siltation gradually from the NW towards the SE direction.

### **6.4 Geology of the Area**

The area surfaced by alluvial and paludal deposits. Alluvial deposits are tidal deltaic deposits and deltaic silt deposits. Paludal deposits are marsh clay and peat deposits (Alam, et. al., 1992).

#### **i) Tidal deltaic deposits :**

Sediments mainly composed of clay, silty clay and silt. Occasionally, fine to very fine sand along the active and abandoned channels including crevasse splays. Sediments are light grey to greenish grey in colour. In places, it weathered into yellowish grey colour. Vertically, sediments are inter-layer of clay, silty clay with peat; clayey peat and peaty clay; wood present both in clay and peat/peaty clay layers.

ii) Deltaic silt deposits :

Sediments are silt, clayey silt and silt. Silt and clayey silt are dusky yellow in colour. Normally, there is alternation of silty clay and clayey silt with fine to very fine sand. Along the natural levees, sediments are fine to very fine sand with silt and sandy silt. At depth sediments are sandy in nature.

iii) Marsh clay and peat deposits :

Paludal deposits, deposited in the swampy environment. Clay is grey to bluish grey in colour. Peat is black in colour. Alternation of clay and peat or clayey peat are common. At the center of the marsh basin, peat is the thickest unit. Wood present at depth in peat, peaty clay, clayey peat and clay deposits. Subsidence is greater in the peat areas. This subsidence is not only due to the tectonic reason but also due to shrinkage of top of the peat layers and oxidation of carbonaceous matters (Egglesmann, 1982).

## 6.5 Physiography of the Area

Important physiographic units are: Peat basins, Ganges tidal floodplain and floodplain.

i) Peat basins

Relatively low trough like depressions surrounded by the Ganges River floodplain are peat basins. These basins remain under water for about 8-9 months of the year. Here active processes are paludal processes. Water and soil are saline to slightly saline in nature and salinity level controlled by fresh water flow from the upstream and rainfall. Sediments are high in organic matters and interbedded with peat and peaty layers.

ii) Ganges tidal floodplain

Relatively broad more or less flat to trough like plains dissected by numerous tidal channels bounded by the Ganges floodplain to the north and Sundarbans to the south is the Ganges tidal floodplain. Tidal plain is strongly influenced by tide, salinity and rainfall. This plain is also crisscrossed by numerous tidal creeks or channels and have high drainage density. The average tide difference is about 2 meters. Most of the areas are in between 1 to 3 meters above mean sea level and have southward regional slope. The water and the soil are saline but in the rainy season salinity becomes low. Fresh water flow from the upstream regions and the tide normally control the salinity of this region. Sediments are mostly clay, silty clay and in

many places alternated with peat and peaty clay at depth.

iii) Ganges floodplain

Relatively more or less flat plains with well-developed natural levees and back-swamps bounded by the tidal plain to the south are Ganges floodplain. In this inactive plain no depositional processes are acting now. Now, the active processes are denudation processes.



Rivers are seasonal and only fed by rainwater. In the southern part of the Ganges floodplain, the tide water feed some rivers only during the spring tide. The tide difference is less than 1 meter. Sediments are silt, sandy silt and clayey silt. Along the rivers, sediments are sandy in nature. Each physiographic unit has its own morpho-dynamics. Peat basins characterized by its paludal processes. Ganges tidal floodplain characterized by its normal tidal action. Ganges floodplain characterized by normal denudation processes. The land and water management of each physiographic unit is different from other physiographic units. Moreover, the morphodynamics of the boundary zone of two or more physiographic units is very complex.

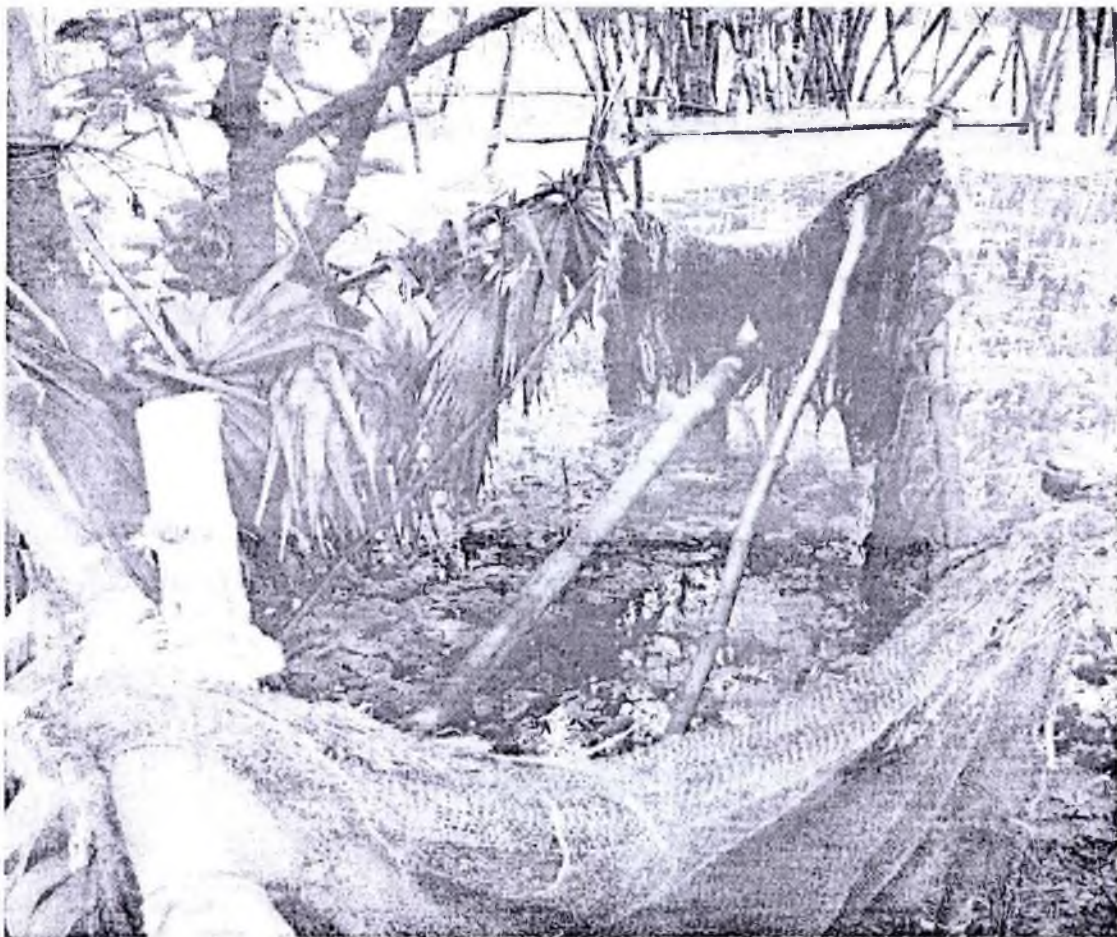


Photo-04: Sanitation system collapsed in the study area



## CHAPTER-7

### 7.0 Data Collection and Analysis

#### 7.1 Demographic Information of the Study Area:

Household census data in study area revealed that there are over 20000 people living in the fifteen villages in study areas. There are 3735 households in the fifteen selected villages in the study areas. There have been slow but steady changes in the social, economic and political organisations as well as in rural social structure over the past few decades. There have also been changes in the population structure. Although the total population has increased, the fertility rate and population growth rate have declined. The average household size is 5.5 in the study area. The figures are larger than the national rural average household size of 4.9 (according to a 2001 population census). Almost every household affected by the recent flood in the study area out of that 79% population area affected severely by the flood 2006 .

**Table-6 Population, Household and % of People Affected by the Flood**

Basin	District	Upazila	Union	Village	Total no of HH	Total population			population affected by flood '06
						Male	Female	Total	
		Avoimagar	Sundoli	Dohor moshihati	497	1384	1350	2734	2530 (92%)
			Paira	Digholia	154	417	430	847	770 (91%)
			Chelisha	Kuta	299	825	820	1645	1645 (100%)
			Porasha va	Dopadi	46	133	120	253	231 (91%)
			Prembang	Ziadanga	149	419	401	820	787 (96%)
	Satkhira	Tala	Tentulia	Dhalbaria	268	738	736	1474	1419 (96%)
			Kumira	Raripara	126	373	320	693	688 (99%)
			Islamkathi	Islamkati	233	651	630	1281	1281 (100%)

			Sarulia	Boorkesha bpur	335	928	915	1843	1705 (92%)
			Tala	Murakulia	332	916	910	1826	1694 (92%)
Kapatak ha	Jessor e	Keshabpu r	Panja	Ruz bakobarsi	190	530	515	1045	660 (63%)
			Keshab pur pourash ava	Modhakul	225	622	615	1237	566 (45%)
			Sufalak ati	Arua	343	952	935	1887	786 (42%)
			Sagorda ri	Bisnupur	178	543	436	979	803 (82%)
			Keshab pur Sadar	Altapool	400	1110	1090	2200	765 (34%)
02	03	05	15		3775	1 0541	10233	20764	16330 (79%)

Source : Study survey findings

## 7.2 Damage Information of the Study Area :

**Table-07 : People Affected by Water Logging Between 2000-2006**

Geographical Location			No. of household and population affected by water logging					
			2000		2004		2006	
Distric t	Upazil a	Union	HHs	Indivi duals	HHs	Indivi duals	HHs	Indivi duals
Jessore	Avayn agar	Sundali	3400	18700			2333	14000
		Prembagh	4100	22550			1250	7500
		Noapara						
		Pourashava	5590	30745			6666	40000
		Chelisha	3790	20845			2000	12000
		Paira	4280	23540			3000	18000
	Keshab pur	Bidyanandak ati	5600	30800	4286	23573	2185	13111



		Gourighona	2400	13200			898	5390
		Keshabpur	5300	29150	5280	29040	1483	8900
		Mojidupur					1050	6300
		Mongolkot					1383	8300
		Panjia	3700	20350			869	5217
		Sagardari	4240	23320	4700	25850	742	4452
		Sufalakati	3480	19140	3700	20350	948	5690
		Trimohini	4200	23100	3464	19052	652	3912
		Pourashava	3800	20900	4600	25300	508	3049
	Monira mpur	Bhojgati	1550	8525			1197	7187
		Dakuria	2980	16390			2022	12137
		Durbadanga	1670	9185			1529	9174
		Horidash Kati	2200	12100			1880	11281
		Horihor Nagar	3300	18150	3220	17710	2051	12309
		Jhampa	4300	23650	4800	26400	2718	16310
		Khanpur					688	4132
		Kultia					1523	9142
		Monohorpur	1200	6600			1030	6184
		Moshim Nagar	3400	18700	4650	25575	1553	9320
		Nehalpur	2400	13200			1302	7813
		Samkur	3600	19800	3700	20350		
		Chraman kathi	4450	24475	3255	17902		
		Rohitha					1319	7916
	Shatkh ira	Tala						
		Dhandia	1650	9075	2400	13200	320	1923
		Islamkati	2100	11550	1780	9790	546	3276
		Kumira	2540	13970	3560	19580	380	2280
		Nagargata	2100	11550	1200	6600	549	3294
		Sarulua	1600	8800	2040	11220	471	2827
		Tala	3870	21285	3010	16555	3054	18325
		Tentulia	2100	11550	1846	10153	1328	7972

Khulna	Dumuria	Magurgona	1010	5555	1170	6435	847	4658
		Atlia	580	3190	1119	6154	678	3729
		Dhamalia	180	990			144	792
		Rangpur	570	3135			352	1936
		Rogunathpur	630	3465			290	1595
Total			103860	571230	63780	350789	53738	321333

Source : Beneficiary survey findings : DER, Oxfam

### 7.3 Household Land Holding Patterns in the Study Area:

The dominant natural capital asset of the villagers is land. Land holding size is used to determine the people's wealth and social status, and is typically unevenly distributed in rural households. Generally, wealthy people have large landholdings and poorer people own less land. In this context, the villagers of study area are mostly poor (see Table 4). However, control over land does not necessarily match with land ownership. This is because people can control other people's land under different land tenure schemes. These include sharecropping in and sharecropping out land, mortgaging in and mortgaging out land, and leasing in and leasing out land. Local people described how the land use pattern of the villagers has changed over the last decade due to water logging.

