

**UNDERSTANDING LIVELIHOODS  
DEPENDENT ON INLAND FISHERIES  
IN BANGLADESH AND  
SOUTHEAST ASIA**  
(DFID/FMSP Project R8118)



Imperial College  
OF SCIENCE, TECHNOLOGY AND MEDICINE



**BANGLADESH  
PRA REPORT**

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## Table of contents

	Page
Executive Summary	vi-viii
<b>Chapter 1: General</b>	
1.1 Methodology	1-1
1.2 Site selection	1-1
1.3 Stakeholder definition	1-1
<b>Chapter 2: Stakeholder Livelihood Characterization</b>	
2.1 Full time fishers	2-1
2.2 Part time fishers	2-6
2.3 Subsistence fishers	2-11
2.4 Part time fishers	2-15
<b>Chapter 3: Summary of PRAs by Environment</b>	
3.1 Reservoir (Kaptai Lake ) Summary of PRA information	3-1
3.2 Oxbow Lake (Simulia Baor) - Summary of PRA information	3-3
3.3 Enhanced Beel (Hilna Beel ) Summary of PRA information	3-5
3.4 Floodplain (Suluar Beel, Narail) Summary of PRA information	3-8
3.4.1 <i>Background</i>	3-8
3.4.2 <i>Livelihoods Background</i>	3-9
3.4.3 <i>Hydrology and fishery</i>	3-12
3.4.4 <i>Human capital</i>	3-13
3.4.5 <i>Social capital</i>	3-15
3.4.6 <i>Natural Resources, Access and exploitation</i>	3-16
3.4.7 <i>Services and service providers</i>	3-20
3.4.8 <i>Vulnerability and coping strategy</i>	3-20
3.4.9 <i>Problem/constraints and opportunities</i>	3-20
3.4.10 <i>Conclusion</i>	3-22
3.5 Haor (Fainda Beel, Derai, Sunamganj) Summary of PRA information	3-24
3.5.1 <i>Overview of haor fisheries</i>	3-24
3.5.2 <i>Livelihoods Background</i>	3-28
3.5.3 <i>Capital Assets</i>	3-32
3.5.4 <i>Natural Capital</i>	3-38
3.5.5 <i>Trend in Natural Resources</i>	3-39
3.5.6 <i>Problem/Constraints and opportunities</i>	3-43
3.5.7 <i>Vulnerability and coping strategy</i>	3-45
3.6 River confluence (Manikgangj) Summary of PRA information	3-47
3.7 Estuary (Bhola) - Summary of PRA information	3-49
3.8 Sundarbans (Khulna) - Summary of PRA information	3-51

## List of Tables

	Page
Table 2.1.1 Poverty/Wealth categorization (% of the population) Full time fisher	2-2
Table 2.1.2 Human Capital Full time fisher	2-2
Table 2.1.3 Physical Capital Full time fisher	2-3
Table 2.1.4 Social Capital Full time fisher	2-3
Table 2.1.5 Financial Capital Full time fisher	2-3
Table 2.1.6 Natural Capital Full time fisher	2-3
Table 2.1.7 Trends Full time fisher	2-4
Table 2.1.8 Problems Full time fisher	2-4
Table 2.1.9 Vulnerability Full time fisher	2-5
Table 2.2.1 Poverty/Wealth categorization (% of the population) Part time fisher	2-7
Table 2.2.2 Human Capital Part time fisher	2-7
Table 2.2.3 Physical Capital Part time fisher	2-8
Table 2.2.4 Social Capital Part time fisher	2-8
Table 2.2.5 Financial Capital Part time fisher	2-8
Table 2.2.6 Natural Capital Part time fisher	2-9
Table 2.2.7 Trends Part time fisher	2-9
Table 2.2.8 Problems Part time fisher	2-10
Table 2.2.9 Vulnerability Part time fisher	2