**Table 8 : Percentage of households by total land holding**

Upazila	Union	Village	No land	0.1 to 0.49 dc.m	0.5 to 1.99 dc.m	2.0 to 4.99 dc.m	5.0 and above	Total HH	% of land permanently under water
Avoinagar	Sundoli	Dohor moshihati	40	267	95	55	40	497	50
	Paira	Digholia	35	76	18	16	9	154	67
	Chelisha	Kuta	45	186	30	24	14	299	55
	Porashava	Dopadi	5	24	10	4	3	46	34
	Prembag	Ziadanga	32	88	16	8	5	149	56
Tala	Tentulia	Dhalbaria	55	147	44	15	7	268	70
	Kumira	Raripara	25	67	15	12	7	126	86

	Islamkat hi	Islamkati	22	165	15	21	10	233	78
	Sarulia	Boorkesha bpur	48	187	32	45	23	335	67
	Tala	Murakulia	41	222	30	36	3	332	56
Keshabp ur	Panja	Ruz bakobarsi	29	89	24	30	18	190	65
	Keshabp ur pourasha va	Modhakul	30	112	35	40	8	225	45
	Sufalakat i	Arua	56	155	35	51	46	343	86
	Sagordar i	Bisnupur	25	75	44	32	2	178	78
	Keshabp ur Sadar	Altapool	21	278	10	12	79	400	42
			509 (13%)	2138 (57%)	453 (12%)	401 (11%)	274 (7%)	3775	62

Source : Study survey findings

During and after the devastating flood of 2000 and 2004, many households moved from the study areas and built homesteads outside of water logging area. In addition, newly married couples have also built many new homesteads. The result is a decline in the area of cropland available to the village. Study revealed that an average of 13% of households are completely landless while 57% owned less than 5 decimal land. This picture actually describe the poverty situation of the project area moreover study also revealed that those have owned land 62% of that remain under water most of the time of round the year that means they also not having any benefit from their land .



## CHAPTER-8

### 8.0 Findings

#### 8.1 Social Changes in Different Aspect Due to Water Logging in South-West Region

##### A. Land use pattern

Issue	Level	Before water logging period	Up-to 1999	2000 and above
System of Cultivation	Community	<ul style="list-style-type: none"> <li>Indigenous cultivation system consistent with local ecology</li> </ul>	<ul style="list-style-type: none"> <li>Ecologically inconsistent HYV introduced</li> </ul>	<ul style="list-style-type: none"> <li>Shrimp culture in agricultural and forest lands</li> <li>Mono – species agriculture.</li> </ul>
Species		<ul style="list-style-type: none"> <li>Indigenous variety Bajra Muri, Baran Patna etc</li> </ul>	<ul style="list-style-type: none"> <li>HYV introduced, BRI</li> </ul>	

##### B. Livestock

Issue	Level	Before water logging period	Up-to 1999	2000 and above
Species & Fodder	Community	<ul style="list-style-type: none"> <li>Cows, Buffalows, goats, and sheep in abundance</li> <li>Grass, hay, produced in abundance</li> </ul>	<ul style="list-style-type: none"> <li>Gradually decreasing</li> <li>Decreased</li> </ul>	<ul style="list-style-type: none"> <li>Totally extinct.</li> <li>No grazing ground</li> </ul>

##### C. Marginal group

Issue	Level	Before water logging period	Up-to 1999	2000 and above
Land less	Community	<ul style="list-style-type: none"> <li>Agriculture</li> <li>Wage labour (Agri)</li> </ul>	<ul style="list-style-type: none"> <li>Agriculture</li> <li>Agriculture</li> </ul>	<ul style="list-style-type: none"> <li>Wage labour</li> <li>Fishery</li> </ul>

		<ul style="list-style-type: none"> <li>• Fishery</li> <li>• Livestock poultry rearing</li> <li>• Honey collection &amp; wood collection in the forest.</li> <li>• Normal dependence on forest and rivers</li> </ul>	<p>Wage</p> <ul style="list-style-type: none"> <li>• Fishery</li> <li>• Livestock poultry rearing</li> <li>• Honey collection &amp; wood collection in the forest.</li> <li>• Depend on rivers &amp; forest increased.</li> </ul>	<ul style="list-style-type: none"> <li>• Shrimp fry collection</li> <li>• Shortage of honey and wood in the forest.</li> <li>• Too much dependence on rivers and forests.</li> </ul>
Women		<ul style="list-style-type: none"> <li>• House wife</li> <li>• No. of divorce, widow and deserts less.</li> <li>• No. of families victim of tiger killing</li> </ul>	<ul style="list-style-type: none"> <li>• Housewife Rate of divorce widow and destitute</li> <li>• No. of Tiger victim very few</li> </ul>	<ul style="list-style-type: none"> <li>• Shrimp fry collector in river &amp; canals High rate of divorce, widow, destitute</li> <li>• No. of tiger victims very high</li> </ul>
Children		<ul style="list-style-type: none"> <li>• were not involved in child labour</li> <li>• Male children engage on limited scale and house none labour and cow boys</li> </ul>	<ul style="list-style-type: none"> <li>• No existing</li> </ul>	<ul style="list-style-type: none"> <li>• Male &amp; female children involve shrimps fry collection &amp; on a large scale subjected to inhuman child level.</li> </ul>

#### D. Land price

Issue	Level	Before water logging period	Up-to 1999	2000 and above
Price	Community	<ul style="list-style-type: none"> <li>Land price was high</li> </ul>	<ul style="list-style-type: none"> <li>Land price decreasing</li> </ul>	<ul style="list-style-type: none"> <li>Land price fall drastically</li> <li>Mono – species agriculture.</li> </ul>
Species	House hold	<ul style="list-style-type: none"> <li>Demand was very high for agriculture land</li> </ul>	<ul style="list-style-type: none"> <li>Demand was very high for agriculture land those located outside of waterlogged area</li> </ul>	<ul style="list-style-type: none"> <li>Demand is less for all sorts of land in the area</li> </ul>

#### E. Occupation

Issue	Level	Before water logging period	Up-to 1999	2000 and above
Main sources of livelihood	House hold	<ul style="list-style-type: none"> <li>Most of the people involved in agriculture</li> </ul>	<ul style="list-style-type: none"> <li>Most of the people involved in agriculture and fishing</li> </ul>	<ul style="list-style-type: none"> <li>Most of the people involved in day labourers</li> </ul>
Job market	Community	<ul style="list-style-type: none"> <li>Job were available in agriculture and fishing sector</li> </ul>	<ul style="list-style-type: none"> <li>Job were moderately available in agriculture and fishing sector</li> </ul>	<ul style="list-style-type: none"> <li>Job is acute in agriculture but available at fishing sector</li> </ul>

#### F. Food security

Issue	Level	Before water logging	Up-to 1999	2000 and above
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		period		
Availability	Community	<ul style="list-style-type: none"> <li>Food sufficiency area</li> </ul>	<ul style="list-style-type: none"> <li>Food deficiency area</li> </ul>	<ul style="list-style-type: none"> <li>Acute food shortage area</li> </ul>
	Household	<ul style="list-style-type: none"> <li>All members of family have had 03 meals in a day</li> </ul>	<ul style="list-style-type: none"> <li>Food was not available round the year</li> </ul>	<ul style="list-style-type: none"> <li>Food shortage in most time round the year</li> </ul>
Source	Community	<ul style="list-style-type: none"> <li>Agriculture was the main sources of food</li> </ul>	<ul style="list-style-type: none"> <li>Agriculture was the main sources of food</li> </ul>	<ul style="list-style-type: none"> <li>Depends on outside food</li> </ul>
Grain		<ul style="list-style-type: none"> <li>Rice was the main food</li> </ul>	<ul style="list-style-type: none"> <li>Rice was the main food but some time due to unavailability people took supplement food instead of rice</li> </ul>	<ul style="list-style-type: none"> <li>Rice is the main food but some time due to unavailability people took supplement food instead of rice</li> </ul>

#### G. Migration

Issue	Level	Before water logging period	Up-to 1999	2000 and above
Frequency	Household	<ul style="list-style-type: none"> <li>No need to migrate outside the study area</li> </ul>	<ul style="list-style-type: none"> <li>At least one time family members have had experience migration in a year</li> </ul>	<ul style="list-style-type: none"> <li>Frequent migration experienced by the people</li> </ul>

Time	Comm unity	<ul style="list-style-type: none"> <li>• Out side people come into study area to find out the job</li> </ul>	<ul style="list-style-type: none"> <li>• People oftenly migrate during July to December to find out job</li> </ul>	<ul style="list-style-type: none"> <li>• At least one family member migrate permanantly to findout job</li> </ul>
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#### H. Public Health

Issue	Level	Before water logging period	Up-to 1999	2000 and above
Disease	Comm unity	<ul style="list-style-type: none"> <li>• Exist friendly health environment</li> <li>• Few cases were recorded regarding waterborne disease</li> </ul>	<ul style="list-style-type: none"> <li>• Water borne disease increasing</li> <li>• Snakebite rate is increasing</li> <li>• Area facing acute health hazards</li> </ul>	<ul style="list-style-type: none"> <li>• Widespread waterborne disease</li> <li>• Area identified as a serious health hazards zone</li> <li>• Livestock disease drastically increasing</li> </ul>

#### I. Water Sanitation

Issue	Level	Before water logging period	Up-to 1999	2000 and above
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Availability	Community	<ul style="list-style-type: none"> <li>• Abundance fresh water</li> <li>• Low sanitation coverage but indigenous system was exist</li> </ul>	<ul style="list-style-type: none"> <li>• Scarcity of safe drinking water</li> <li>• Low sanitation coverage prevailing due to water logging</li> </ul>	<ul style="list-style-type: none"> <li>• Acute crisis of safe drinking water</li> <li>• Scarcity of place to install latrine</li> </ul>
Usability	Household	<ul style="list-style-type: none"> <li>• Use fresh water in all household chores</li> </ul>	<ul style="list-style-type: none"> <li>• Water source polluted by water logging</li> <li>• Household members forced to use as shorten of place to install latrine</li> </ul>	<ul style="list-style-type: none"> <li>• Use polluted water in all household chores</li> <li>• Household members forced to use open latrine and female suffer most for using open latrine</li> </ul>
Sources	Community	<ul style="list-style-type: none"> <li>• Brackish water was the sources of water for drinking and using other purpose</li> <li>• Tube well is the sources of drinking water</li> </ul>	<ul style="list-style-type: none"> <li>• Rain water and ground water was the sources of water for drinking and using other purpose</li> <li>• Dug well is the sources of drinking water</li> </ul>	<ul style="list-style-type: none"> <li>• Rain water and polluted ground water was the sources of water for drinking and using other purpose</li> <li>• Dug well is the sources of drinking water</li> </ul>



Distance	House hold	<ul style="list-style-type: none"> <li>Household members can collect drinking water from near place as water was abundance</li> </ul>	<ul style="list-style-type: none"> <li>Household members can collect drinking water from near place</li> </ul>	<ul style="list-style-type: none"> <li>Household members move far ( in an average 1-1.5 km ) to collect drinking water</li> </ul>
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#### J. Asset mortgage

Issue	Level	Before water logging period	Up-to 1999	2000 and above
Frequency	House hold	<ul style="list-style-type: none"> <li>Household rarely need to mortgage assets</li> </ul>	<ul style="list-style-type: none"> <li>Household moderately need to mortgage assets</li> </ul>	<ul style="list-style-type: none"> <li>Household frequently need to mortgage assets</li> </ul>
Rate	Comm unity	<ul style="list-style-type: none"> <li>Mortgage rate was at tolerable level</li> </ul>	<ul style="list-style-type: none"> <li>Mortgage rate was increasing</li> </ul>	<ul style="list-style-type: none"> <li>Mortgage rate is very high</li> </ul>

N.B:

1. The phase of ecological farming upto 1960 before construction of CEP.
2. The phase of HYV cultivation after construction of CEP 1960 – 1999
3. The phase of large – scale mono – species shrimp culture with saline irrigation after 1999 till today.

The chronology is rough and approximate. The classification has been made for convenience of situation analysis.

#### Phase – 1

Farming system was environment friendly. Building up temporary dykes for prevention of saline intrusion during the rainy season and cultivation long stemmed indigenous rice varieties, were principal features of eco friendly agriculture.

Cow dung, hay stalks left in the field, and tidal silts formed the principal source of fertilizer. No chemical fertilizer and pesticide was used for agriculture those days. Biological control (frogs, spiders and beneficial insects etc.) was the principal means of pest control.

Long stemmed hay stalks were the main source of fuel and thatching materials. Dependence on environmental resources was minimum. Flourishing live stocks and abundant indigenous fish species were enough to met nutrition requirement of the community.

The coastal and mangrove ecosystem with its rivers, canals and wetlands formed an ideal grazing ground for fishery and birds.

Many aquatic species living in deep sea, spend the initial phase of their life cycle in brackish water wet land areas.

## **Phase – 2**

Coastal embankment project was implemented during the period 1960 – 1969. Cessation of natural land formation process deprived agricultural lands of its vast reserve of natural fertilizer carried by silts. Dwarf variety high yielding crops could not meet fodder and thatching material requirement of the community. Chemical fertilizers and pesticides became principal inputs of the farming system. High input cost gradually barred poor peoples access to farming and accelerated the process of landlessness.

Destruction of fish habitats due to CEP and environmental pollution due to chemical inputs, severely reacted on terrestrial and aquatic bio – diversity. Indigenous fish species, traditional and migratory birds, all were severely hit and became almost extinct in the locality

Embankments built up across the course have caused unnatural death of rivers and canals and at the same time cessation of natural land formation process increased riverbed siltation.

## **Phase – 3**

Large scale shrimp culture in agricultural lands with saline irrigation is the principal form of farming system in this phase.

Principal characteristics of this phase are as follows:

1. Major agricultural lands are converted into shrimp culture zones with round the year saline irrigation.
2. Fresh water vegetation is destroyed due to salinity seriously affecting live stock.
3. Shrinkage of open water fisheries with consequent negative impact on community nutrition.
4. For domestic fuel and thatching materials people are solely dependent on Sundarban forest resources.
5. Majority people are displaced from their original profession and scope of employment becomes very limited.
6. Birds and indigenous fishes have been worst hit due to habitat destruction.

To understand the complex socio economic dynamics of the program area one must understand the interrelation between degrading environment and land use conflict persisting in the region for the last few decades. Environmental degradation is the out come of ecologically inconsistent land use leading inevitably to socio economic instability. Large scale Mono culture of shrimps has given rise to enormous environmental and social problems in the region, Large scale shrinkage fo scope of employment due to shrimp culture has caused mass scale professional displacement of the male members of the society forcing them to take up environmentally harmful, risky and physically painstaking professions. Uncertainty of employment has forced the male members of the society to abdicate social and financial responsibilities towards their wives and children, As a result cases of divorce and desertion have frighteningly increased giving ride to moral crisis in the

## **8.2 Solution of the Problem**

When KJDRP presented Huskoning plan for drainage of waterlogged areas of the region. NGOs under the initiative of Uttaran began taking an active part to review the plan. The development organizations opposed this proposal and demanded that people's participation in all stages of the project - from preparing drainage plans to their implementation - be guaranteed, and that drainage plans should be ecologically sound. ADAB, the national coordinating body of NGOs, and the Coalition of Environment NGOs (CEN) performed



leading role in the campaign. On this perspective KJDRP – B component (Engineering component) gradually changed their drainage plans.

Continuous efforts by the NGOs coupled with their mass-awareness and advocacy campaigns led to the suspension of the drainage implementation programme (in April 1997), by the donor agency ADB, subject to environment and social impact studies(EAI & SIA), and scrutiny of their findings. The NGOs continued both their mass-awareness campaign to resist the environmentally disastrous drainage plans of KJDRP and their efforts to evolve an alternative drainage plan consistent with eco-technological approach. This drainage plan has been based on the opinions and experience of the local people.

Points to be considered to develop Policy of Advocacy :

Following points have been considered to develop an appropriate policy of advocacy to mobilize people on proposed drainage plans of KJDRP and compile Alternative People's Plan based on TRM concept and lobby to the Government and funding agency (ADB).

Strengths and Weaknesses, Opportunities and Threat:

Strengths :

- a. In general, people are against solely engineer-driven solutions to waterlogging.
- b. People's organizations have emerged in order to solve the problems. They are aware of the need for environment-friendly approaches.
- c. The local NGOs have organized themselves into a NGO Network, and have risen against structural solutions.
- d. National and sectoral level networks have been formed against the proposed KJDRP.

Weaknesses :

- a. Some of the local vested interest groups (especially would be contractors) are working in favour of the project.
- b. Some NGOs have joined the project and the funder and the KJDRP are using them against the movement of the people.

Opportunities :

- a. No Environmental Impact Assessment (EIA) or Social Impact Assessment (SIA) by the KJDRP has been implemented. The donors generally do not fund a project without making the above assessments.
- b. The environmentalists and journalists of the country are against the implementation of KJDRP in its present form.
- c. Some of the experts of the Ministry of The Environment and Forest are opposed to this project.
- d. There is a global movement against large dam constructions and similar structural solutions.

#### Threats :

- a. The 'Establishment' - especially the bureaucrats, engineers and their contractors, who are associated with the project, which gives them the opportunity to make great financial gains.
- b. International Groups of consultants are strongly interested in the project, as they too can benefit financially by supporting any project for or against the people's interests.

#### Level of Advocacy

This project is supported by international funding agencies, and international consultant groups are working with them. The advocacy campaign should target the grassroots level (affected communities of 3 districts), the national level (Water Development Board, Water Resource Ministry, Environment Ministry, Fisheries Ministry) and the international level (ADB).

#### Strategy for the Advocacy Campaign :

The following strategies have already been completed:

##### A. Media Campaign

- 1. A book titled 'In quest of Development Approach for South West Coastal Region' has been published to influence the policy makers at national and international levels.
- 2. Newspaper cuttings on 'Waterlogging' issues have been accumulated for the last three years, which have been compiled to influence the policy makers as above.

3. A monthly Newsletter named 'Upakul Barta' (Coastal Newsletter) is being published for the opinion leaders (Union Parishad Chairmen, School Teachers, political leaders etc.) and policy makers to enhance their knowledge on waterlogging.
4. Orientation course on waterlogging and other problems of the coastal wetland have been imparted to the journalists of Khulna, Satkhira, Keshabpur and Tala Press Club. This has been done so that they can present the news in the newspapers correctly and effectively.
5. A TV film was produced on waterlogging and the impact of the Coastal Embankment Project (CEP) and was shown in Diganta (a development programme of Bangladesh Television).

#### *B. Grassroots Mobilization*

1. A regional network of small organizations has been developed known as the SANJOG – A NGO network of South West Coastal Region.
2. Group discussions, workshops, seminars have taken place with the members in the organized groups and a leadership cadre has been developed in each.
3. A Cultural Group has been organized jointly with Gana Sangskritic Kendra through which different plays are being staged on environmental and specifically waterlogging issues.
4. Issue based/ regional based People's committee have been developed spontaneously. Such as –

‘Action committee for the re-excavation of the Hamkura River’.

‘People's Committee for implementing TRM.’

‘People's Action Committee to save the Upper Bhadra River’.

The Water Committee has developed a strong relationship with such groups and have endeavoured to empower them through workshops, seminars and information dissemination.

#### *C. National level alliance building:*

Alliance has been made with ADAB and also with CEN. They have undertaken the waterlogging issue as one of their advocacy programme components.

Proshika – MUK has taken the leading role to mobilize national and international level coordination.



#### *D. Persuasion:*

The targets for persuasion have been identified as:

- Water Development Board
- Water Resource Ministry
- Ministry of Environment and Forest
- Local Government
- Local politicians of water-logged area, especially the M.Ps.
- Consultant Team of KJDRP.

The main role players for the implementation of this project are the funding agency (ADB) and the implementers (Water Development Board) who need to be influenced. These are the agencies who can implement the project in an environment-friendly way.

#### Outline of Alternative People's plan :

As a component of Advocacy the people and NGO's involved in this process have developed an outline of Alternative People's plan based on TRM concept.

The total waterlogged area within KJDRP depends on the drainage capacity of 4 river systems. These are –

- i. Solmari River.
- ii. Hamkura River
- iii. Hari River – Shree – Mukteshwari
- iv. Upper Bhadra – Harihar – Buri Bhadra

These river systems should be deepened through TRM process. Tidal basin should be constructed in the appropriate beels within polders in each river system.

- Polders will be re-opened in such a regulated way, that maximum silt will be accumulated in the beels accordingly.
- When the ground level of the beels will be heightened upto desired level, next appropriate beel will be reflected for tidal basin.
- These rotatory tidal basins will keep the rivers deep.

#### Implementation Strategy :

Before preparing a large-scale project plan for any area, it is important that one experimental project plan be prepared in the light of the concept and guidelines discussed above.

Such an experimental project plan will not only act as a basis for the implementation of the larger project and allow project planners to take note of observations and experiences gathered, but will also encourage people's participation in the entire process.

Action Sequence :

- a. To conduct full-scale investigations to find out the causes of waterlogging, its depth, extent and direction of the waterlogging and select the probable suitable beels for tidal basin chronologically.
- b. In selected beels of tidal basins the owners of waterlogged land should be organized to prepare a plan of action for their rehabilitation and livelihood.
- c. To prepare experimental tidal basin and implement it with people's participation.
- d. To prepare an overall plan on the basis of review.

Positive aspects of the alternative plan :

The outline of the alternative proposal will be based on the ecological and environmental characteristics of the coastal region and will combine people's experience with the knowledge of the experts. The success of the project will come from the involvement of people of all social and economic classes in the preparation and implementation of the project. People will take part in decision making and implementation process for such activities as selecting the sites at which the polders will be breached, selecting the sites for opening the polders, ensuring alluvial deposits in a planned manner, selecting the sites for constructing embankments around villages etc.

The project, when fully implemented, will deepen the estuaries, extend flood plains compensate for the sinking of land, raise the level of wet lands, and dissolve and remove the accumulated salt from croplands. The project will not interrupt the life-cycle of marine creatures or affect the bio-diversity of the region.

This plan is very much cost effective. To implement the proposed regulator based drainage plans, it is estimated that 62 million US dollars will be needed. But for implementing TRM based proposal, per year only 20 million Taka will be necessary for maintenance. This concept has no negative impact, but will keep the rivers alive for next century.

Gradual development of Advocacy level : Chronology of Activities:

When the KJDRP commenced its drainage plan in 1995, the local people got together with NGO's and started reviewing the project.

In July, 1996, ADAB the apex body of NGO's submitted memorandum titled 'Some Urgent recommendations to the Hon'ble Minister for Water Resources Mr. Abdur Razzaque.

Along with the memorandum, ADAB also submitted report on the waterlogging of this area to the minister. On August 24, 1996, ADAB, Khulna Chapter, invited all the local NGOs to participate in a Seminar to discuss the problems and possibilities of the Khulna-Jessore Drainage Rehabilitation Project. On September 01, 1996, the Deputy Team Leader of the A-Component of the KJDRP, Mr. Khandakar Mahmudur Rahman, in reply to the letter submitted by the NGO's, sent a letter with two proposals in reply. The two proposals were on (1) All possible means and methods of drainage and (2) A proposal for selection of NGOs for help in Rehabilitation and Development.

After receiving these two proposals, the member NGOs of the Khulna and Jessore chapters arranged three meetings. On the basis of these three meetings, an alternative statement was prepared under the title, "A Statement of the stand taken by the NGOs and other people's organizations in the region regarding the disaster created by the siltation of rivers caused by the polder system and on the proposals contained in the Khulna - Jessore Drainage Rehabilitation Project". On the basis of this statement, a revised proposal for Drainage and Rehabilitation of the waterlogged areas was prepared, taking into consideration the special topographic and morphological characteristics of the region. This proposal was passed by the 22 representatives of local NGOs and CBOs who were present at the meeting held on September, 1996.

On September 9, 1996, a meeting of NGOs working in the waterlogged areas was held under the aegis of CARITAS, Khulna. In that meeting attended also by representatives of the KJDRP and the WDB / Asian Development Bank, a sketch was submitted regarding the participation of NGOs in the Khulna-Jessore Drainage Rehabilitation Project.

In reply to the alternative proposal of the NGOs, the KJDRP authorities not only rejected that, but on October 5, 1996, they issued advertisement calling for tenders for the participation of NGOs in the project.

Taking into consideration all the factors, ADAB requested its member organizations not to participate in the tender. On November 24, 1996, in a meeting held at the ADAB auditorium, Dhaka, the participating NGOs unanimously agreed to the following decisions:-

1. The existing Khulna-Jessore Drainage Rehabilitation Project, if implemented as it is, will further degrade the environment. The Project proposal must be amended to suit the environment of the concerned region.



2. No provision has been made in the project for participation of the affected people of the region. The project must be amended to ensure the active participation of the people.
3. An alternative project proposal must be prepared within January, 1997, in consultation with all the NGOs and CBOs working in the region, whether they be members of ADAB, Khulna or Jessore chapters, or not. Any alternative proposal so submitted, must be on the basis of prior assessment, by an independent study approved by the Government and ADAB.
4. The participation of NGOs in any such project must be through co-ordination by ADAB.
5. The implementation project proposal in its present form must be suspended until a viable alternative acceptable to all concerned is approved.'

In order to implement the requirements of proposal No. (3) above, a Task force would be formed by the Khulna and Jessore chapters of ADAB on the basis of unanimity. This Task Force would consider the views and opinions of the people by means of several participatory Rural Appraisals (PRA), on the basis of which the revised or alternative project proposal would be made.

In accordance with No.4 proposal made above, in addition to all the member NGOs of the Khulna and Jessore chapters of ADAB, all other development organizations actively working in the area must also be included.'

During December 1996 and January and February, 1997, the following steps were taken to review the KJDRP :-

- a) creating awareness among the people, and
- b) holding meetings of concerned voluntary development organizations.

On December 12, 1996, the Directorate of Land and Water use of BWDB organized a meeting of the NGOs for enlistment of the NGOs in the Khulna Jessore Drainage and Rehabilitation Project. Though Uttaran, Bhumija, Prabhati had not applied for enlistment in KJDRP, they participated on the invitation of ADAB. The purpose of the Directorate in calling this meeting at the 'Component A' office of KJDRP to implement the Project in its original shape. But such environment-conscious NGOs like Uttaran, Bhumija, Prabhati etc. submitted an alternative proposal in the meeting. On behalf of participating NGOs, Prodipan also submitted an alternative proposal. As a result of these alternative proposals, the original intention of the government department was upset.

Meeting to form a Task Force on KJDRP :-

On 26-12-1996, a meeting was organized at the BMA auditorium in Khulna to exchange views on KJDRP. Among others, the representatives of non-ADAB NGOs within the KJDRP were also present. At the invitation of the chair, the representatives actively participated in the discussions.

On February 13, 1997, a letter was sent to the Governor of ADB, which is the funding agency for the project. In the letter, the ADB was informed of the possible negative consequences that would arise if the project was implemented in its existing shape. In that letter ADAB pointed out the following points :-

1. An Independent Multi-dimensional Committee was formed for the purpose of conducting an impartial comparative study of the original Khulna Jessore Drainage Rehabilitation Project prepared by the Water Development Board and the alternative concept proposals submitted by the NGOs.
2. To actively include all the NGOs working in the area as well as their co-ordinating body ADAB, in all phases of the project from its conception to the last stage of implementation in accordance with the principles of the ADB.
3. In accordance with the principles of the Asian Development Bank, implementation of any phase or stage of the project shall not commence before its Environmental impact assessment and Social Impact assessment is conducted.
4. All work of the KJDRP will be suspended until all the above recommendations have been fulfilled.

□ In reply to the above letter, the Asian Development Bank replied, vide its letter dated March 31, 1997, that the ADB will seriously take into consideration all the factors and recommendations brought to its notice by the NGOs and ADAB, and that a meeting will soon be called to consider the same.

□ On the basis of the above, in a meeting between ADAB and the Asian Development Bank at the ADAB central office in Dhaka, the following decisions were agreed upon on April 21, 1997.

1. A team of specialists nominated by the ADB will study the Environmental Impact of the Project. Representatives of ADAB will assist in preparing the Terms of Reference for such a study.

2. Until the above study is completed, all the works on the project will remain suspended.
  3. During this period, only the re-excavation work of Hari river will continue, and in the Bhabadaha region, the running programmes of the NGOs for mitigating the waterlogging will be coordinated with the Government work in this regard.
- In the afternoon of the same day, that is, April 21, 1997, in a tripartite meeting of ADAB, ADB and the Water Development Board of the GOB was held in the Dhaka office of the ADB for the purpose of coordination among them. In that meeting, the decisions arrived at in the morning meeting between the ADB and ADAB were placed before the WDB representatives.
  - In accordance with the decisions arrived at in the meeting, the representatives of ADAB, along with the Environmental Specialists, the Consultants of the WDB's KJDRP "Component A" and the Engineers of WDB in the project, visited the project area, the areas of possible impact and the Sundarban areas in order to perceive information for preparing the Terms of Reference for ADB's Environmental Impact Assessment, on April 23, 24 and 25, 1997. On the basis of these visits, Terms of Reference (TOR) were prepared after mutual discussions among all parties concerned.

Later, it has been reported that because the Water Development Board was not willing to agree to the proposals made by the donor ADB, the latter has suspended funding for the project.

- Immediately after the Asian Development Bank suspended funding, the Water Development Board published a Memorandum. In the memorandum, the WDB claimed that it would not be possible to mitigate or remove the water logging in the area except by means of the proposed KJDRP project.
- On the other hand, some NGOs are giving confusing statements about KJDRP and thus helping to increase the confusion. They are working against the decisions of ADAB. And their activities are strengthening the hands of the Water Development Board.

In the meantime the situation became worse in the water logged areas. WDB failed to excavate the natural drainage channels. Actually none of the



activities mentioned in the Emergency Action Plan was only not successful, the sufferings of the people increased.

- In this perspective, under the initiatives of Uttaran, a Committee was formed for Emergency Action for Removal of Waterlogging, Relief and Agricultural Rehabilitation in the Bhabadaha area. Proshika-MUK had made a grant of Taka 16,00,000.00 (Taka Sixteen lacs) to the Committee, out of which Taka 7,60,000.00 was for distributing interest-free soft loans to marginal farmers for Agricultural Rehabilitation and the remaining Taka 8,40,000.00 was for implementation of the Emergency Drainage Plan. Eight voluntary organizations commenced distributing the soft loans for Agricultural Rehabilitation and two others started clearing the channels for the Emergency Drainage Programme.
- In this connection, it may be mentioned that the Prime Minister visited the area on February 23, 1997 and on the basis of the demands of the people, instructed the concerned authorities to re-excavate the Hari river, and assured funding for the work by announcing a grant of Taka two crore. Accordingly, manual re-excavation of 8.26 kilometres of the Hari river from the Bhabadaha sluice gate by the people, and another 2.88 km downstream of that by mechanical dredging was commenced. It was hoped that, 'as a result of this work which would end in May, 1997, the people of the area would remain safe from waterlogging during the next monsoon season'. But questions were raised about the possible success of this programme. Many criticisms appeared in many newspapers and many questions were raised apprehending more disastrous waterlogging. The reasons were :-

1. The manual re-excavation work was divided into 50 parts, and the 50 groups that undertook the work did not have any co-ordination, as a result of which, the excavated depth was not uniform in the whole length.
2. Even after re-excavation, it was seen that the bed of the river was still higher than the Beels from which it would have to drain the water.
3. The earth, which had been dug out to excavate the river, has been stacked on the river bank. The very first rains would bring it all back to the river-bed.
4. About 8'-0" to 10'-0" high siltation had occurred below the cross-dam. As such it was apprehended in the very beginning, as to whether the Hari river would ever become navigable even after removal of the cross dam. Later

this apprehension proved correct. Even after removal of the cross dam on July 10, 1997, the Hari river did not become navigable.

As a result of that failure of the WDB, it was being apprehended that 27 Beels including the Khuksia Beel, Katakhalai Beel, Jialdaha Beel, Karer Beel, Ashanagar etc. would remain water-logged. The catchment area of these 27 beels amount to 39,557 acres in which 47 villages are situated. The water from these 27 beels used to flow down through the Dyerkhali sluice Gate, but as a result of the siltation of the Hari river bed up to a height of 6'-7', this drainage route became closed. As a result, all these 27 beels and their adjacent villages are certain to be affected by waterlogging.

- It had happened at last and water-logging situation had become worse .
- From the last week of November, 1997, when the sufferings of the people increased, Uttaran, along with 12 other NGOs working in the area then prepared an Emergency Drainage Plan for the area in consultation with the affected people of the area. In order to understand the needs of the people and to alleviate their distress, ADAB had constituted a Task Force comprising representatives from National and International NGOs. On October 9, 1997, the members of the Task Force visited the affected areas. The Task Force then prepared a Report on the basis of this visit, and submitted it to the donor agency (ADB). PROSHIKA-MUK made a grant of TK. 22,00,000 (twenty two lacs) only to implement this project. Out of this Taka 12,00,000 (twelve lacs) was distributed among the distressed farmers as interest-free soft loan for Agricultural Rehabilitation. The remaining ten lac taka was spent on the Emergency Action Plan of the NGOs.
- For the mitigation of the distress of the people living in the water logged Bhabadaha area, the people commenced a week-long Drainage Programme from October 13, 1997. As a part of this programme, the people dismantled the Beel Bhaina embankment in Keshabpur thana on October 29, 1997, and dug a 550' channel to connect it to the river.
- Mr. Sirajul Haque of Proshika and Ashraf-ul-Alam Tutu of Uttaran attended Board of Governor's meeting of Asian Development Bank held in Geneva. Switzerland from 28th April'98 to 3rd May'98 as NGO visitors, on behalf of ADAB. They also attended different meetings of NGO representatives of different countries, distributed documents and conducted campaign on adverse effects of proposed KJDRP drainage plans.

- On 18th May'98 a meeting was held between representatives of ADB, EGIS, KJDRP, NGOs working in this region and ADAB. A detailed discussion was held on the activities of KJDRP in the meeting which had two sessions. EGIS representatives tabled a draft report in the meeting. The NGO representatives participating in the meeting expressed in their opinion, 'this report has tactfully evaded people's opinion camouflaged behind popular vocabularies'. The meeting gave a call to all concerned to pay due attention to people's expectation.
- On 23rd December, 1998, ADB formally requested ADAB and CEN for their comments on EGIS report. And in reply ADAB and CEN through a fax dated Feb 02, 1999, ventilated their opinion specifying the limitations of EGIS report.

Advocacy campaign after recommendation of EGIS:

Forced by the people's movement and relentless advocacy of the environmentally conscious NGOs led by ADAB and CEN, KJDRP authority had been constrained to change their proposed drainage plans. The consultant engineers of B component of KJDRP, formulated an all out development plan dividing the project areas in two distinct sections -

a) South-east part.

b) North-west part.

A) South-east part:

This section consists of three polders No. 25, 27 and 28. Beel Dakatia and tidal basin of the upper Sholmari river, covering 27% of the entire project area lying in this region. The implementation of the project in this region had already started since 1996-97 financial year.

The project includes construction of three large regulators, one in Ramdia with 9 vents, one in the Sholmari river with 10 vents and another in Tiabunia with 7 vents. Besides all these, construction of cross dam in the Sholmari river, dredging of the Upper Sholmari river for the last time and re-excavation of the Shalta and the Bhadra river are also included in the project component.

The people of Beel Dakatia region particularly of Dumuria thana are actively against the construction of these regulators.

A sense of apprehension has led them to oppose the project on the following grounds -

For Sholmari Regulator:

- This will permanently obstruct natural land formation process siltation within Beel Dakatia and hinder process of compensation for natural earth subsidence.



- It is said in the project documents that, water level outside regulators will be lower than maintained inside, but the reality will be just the reverse. The physical observation made at newly built regulator of Singair Beel confirms the fact that, the water draining out for only four hours a day is not enough for complete draining out of water from the project area.
- The lower Sholmari and the Salta Rivers will be silted up quickly.
- The project is absolutely dependent on dredging for prevention of riverbed siltation. This sort of attempt to maintain navigability of the Hari river, through dredging in front of the regulator completely failed previously.
- The process may be effective for a short time but not a permanent solution. Ultimately the process will prove ineffective and more areas will be engulfed by water logging.

For Tiabunia Regulator :

The faith in the new plans among the people of polder 27 is little. The people believe that the water of 27/1 polder cannot drain through the new big regulator and request that the still operational drainage system through the Upper Shomari River should be maintained. Because of the complete siltation of the Hamkura River the western part of polder 27 cannot use the existing drainage system anymore and the people want a solution for their problems. The general preference is TRM and reviving the Hamkura River; so the former drainage system can also be used again instead of the new drainage channel. The main channel costs too much loss of land as well, so generally the plans for polder 27 are objected to. Especially the people of the southern part don't want those on big main channel, the eastern part want to drain on the Upper Sholmari River and those on the western part want to revive the Hamkura River so TRM can also be possible.

If a significant part of polder 27 (especially 27/1) is drained otherwise (through the Hamkura river), main channel and regulator could be designed smaller, so that less land will be needed.

For the Hamkura River :

The people have demanded re-excavation or dredging of the river Hamkura. In this context their demands are as follows: -

- The construction of Shoilmari, Ramdia and Tiabunia regulators must be immediately stopped, and canceling the present KJDRP drainage plan in Beel Dakatia region and taking up plans based on tidal process (TRM).

- The rivers Hamkura and the Bhadra should be dredged and connected to Beel Dakatia. The mouths of the regulators of the older canals of water logged Beels along both the banks of the rivers Hamkura / Bhadra / Shoilmari / and Hari, should be opened and connected with the river for regenerating tidal process and ensuring siltation deeper in the Beel areas.
- To realize the above demands they are mobilizing mass movement.

#### North-west Part :

This section consists of the western parts of the polders 24 & 25, covering an area of 733.70 sq.km. almost 73% of the entire project area.

The rivers of this region are:

The Mukteswari - Tekka - Hari river basin : It consists of 8 large Beels such as Kedaria, Kapalia, Paira, Barunia, Khukshia, Rudagara, Madhugram and Bhaina.

The Harihar - Upper Bhadra river basin : This basin contains some small and medium sized beels such as Pajia, Patra & Baruli etc.

'According to KJDRP authority the major problem of this region is the congestion of regulators through siltation.'

#### KJDRP Proposals :

'To solve the above mentioned problem' the following alternative recommendations have been made in their reports.

#### 'A. Tidal River Management (TRM)

To allow testing of the tidal basin concept, the EIA/SIA Study, tentatively selected two basins. One tidal basin of 400 ha would be established in Kedaria beel at the upstream end of the Hari river and the other of 200 ha along the Upper Bhadra river in the Buruli-Panjia-Pathra beel, hydrologically separating the Buruli beel from the other two. This concept of small basins was confirmed through the model tests carried out by the EIA/SIA Study (section 6.3).

The Bhabadaha regulator (30 vents, 1.52 x 1.83 m) will not be removed although it will be out of operation, except in case of emergency.'

#### B. 'The Kedaria Tidal Basin (KTB)

This tidal river management option has been developed by the KJDRP. The concept of this option is very similar to the tidal basin option developed by CERP (II) (Haskoning, 1993). The main features of the proposal area:

- the establishment of a tidal basin in Kedaria beel at the upstream end of the Hari river (originally the size of the beel was taken at 1,710 ha, but during the EIA/SIA Study and the model texts, a 400 ha basin was designed, similar to the TRM option);
- a major regulator to be constructed at Kashimpur at the confluence of the Upper Bhadra and Teligati at 18.5 km of the Upper Bhadra, which will drain 31.3 thousand hectares (this regulator is a one-directional culvert equipped with 20 openings of 1.52 x 1.83 m size and a sill level at - 1.7 m PWD);
- the Bhabadaha regulator (30 vents, 1.52 x 1.83 m) will not be removed, but it will be out of operation, except in case of emergency; and
- a new regulator has to be provided in the Mukteswari River immediately upstream of the Kedaria tidal basin.

This option includes a new embankment, separating the tidal basin from the rest of the beel and acquisition of the area necessary for the purpose.'

People's opinion on Kashimpur Regulator :

KJDRP authority had proposed to build regulators on the Bhadra at Kashimpur. The local people are also against this regulator.

The regulator to be constructed at Kashimpur, will ultimately result in silting up of the southern portion of the river, with consequent ecological disaster in a vast area.

Apprehended Negative Impact of Kashimpur Regulator :

- a. New areas and human habitations will become water logged.
- b. Local system of production will crumble down. Particularly the production of vegetables, rice and other crops will be seriously affected due to scarcity of water.
- c. Disruption of water ways will threaten the existence of markets along the river banks, and will result in shrinkage of employment opportunity of the people dependent on the rivers for their livelihood.
- d. Traditional fish species will become scarce.
- e. It will create adverse impact on subsoil water level.



#### People's Resistance :

With the above perspective in view, a committee named, 'Kashimpur Regulator Construction Resistance Committee' has been formed consisting of peoples representatives, school and college teachers, NGO activists, Journalists and members of various professions of the affected areas under KJDRP Project.

#### ADB's latest position :

An ADB mission visited Dhaka from 29 August to 1<sup>st</sup> September 1999 to discuss with The Government of Bangladesh (GOB) the latest stage of implementation of the KJDRP.

Based on the feed back of the project beneficiaries and suggestions received from the stakeholders the TRM option was studied by the Bank in greater detail in terms of both technical feasibility and environmental and social impact. They found that 'TRM approach is technically feasible and attractive from social and environmental points of view'. So the Bank decided to reformulate the project, taking into account the views of stakeholders, GOB and BWDB have accepted the TRM option (according to their understanding).

#### Proposed Revised Work Plan :

The work plan will include:

In the North-west part of the project area:

- \* The development of one temporary tidal basin (Beel Kedaria), while managing, improving and closing the existing basin in Beel Bhaina (which is reaching the end of its useful life).

In the South-east part of the project area:

- \* Ramdia and Shomari Regulators will be completed.

The proposed work plan will not include provision for –

- \* Kashimpur regulator will not be constructed at present but could be considered after TRM has been properly tested, now construction of seasonal cross dam will be introduced.
- \* Tiabunia regulators will not be constructed for drainage of polders 27/1 and 27/2, existing sluices at Magurkhali & Khaira will be rehabilitated.

#### Present Status

According to the original plan of the KJDRP, the time limit for the program (1993-99) has already expired on 31st December, 1999.

The ADB has concluded an agreement with the GOB for extending the period. At present the work is at a stand-still; work will resume after disbursement of funds.

The NGOs and people's organizations are conducting advocacy campaigns to create awareness among the people and to organize them for implementing the Alternative People's Plan based on TRM.

The people believe that the situation has improved after acceptance of the Tidal Basin design.

Now the focal point of the Advocacy is to organise the people in favour of the Tidal Basin concept and to ensure the participation of the people in the decision making process at all stages.

Lessons learnt: People break the barriers

A number of lessons can be learnt from this Advocacy progress.

- Mere economic considerations (such as, for example, enhanced production of High Yielding varieties of Rice) should not encourage policy makers to adopt structural development projects, totally ignoring long-term environmental consequences.
- In the highly sensitive and fragile environment of the Southwest Coastal region of Bangladesh, where the lives and livelihoods of the vast majority of the people depend to a large extent on the sustainability of the ecology, traditional wisdom and experience of the people must never be ignored. Policy makers should not be misguided by the so-called "highly educated experts" who are, at best, mere mercenaries. In matters of problem identification, design and implementation, full play must be given to decentralization of the society, economy and polity in order to avoid the pitfalls that have already fallen on the region.
- Previously the government undertook the coastal embankment project without taking into consideration its environmental impacts, as a result of which a whole range of economic disasters such as waterlogging and siltation of river has enveloped the region which has, in turn, brought about sufferings of unprecedented magnitude to the people, the concerned authorities have tried to find solutions to those problems based on the same rigid perspectives and failed time and again.
- On the other hand, the people, on the basis of their traditional wisdom and practical experience, have devised effective eco-technological strategies to successfully deal with the situation.

- In any rural scenario, and especially in such a highly sensitive region as this, there is a strong linkage between the state of the environment and development. Short-term economic returns cannot compensate for a damaged environment. The people of the region have been contending with the forces of nature for generation after generation and they know best what is good for them. So due respect may be paid to their views and perceptions.
- The NGOs, if they are to serve the people and implement development activities, must be environmentally conscious. People's development cannot be achieved by ignoring environmental issues and implementing development projects in a copy-cat manner. Such a perspective will be like filling water in a leaky bucket.
- The principal lesson learnt from the experience of this advocacy campaign is that NGOs working the region must develop empathy with of the people and adopt the perspective of the people as their own, then it will be possible to alter the points of view of high level policy makers.



## SECTION-9

### 9.0 Conclusion and Recommendations

The abstract of this report, reflects the fact that time has not come to say the last word about final development of the NGOs advocacy for sustainable drainage plan of KJDRP though some victory has been achieved. The reality is that the KJDRP authority though 'convinced' on the TRM concept but no full scale investigation and data collection work has been done on the physical, environmental and other aspects of the coastal region. The redesigned plan yet to be started and after completion of the – three years successful working of the first tidal basin, the TRM concept will be implemented on the other part of the project area (within Jessore zone).

KJDRP authorities themselves have maintained that their so far previous proposed 'drainage plan's are not based on adequate investigation. That only raised doubts about the effectiveness of the drainage plans. The drainage programmes that have so far been implemented on an emergency basis have failed to attain their desired goal on the one hand, and created new waterlogging and river siltation problems on the other. The programmes have also failed to gain people's confidence. People have themselves taken a number of measures to solve the problem of waterlogging, and have registered their angry protests against many components of KJDRP's drainage plans that have failed to bring the environmental features into consideration. These plans have only replicated the rigid methodology of the earlier coastal embankment plans, especially their attitudinal aspects, and have attempted to solve the waterlogging problems. Environment conscious local NGO's and their apex body ADAB and CEN are implementing an advocacy programme on this issue. This is such an innovative advocacy programme, that it has no equal in Bangladesh. The advocacy programme has been started from the lowest grassroots level.

As a result of the People's movement and the advocacy programme of the NGO's, the KJDRP has been compelled not only to review the proposed drainage project, but also agreed on Tidal River Management concept, at least partly, although because of wrong decisions, many obstacles have been created in the process of implementing the programme. The people of Beel Dakatia are still engaged in their movement to stop the construction of regulators on the Sholmari river and to restore tidal flow in the region.

It is imperative to properly realize the uniqueness of the coastal environment and to identify the areas where investigation and research activities can be taken up.

The region has been subjected to different kinds of environmental imbalance and natural disasters ever since the implementation of "development" projects that are clearly at odds with the region's environmental characteristics, and are ecologically unsound.

No holistic attempt at investigation and research has been made to ascertain the negative impacts of river siltation, waterlogging, salinity and other disasters on the life of the people - especially women and children - and on their economic and family lives, on education, health, and hygiene. Yet, this is a task that cannot be neglected.

We must therefore take a correct approach towards the development of the coastal region. Isolated mechanical and technological approaches that have no consideration for the environment will necessarily fail to address the uniqueness and the problems of the coastal region. Only an eco-technological approach may bring about real development of the region.

The authority, who are entrusted by the people as policy makers and governors of the country, must be adaptable on advocacy campaign. They should develop their mental makeup that 'ordinary people have the democratic right to say something about technical projects' that may profoundly affect their lives and livelihoods.

People's voice should be honored. But the reality is different and painful. NGOs' advocacy had been not only been ignored, but has been misinterpreted. They are subjected to harassment and humiliation.

Based on our discussion so far, we may draw two important conclusions:

- \* The widespread application of the objective, technological knowledge of the west is not fruitful in all cases.

- \* Development processes must ensure the involvement of the people.

Local people have been trying to take part in decision making processes. Foreign experts come and go but they have no stake in the environment in which they apply their 'superior' knowledge and skills. But the local people have. They have to stay there and survive. Any change in the environment profoundly affects local communities and the lives of the people. Therefore, if local communities have to achieve desired progress, they have to have more power in taking decisions. Abstract facts, data, and debates on different issues should be made simple, so that people can easily understand these issues, and realize their own roles in the development of their region, as well as the consequences that might follow, and what they should do in such eventualities.

All the organizations and agencies connected with the different stages of the development process have the responsibility to promote such a people-oriented approach. The ongoing advocacy campaign reflects this truth.

## 9.1 Immediate and Short Term Options

### A1. Emergency Relief

A 1.1 There are at least 1 million vulnerable people in these areas, and these households need immediate support for sanitation, drinking water, medical care and some income subsidy by food/cash for work.

A 1.2 There is a need of sensitization about the problem among the service agencies as well as other national level stakeholders.

A 1.3 Emergency relief effort need to target first to the hot spots identified in the reconnaissance survey. As people are not relief oriented, the efforts should keep the spirit up and by no means will turn them to relief oriented. Relief in "cash for work" form might be the best for to keep the spirit up and to contribute in the reduction of water level down to 1-2 ft by manual excavation of the river and gates.

### A.2 Cash for Work to de-silt the following points:

#### A 2.1 Immediate Re-excavation

There is a general consensus among the people that one of the prime need is reexcavation of 17 Km river bed of Sri-Hari-Teka-Mukteshwari Rivers before re-opening the TRM of *Beel Khuksia* . Immediately, the left 3 km river bed is very urgent need for re-excavation either by BWDB or by manual labour using cash for work.

A 2.2 Re-Excavation with Coordinated Efforts of Development and Relief Agencies After the very immediate work of re-excavation of 3 Km of Hari River, there should a massive effort to re-excavate the following gates with the cooperation of GoB and DER groups.

Upper Vodra: Nurnia Gate (4 vent), Burulia (3 vent) and Patra (4 vent) Gate, Borenga Gate (3 vent), Khozakhai (4 vent), Kashimpur (1 vent), Olipurbag Point and Verchimore Point

Lower Vodra: Bharatia Gate, Kharnia Gate Kapotakshi: Gopalpur Gate, Boga Gate, Magura Gate, Islamkathi Gate Hari-Sri-Teka-Mukteshwaeri nadi: Choera Gate (4 vent), Bharat Bhayna (1 vent), Vaena Gate in Rudughara Village (2 vent), Agorhati Gate (4 vent), Kanirshihi (3 vent) Khuksia Gate (daier gate) (8 vent), Kapalia Gate outside (3 vent), Singher gate (4 vent), Keuratala Gate (4 vent), Dahkula Gate (2 vent), Salate Gate (2 vent),



Katenga (1 vent). Salta: Charibhanga gate, Hulor Gate, Gelapdah Gate, Salta Gate, 3 No. Gate Ghangrail: Kulbaria Gate

### A.3 Livelihood Rehabilitation Support

#### A.3.1 Rehabilitation need assessment, advocacy and support

There is potential risk of huge damages of houses, schools, roads, other infrastructures, crops, livestock and poultry birds. Some crop rehabilitation incentive might be provided to the sufferer people if advocacy effort might not get result immediately after the water removal from lands. GoB also should extend their rehabilitative support to the highly vulnerable people.

### A.4 Social Audit

A.4.1 Facilitate a social audit to Water Development Boards works specially to ensure good governance of BWDB implementation transparency This is very important task to forward to any advocacy work and develop civil society dimension in the advocacy process. AAB has relative advantage to facilitate social audit and that might be an short term response to the problem in a meaningful way.

## 9.2 Mid Term (2-5 Years) Options and Strategies

The following are the recommendations, which can start now and can be implemented by 2-5 years from now.

### B.1 A comprehensive study on the problem and possible solutions

### B.2 Livelihood Security by Adopting Alternative Options

It could be a wise approach if we also take preparation for the worst case scenario. There will be continuous effort to solve the problem through emergency, advocacy and service initiatives. However, the efforts might take long time and in the mean time the whole area could be inundated by stink water. In that case livelihood security will be at risk for long time, which might cause severe humanitarian crisis in long run. Climate change impact might aggravate the situation to a worst end. There should be a parallel effort to develop alternative livelihood options resilient to water logging.

### B.3 Rehabilitation work in the light of worst-case scenario risk reduction targets

B.4 Methods of Peoples' Participation; meaning, indicators, and acceptability ActionAid Bangladesh 13

B.5 Democratization of Civil Society Platform (Pani Committee and WMA & WMF)

### **9.3 Long-Term (5-10 Years) Options and Strategies**

C.1 Advocacy for Alternative Silt Management

C.2 Strengthen Civil Society Dimensions

C.3 Mainstreaming the issues into political process

Bangladesh Water Development Board opined about political willingness and influence to their operation. There should be an strategy to mainstream the issues into political process (which exist to some extent in this area) to make sure that by no means this sufferings could be longer rather immediate agreed solutions are supported by all parties.

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# Appendix-A-1 District Demographic and Socio-Economic Information- Jessore

District fact sheet- Jessore

Indicators	Variables	Unit	Jessore	Coastal Zone	Bangladesh	Year & data source
Area/Admin unit	Area	km <sup>2</sup>	2,567	47,201	1,47,570	2001(B.B.S,2003)
	Upazila	number	8	147	507	2001(B.B.S,2003)
	Union	number	92	1,351	4,484	2001(B.B.S,2003)
	Pourashava	number	4	70	223	2001(B.B.S,2003)
	Ward	number	36	743	2,404	2001(B.B.S,2003)
	Mouza	number	1,433	14,636	67,095	2001(B.B.S,2003)
	Village	number	1,434	17,618	87,928	2001(B.B.S,2003)
Demography	Population	Lakh	24.69	350.78	1238.51	2001(B.B.S, 2003)
	Male	Lakh	12.82	179.42	638.95	2001(B.B.S, 2003)
	Female	Lakh	11.87	171.35	599.56	2001(B.B.S, 2003)
	Population density	Km2	962	743	839	2001(B.B.S, 2003)
	Sex ratio	Ratio	108.0	100:105	100:107	2001(B.B.S, 2003)
	Household size	Persons/HH	4.7	5.1	4.9	2001(B.B.S., 2003)
	Total number of household	Lack	5.21	68.49	253.07	2001(B.B.S., 2003)
	Female headed household	% of village HH	4.00	3.44	3.5	1996(B.B.S.,1999)
Physical infrastructure	Household with durable walls	% of total HH	81	47	42	1991(B.B.S,1994)
	Household with durable roof	% of total HH	60	50	54	1991(B.B.S,1994)
	Household with electricity connection	% of total HH	39	31	31	2001(B.B.S,2003)
	Primary school	number/ 10,000 person	7	7	6	2001(DoPE: 2003)
	Road density	km/km <sup>2</sup>	1.25	0.76	0.72	WB, 1996 & B.B.S.,2003



	Average area per growth center	km <sup>2</sup> /number	63	80	70	1996 (WB, 1996)
Economic	Total GDP	Crore	4,745	67,880	2,37,074	1999/2000(B.B.S,2002)
	Per capita GDP	Taka	18,588	18,198	18,269	1999/2000(B.B.S,2002)
	Active labor force (15 years+)	Thousand	1,155	17,418	53,514	1999/2000(B.B.S,2002)
	Proportion of female working for cash or kind	% (15-49)	33	26	28	2001 (NIPORT 2003)
	Agriculture labor household	% of total HH	41	33	36	1996(B.B.S,1999)
	Fisher household	% of total HH	10	14	8	1996(B.B.S,1999)
	Per capita net cultivated area	Hactare	0.08	0.06	0.07	1996(B.B.S,1999)
	Household under absolute poverty (based on DCI method)	% of HH	46	52	49	1998(B.B.S,2002)
	Household under hardcore poverty (based on DCI method)	% of HH	17	24	23	1998(B.B.S,2002)
Education	Primary enrolment rate (6-10 years)	%	98	95	97	2001(DoPE: 2003)
	Literacy rate (7 years +)	% of total population	51	51	45	2001(B.B.S,2003)
	Male	%	56	54	50	2001(B.B.S,2003)
	Female	%	46	47	41	2001(B.B.S,2003)
	Literacy rate (15 years +)	% of total population	52	57	47	2001(B.B.S,2003)
	Male	%	59	61	54	2001(B.B.S,2003)
	Female	%	45	49	41	2001(B.B.S,2003)

Health	Rural water supply (no of running tubewell)	No/person	114	111	115	2002 (DPHE, 2003)
	Access to potable safe water	% of HH	95	88	91	2001(B.B.S., 2003)
	Access to sanitation	% of HH	37	46	37	2001(B.B.S., 2003)
	Hospital bed population ratio (Govt)	Population/bed	5,479	4,637	4,276	2001(B.B.S.,2003)
	Infant mortality rate	Per 1000	84	51-68	43	2001(B.B.S.,2003)
	Under Five mortality rate	Per 1000	84	80-103	90	2000 (B.B.S & UNICEF2001)
	Severe child malnutrition	%	7	6	5	2000 (B.B.S & UNICEF2001)
	Boy	%	5	4	4	2000 (B.B.S & UNICEF2001)
	Girl	%	9	8	6	2000 (B.B.S & UNICEF2001)
	Maternal mortality rate	Per 1000	5	5	5	1998/99 (DoH 2000)
	Contraceptive prevalence rate (modern method)	%	56	41	44	2001 (NIPORT 2003)

# Appendix-A-2 District Demographic and Socio-Economic Information-Shatkhira

Indicators	Variables	Unit	Satkhira	Coastal Zone	Bangladesh	Year & data source
Area/Admin unit	Area	km <sup>2</sup>	3,858	47,201	1,47,570	2001(B.B.S,2003)
	Upazila	number	7	147	507	2001(B.B.S,2003)
	Union	number	79	1,351	4,484	2001(B.B.S,2003)
	Pourashava	number	2	70	223	2001(B.B.S,2003)
	Ward	number	18	743	2,404	2001(B.B.S,2003)
	Mouza	number	989	14,636	67,095	2001(B.B.S,2003)
	Village	number	1,436	17,618	87,928	2001(B.B.S,2003)
Demography	Population	Lakh	18.45	350.78	1238.51	2001(B.B.S, 2003)
	Male	Lakh	9.36	179.42	638.95	2001(B.B.S, 2003)
	Female	Lakh	9.09	171.35	599.56	2001(B.B.S, 2003)
	Population density	Km2	478	743	839	2001(B.B.S, 2003)
	Sex ratio	Ratio	103:100	100:105	100:107	2001(B.B.S, 2003)
	Household size	Persons/HH	4.7	5.1	4.9	2001(B.B.S., 2003)
	Total number of household	Lack	3.90	68.49	253.07	2001(B.B.S., 2003)
	Female headed household	% of village HH	4	3.44	3.5	1996(B.B.S.,1999)
Physical infrastructure	Household with durable walls	% of total HH	89	47	42	1991(B.B.S,1994)
	Household with durable roof	% of total HH	37	50	54	1991(B.B.S,1994)
	Household with electricity connection	% of total HH	18	31	31	2001(B.B.S,2003)
	Primary school	number/ 10,000 person	7	7	6	2001(DoPE: 2003)
	Road density	km/km <sup>2</sup>	0.69	0.76	0.72	WB, 1996 & B.B.S.,2003



	Average area per growth center	km <sup>2</sup> /number	102	80	70	1996 (WB, 1996)
Economic	Total GDP	Crore	3,064	67,880	2,37,074	1999/2000(B.B.S,2002)
	Per capita GDP	Taka	16,077	18,198	18,269	1999/2000(B.B.S,2002)
	Active labor force (15 years+)	Thousand	659	17,418	53,514	1999/2000(B.B.S,2002)
	Proportion of female working for cash or kind	% (15-49)	31	26	28	2001 (NIPORT 2003)
	Agriculture labor household	% of total HH	46	33	36	1996(B.B.S,1999)
	Fisher household	% of total HH	22	14	8	1996(B.B.S,1999)
	Per capita net cultivated area	Hactare	0.07	0.06	0.07	1996(B.B.S,1999)
	Household under absolute poverty (based on DCI method)	% of HH	55	52	49	1998(B.B.S,2002)
	Household under hardcore poverty (based on DCI method)	% of HH	14	24	23	1998(B.B.S,2002)
Education	Primary enrolment rate (6-10 years)	%	92	95	97	2001(DoPE: 2003)
	Literacy rate (7 years +)	% of total population	45	51	45	2001(B.B.S,2003)
	Male	%	51	54	50	2001(B.B.S,2003)
	Female	%	39	47	41	2001(B.B.S,2003)
	Literacy rate (15 years +)	% of total population	47	57	47	2001(B.B.S,2003)
	Male	%	56	61	54	2001(B.B.S,2003)
	Female	%	38	49	41	2001(B.B.S,2003)

Health	Rural water supply (no of running tubewell)	No/person	112	111	115	2002 (DPHE, 2003)
	Access to potable safe water	% of HH	84	88	91	2001(B.B.S., 2003)
	Access to sanitation	% of HH	36	46	37	2001(B.B.S., 2003)
	Hospital bed population ratio (Govt)	Population/bed	6,595	4,637	4,276	2001(B.B.S.,2003)
	Infant mortality rate	Per 1000	57	51-68	43	2001(B.B.S.,2003)
	Under Five mortality rate	Per 1000	87	80-103	90	2000 (B.B.S & UNICEF2001)
	Severe child malnutrition	%	2	6	5	2000 (B.B.S & UNICEF2001)
	Boy	%	2	4	4	2000 (B.B.S & UNICEF2001)
	Girl	%	2	8	6	2000 (B.B.S & UNICEF2001)
	Maternal mortality rate	Per 1000	5	5	5	1998/99 (DoH 2000)
	Contraceptive prevalence rate (modern method)	%	55	41	44	2001 (NIPORT 2003)

### Appendix-A-3: Village Wise Beneficiary Survey Findings

Avayanagar Upazila

Upazila	Union	Name of Village	Total house hold survey			
Avainagar			HHS	A	B	C
	Prembagh	Balia danga	276	62	08	06
		changutia	43	39	03	01
		prembagh	36	34	01	01
		Bonogram	115	107	06	02
		Jiadanga	149	147	02	00
		Magura	51	49	02	00
		<b>Total</b>	<b>470</b>	<b>438</b>	<b>22</b>	<b>10</b>
	Chalisia	Baghda	53	53	00	00
		Kuta	299	299	00	00
		Bethvita	153	108	27	18
		Bolara badh	88	82	06	00
		dumurtola	116	112	04	00
		Anda	146	132	19	01
		Cholisia	178	178	00	00
		<b>Total</b>	<b>1033</b>	<b>964</b>	<b>50</b>	<b>19</b>
	Pourasaha va	Dopadi	46	42	05	01
		Amdanga	79	41	32	06
		Sorkhula	27	21	30	02
		<b>Total</b>	<b>152</b>	<b>104</b>	<b>47</b>	<b>07</b>
	Paira	Barandi	92	92	00	00
		Chumor danga	-	-	-	-
		Digolia	154	140	14	00
		R-Para	08	07	01	00
		kalishakool	24	24	00	00
		R-Para	38	37	01	00
		kalishakool	54	54	00	00



		<b>Total</b>	<b>336</b>	<b>323</b>	<b>15</b>	<b>00</b>
	Sundali	Sundali	315	296	18	01
		Sora Danga	127	120	05	02
		Govindopur	195	146	29	20
		R-Para	128	126	02	00
		Fular Gati	182	179	02	01
		Horishpur	66	66	00	00
		Vath vila	118	113	05	00
		Rajar pur	149	128	13	08
		Rumsora	151	151	00	00
		Dopadi	87	79	03	05
		Dopa para	71	65	00	06
		Dohar mosihati	497	466	20	11
		<b>Total</b>	<b>2086</b>	<b>1935</b>	<b>97</b>	<b>54</b>
		<b>Sub-Total</b>	<b>4079</b>	<b>3764</b>	<b>235</b>	<b>90</b>

### Keshabpur Upazial

District name	Upazila name	Name of Union	Name of village	category wise Survey			
				A	B	C	Total
Jessore	Kasabpu r	Suflakhati	Crisnanagor	23	18	14	55
			Batekhola	64	32	4	100
			Hariaghob	41	35	19	115
			Naranpur	3	10	2	15
			Sarotia	217	153	62	432
			Suflakhati	44	46	9	99
			Kanaydanga	15	27	14	56
			Gridhornagor	18	29	9	56
			Arua	143	145	55	343
			Kalicharonpur	24	66	73	163

			Santola	28	34	15	77
			Moynapur	3	17	10	30
			Kaimkhala	34	17	3	54
Jessore	Ksabpur	Ksabpur	Maguradanga	38	24	9	61
			Sujapur	53	43	2	98
			Basdanga	69	47	4	120
			Baliadanga	13	23	5	51
			Khatiakhali	9	4	-	13
			Moddhokul	56	54	4	114
			Ramchandropur	15	9	-	24
			Altapol	139	236	25	400
			Mulgram	7	3	1	11
Jessore	Ksabpur	Pangia	Monohornagor	50	51	9	110
			Bagdanga	27	19	10	56
			Patharghata	94	30	4	128
			Madardanga	44	30	5	79
			Balkhati	18	4	-	22
			Sagordattakhati	17	2	-	19
			Gorvanga	3	-	-	3
			Donghata	14	-	-	14
			Panchbakaborsy	50	21	-	71
			Pangia	33	29	1	63
			Hod	66	14	1	81
			Raz bakaborsy	120	66	4	190
			Napakhati	12	7	-	19
			Kamolapur	3	1	-	4
Jessore	Ksabpur	Pourasova	Altapol	18	99	5	284
			Maddhokul	103	98	24	225
			Habapol	29	30	1	60
			Vogoti	73	22	3	98
			Ksabpur	14	14	-	28

			Bajitpur	29	21	3	53
			Sapdia	7	4	-	11
			Baliadanga	62	20	3	85
Jessore	Ksabpur	Sagordari	Sagordari	119	57	7	183
			Shakpura	43	12	-	55
			Komorpur	83	33	11	128
			Bisnupur	146	27	5	178
			Mirjapur	52	17	-	69

**Tala Upazila :**

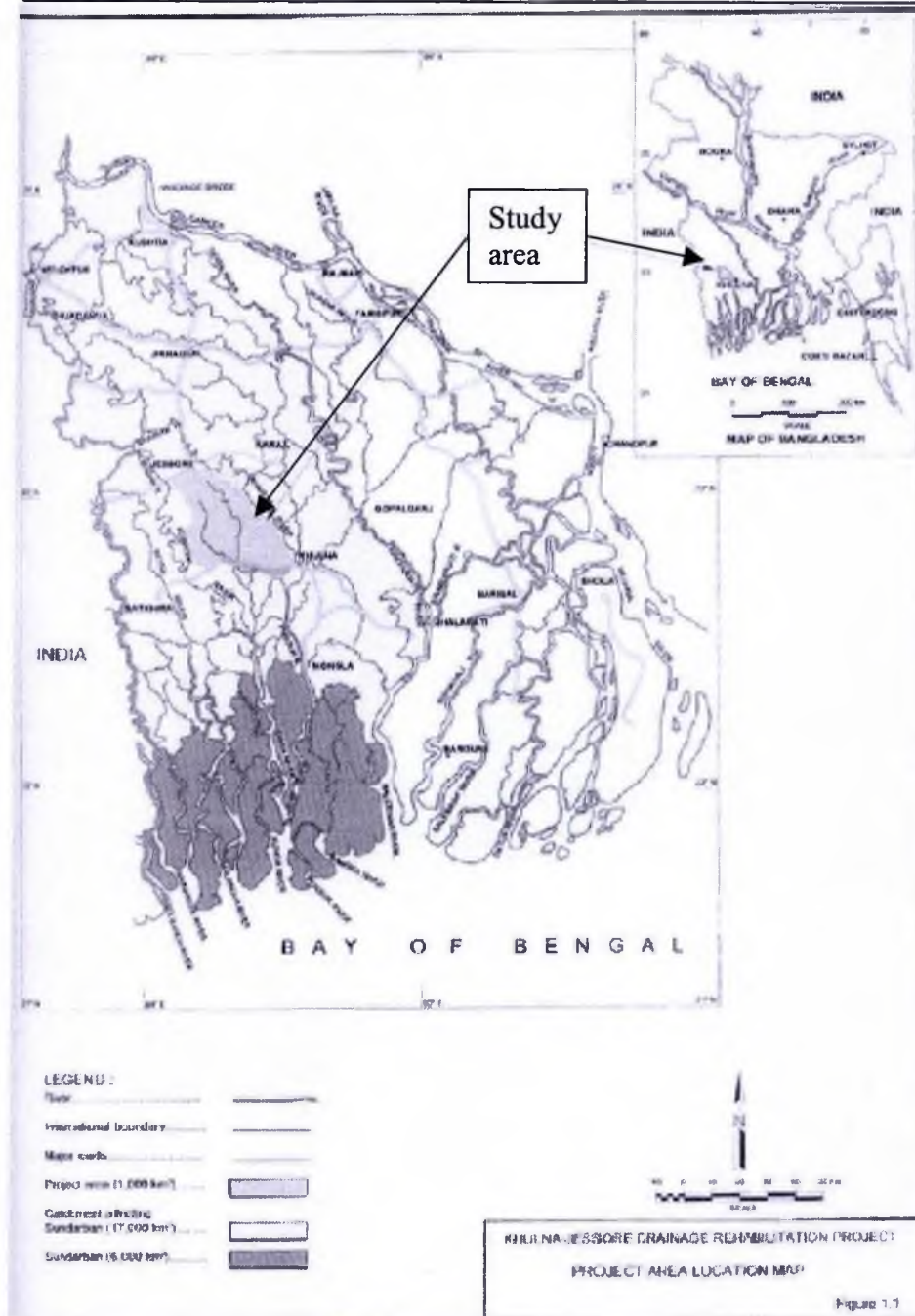
District name	Upazila name	Name of Union	Name of village	category wise Survey			
				A	B	C	Total
Jessore	Tala	Tala	Kesmot ghona	141	8	-	149
			Kharardanga	76	14	4	94
			Majheara	97	13	2	112
			Murakulia	308	24	-	332
			Khanpur	467	12	-	479
			Jatpur	184	22	-	206
			Aladepur	134	35	-	169
			Shibpur	54	4	-	58
			Shapur	94	13	-	107
			Jeala	44	23	-	67
			Jeala nalta	38	12	-	50
			Ataroy	46	31	-	77
Satkira	Tala	Kumera	Mondirkhola	20	-	-	20
			Achintola	29	-	-	29
			Gourepur	91	8	-	99
			Bokshea	26	-	-	26
			Noakhati	21	-	-	21
			Mirzapur	70	-	-	70
			Kumera	16	-	-	160
			Kaimkhola	36	-	-	36
			Vagbaho	26	4	-	30



			Sanpur	25	-	-	25
			Dadpur	40	3	1	44
			Rarepara	125	1	-	126
			Kasa	31	3	-	34
			Monohorpur	21	-	-	21
Satkhira	Tala	Islamkhati	Narayonpur	64	1	1	66
			Ghona	165	2	1	168
			Dhamsakhola	187	3	-	190
			Kharail	40	10	-	50
			Sujansha	36	-	-	36
			Islamkhati	233	-	-	233
			Vabanipur	118	16	-	134
			Gondanga	31	-	-	31
			Paikpara	35	-	-	35
			Boukola	14	-	-	14
			Barat	11	-	-	11
Satkhira	Tala	Tentulia	Somojdipur	64	-	-	64
			Panchrokey	165	-	10	175
i			Laxmonpur	174	-	-	174
			Madonpur	19	-	-	19
			Noapara	184	-	-	184
			Dhalbaria	258	-	10	268
			Hatbas	89	-	-	89
			Tentulia	101	-	21	122
			Kalapata	102	-	-	102
			Terse	8	-	-	8
			Sukdebpur	81	-	-	81
			Lytara	102	-	-	102
			Dawanepara	83	120	-	203
			Kolea	15	-	-	15
			Serasuni	395	20	19	334
			Suvaseni	98	-	-	98
Satkhira	Tala	Sarulia	Barokashepur	310	25	-	335

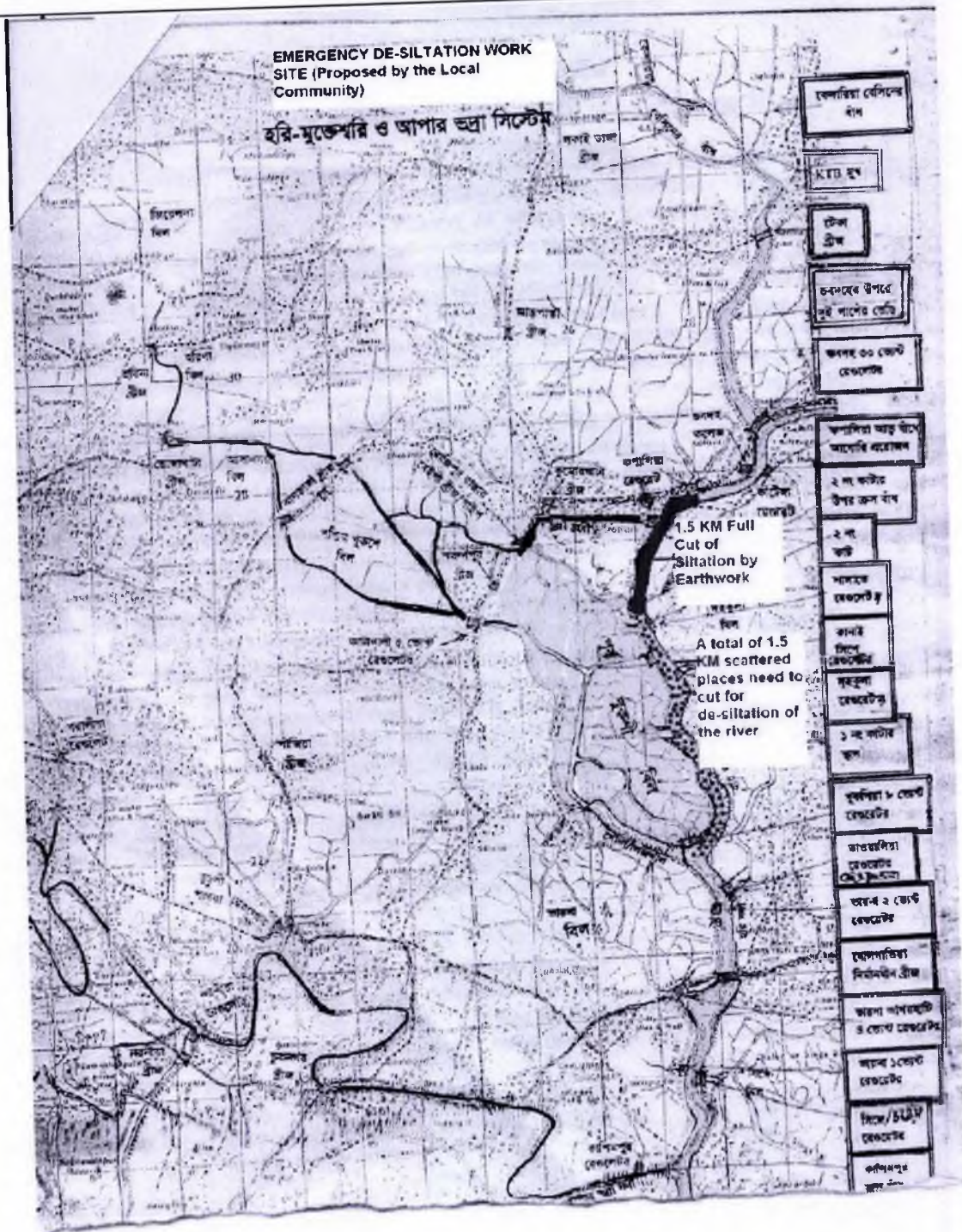
			Putiakhali	105	-	-	105
			Par kumera	25	-	-	25
			Jugipukur	105	-	-	105
			Patkelghata Brize	47	-	-	47
			Varsa	10	-	-	10
			Toulkupi	4	-	-	4
			Byguni	43	-	-	43
			Accemtola	13	-	-	13
			Sakdaho	56	-	-	56
			Jusjkhola	60	-	-	60
			Soto kashepur	68	-	-	68
			Borobila	165	-	-	165
			Sarulia	73	-	-	73
			Khordo	38	-	-	38
			Chougacha	20	-	-	20

# Appendix B-1: Location of study area

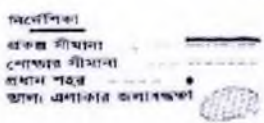




Appendix-B-2 : Location of proposed emergency de-siltation work



Appendix-B-3: Severe water logging area in south-west region





12/21





Post Graduate Program for Disaster Management

BRAC University

“Changes in livelihood pattern of inhabitants in waterlogged areas in south-west region in Bangladesh”

Appendix C-1: Questionnaire survey for beneficiary

(Only use for academic purpose)

i) Serial No . : \_\_\_\_\_

ii) Date of interview : \_\_\_\_\_

**1. Household biography :**

1.1 Interviewer name:		Sex	Age
Marital status	Education	Occupation	

1.2 Address : \_\_\_\_\_

1.3 Household information	No . of HH members			No . of dependent		
	Pattern of HH members :			Condition of house (Pacca/semi pacca/kacha)		
	Male		Female		Latrine	Yes/No
	Children		Elder		Tubewell	Yes/No
	Disable		Widow		Cow shed	Yes/No
	Relation with HH head			No . of children in school		
	Family status ( Joint /Single)					

**2. What is the main occupation and status in last 20 years**

Primary occupation	Before water logging period	Last 5 years	Current
--------------------	--------------------------------	--------------	---------

Agriculture			
Sharecropper			
Wage labourer			
Fishing			
Rickshaw puller			
Service			
Skills (carpenter, tailoring, weaving etc)			
Others			

### 3. Household land holding size

Land holding size	Before water logging period	Last 5 years	Current	About what % remain under water most time in year
No land				
0.1-0.49 dc.m				
0.5 -1.99 dc.m				
2.0-4.99 dc.m				
5.0 and above				

### 4. Damages due to flooding caused by water logging:

Damages	Flood 2000	Flood 2004	Flood 2006
Lives-Death ( no. )			
Lives-Injuries ( no. )			
Livestocks-Death ( no. )			

Livestocks-Injuries ( no . )			
Livestocks-Sold ( no . )			
House-Fully ( no . )			
House-Partially ( no . )			
Crops-Fully ( How many decmal)			
Crops-Partially ( How many decmal)			
Household assests like savings/gold/machine etc(amount)			
Trees/plants (no .)			
Left to shelter places (yes/no)			
How many days spent in shelter places ( no . of days)			
Unemploment - in case of day labours- (How many days)			
Fishing pond – Fully (amount)			
Fishing pond – Partially (amount)			
Tubewell ( yes/no)			
Latrine ( yes/no)			
Children education ( How many days/month disrupted the class)			
Health -affected by deasease (yes/no)			
Agri tools -plough/ladder etc(no .)			
Utencils ( no . of utencils)			
Homestaed vegetation (amount)			

##### 5. Changes in livelihood pattern at household level:

**Land use pattern :**



	Before water logging time	During water logging time	
		2000	2006
What type of crops you produce in your land ( paddy/ vegetable/ sugercane /wheat/ etc)			
What type of crops you produce in your homestead ( vegetable / fruits plant/ wood plant)			
What is your plan to use your land if water logging situation exist *			

- 1 . Transfer it to gher/fishing 2 . Continuing current practice 3 . Remain unused 4 . Others ( please write specifically)

#### Land price :

	Before water logging time	During water logging time	
		2000	2006
What was/ is the status of price of your homestead land ( very high rate / high rate / moderate rate/ low rate )			
What was/ is the status of price of your agriculture land ( very high rate / high rate / moderate rate/ low rate )			
What is your opinion in an average land price rate is decreasing or increasing ( Decreasing/increasing )			
Could you percentige this decreasing or increasing rate (like 10 % decreasing than before water logging situation)			

#### Occupation :

	Before water logging time	During water logging time	
		2000	2006
What was/is your main occupation / sources of income			

Have you changed your occupation (Yes/No)			
If yes, what is the job now you doing			
If yes, what is the reason for changing the occupation			
Situation of job market ( increasing/ decreasing)			

**Household food security :**

	Before water logging time	During water logging time	
		2000	2006
Main sources of food supplies to your family *			
Food availability situation in your household ( fully available / moderately available/food scarcity)			

\*1 . Own agri land . 2 . Sharecropping 3 . Market 4 . Others (please write specifically)

**Food Consumption :**

	Before water logging time	During water logging time	
		2000	2006
What are the types of main food your family consumed			
Due to water logging are there food habit changing in your family (yes/no)			
Please give example of changing of food habit ( like consumption of non food items )			

\*1 . Rice/ dal/ fish / veg . 2 . Rice /dal/ fish/meat 3 . Rice /vegetable 4 . Rice / dal 5 . Others (please write specifically)

**Migration :**

	Before water logging time	During water logging time
--	---------------------------	---------------------------

		2000	2006
How many times you have to shift your houses( Bashatvita) from one place to another			
What is the main reason for shifting			
How many times you have to migrate seasonally to other places			
What is the main reason for seasonal migration			
Have you any plan to migrate permanantly to other palces			
If yes what is the main reason for migrating permanantly			

**Public Health :**

	Before water looging time	During water logging time	
		2000	2006
Due to water logging any death case recorded in your family			
What is the causes of the death			
Due to water logging any injuries recorded in your family			
What is the causes of the injuries			
In an average how many times water borne deases recorded in your family			
What is the main reasons for this deases			

**Water and Sanitation:**

	Before water looging time	During water logging time	
		2000	2006
What is the sources of drinking water ( Tubewell/dugwell/canal/ pond etc)			



How far from you are to collect safe drinking water ( km .)			
Type of latrine you use ( Water sealed / hanging/ opened)			

### Livestocks :

	Before water logging time	During water logging time	
		2000	2006
Types of livestock you rear ( Cow / buffelov/ goat/ sheep/ chicken)			
What is the major problem related with livestock rearing			
Do you have experience to force to sell livestock ( no . )			
If yes what is the reason for selling livestock			
What do you think types of livestock are most vulnerable to water logging ( Cow / buffelov/ goat/ sheep/ chicken)			

### Housing :

	Before water logging time	During water logging time	
		2000	2006
What are the types of your houses*			
What do you think type of houses are best suitable for water logging			

1. Kacha plinth with tali roof and bamboo fence 2 . Kacha plinth with CI sheet roof and bamboo fence
3. Kacha plinth with CI sheet roof and bamboo fence 4 .Kacha plinth with CI sheet roof and fence
- 5 .Cement base plinth with tali and bamboo fence 6 . RCC plinth with CI sheet roof and bamboo fence
- 7 .RCC plinth with CI sheet roof and fence 8 . RCC plinth with tali roof and bamboo fence

**Asset mortgage:**

	Before water logging time	During water logging time	
		2000	2006
What is the status of asset mortgage in your family ( Frequently/ moderately/ rarely)			
What is the reason of assest mortgage			
What are the conditions( interest rate ) of the mortgage			

**Micro credit :**

	Before water logging time	During water logging time	
		2000	2006
What are the sources of microcredit ( NGO-MFI/ Grmeen bank/ Govt . Bank/ local money lenders/others)			
Do you engaged with any shomity or credit org . ( Yes/No)			

**Fuel/ firewood :**

	Before water logging time	During water logging time	
		2000	2006
Types of fuel you use for cooking purpose ( Gas/Jute stick/ hiter/leaves/local made cowdung/others)			
Status of avilability of fuel (Fully/ moderately/ scarecity)			

**6. Coping strategy adopted by HH: ( Multiple answer may be counted)**

Sl.	Strategy	2000	2004	2006
01	Sell household assets ( Name and no. of HH assets)			
02	Migrate temporary for seeking job ( Yse/ No)			
03	Migrate permanantly ( Yse/ No)			
04	Eliviate homestead ground above flood level ( Yse/ No)			
05	Eliviate Tube well ground above flood level ( Yse/ No)			
06	Eliviate latrine ground above flood level ( Yse/ No)			
07	Shifting shelter places ( Yse/ No)			
08	Prepare Matcha inside the house ( Yse/ No)			
09	Savings cash ( Yse/ No)			
10	Store food (rice/wheat etc) for crisis time ( Yse/ No)			
11	Store dry vegetable for crisis time ( Yse/ No)			
12	Shifting occupation temporarily ( yes/No)			
13	Sending HH members to safer places of relative houses (Yes/No)			
14	Taking less meal (Yes/No)			
15	Seeking for realief			
16	Others ( Please write specifically			



**7. Household opinion to solve the water logging problem**

Recommendation to solve the problem	Short term	Mid term	Long term

Name of the Interviewer :

Signature

## BRAC University

## Appendix C-2: Questionnaire survey for Community leader/Officials

i) Serial No . : \_\_\_\_\_

ii) Date of interview :

1.1 Interviewer name:		Sex	Age
Marital status	Education	Occupation	
1.2 Address :			

**Land use pattern :**

	Before water logging time	During water logging time	
		2000	2006
What type of crops produce in land ( paddy/ vegetable/ sugercane /wheat/ etc) in this community			

What is tendency you noticed to use land if water logging situation exist *	
---	--

- 1 . Transfer it to gher/fishing 2 . Continuing current practice 3 . Remain unused 4 . Others ( please write specifically)

**Land price :**

	Before water logging time	During water logging time	
		2000	2006
What was/ is the status of price of homestead land ( very high rate / high rate / moderate rate/ low rate )			
What was/ is the status of price of agriculture land ( very high rate / high rate / moderate rate/ low rate )			
What is your opinion in an average land price rate is decreasing or increasing ( Decreasing/increasing )			
Could you percentage this decreasing or increasing rate (like 10 % decreasing than before water logging situation)			

**Occupation :**

	Before water logging time	During water logging time	
		2000	2006



What was/is main occupation / sources of income in the community			
Situation of job market ( increasing/ decreasing)			

**Household food security :**

	Before water logging time	During water logging time	
		2000	2006
Main sources of food supplies to family in this community *			
Food availability situation in this community ( fully available / moderately available/food scarcity)			

\*1 . Own agri land . 2 . Sharecropping 3 . Market 4 . Others (please write specifically)

**Migration :**

	Before water logging time	During water logging time	
		2000	2006
What is the status of migration in your community			
How many times you have to migrate seasonally to other places			
What is the main reason for seasonal migration			

Have you any plan to migrate permanently to other places	
If yes what is the main reason for migrating permanently	

**Public Health :**

	Before water logging time	During water logging time	
		2000	2006
Due to water logging any death case recorded in your family			
What is the causes of the death			
Due to water logging any injuries recorded in your family			
What is the causes of the injuries			
In an average how many times water borne deases recorded in your family			
What is the main reasons for this deases			

**Water and Sanitation:**

	Before water logging time	During water logging time	
		2000	2006
What is the sources of drinking water ( Tubewell/dugwell/canal/pond etc)			

How far from you are to collect safe drinking water ( km . )			
Type of latrine you use ( Water sealed / hanging/ opened)			

**Livestocks :**

	Before water logging time	During water logging time	
		2000	2006
Types of livestock you rear ( Cow / buffalo/ goat/ sheep/ chicken)			
What is the major problem related with livestock rearing			
Do you have experience to force to sell livestock ( no . )			
If yes what is the reason for selling livestock			
What do you think types of livestock are most vulnerable to water logging ( Cow / buffalo/ goat/ sheep/ chicken)			

**Housing :**

	Before water logging time	During water logging time	
		2000	2006
What are the types of your houses*			



What do you think type of houses are best suitable for water logging	
--	--

1. Kacha plinth with tali roof and bamboo fence 2 . Kacha plinth with CI sheet roof and bamboo fence
3. Kacha plinth with CI sheet roof and bamboo fence 4 .Kacha plinth with CI sheet roof and fence
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**Asset mortgage:**

	Before water looging time	During water logging time	
		2000	2006
What is the status of asset mortgage in your family ( Frequently/ moderately/ rarely)			
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**Micro credit :**

	Before water looging time	During water logging time	
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What are the sources of microcredit ( NGO-MFI/ Grmeen bank/ Govt . Bank/ local money lenders/others)			
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	Before water logging time	During water logging time	
		2000	2006
Types of fuel you use for cooking purpose ( Gas/Jute stick/ hiter/leaves/local made cowdung/others)			
Status of avilability of fuel (Fully/ moderately/ scarecity)			

**3. Coping strategy adopted by HH: ( Multiple answer may be counted)**

Sl .	Strategy	2000	2004	2006
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03	Migrate permanantly ( Yse/ No)			
04	Eliviate homestead ground above flood level ( Yse/ No)			
05	Eliviate Tube well ground above flood level ( Yse/ No)			
06	Eliviate latrine ground above flood level ( Yse/ No)			
07	Shifting shelter places ( Yse/ No)			

08	Prepare Matcha inside the house ( Yse/ No)			
09	Savings cash ( Yse/ No)			
10	Store food (rice/wheat etc) for crisis time ( Yse/ No)			
11	Store dry vegetable for crisis time ( Yse/ No)			
12	Shifting occupation temporarily ( yes/No)			
13	Sending HH members to safer places of relative houses (Yes/No)			
14	Taking less meal (Yes/No)			
15	Seeking for relief			
16	Others ( Please write specifically			

**4. Community/ officials opinion to solve the water logging problem**

Recommendation to solve the problem	Short term	Mid term	Long term




Name of the Interviewer :

Signature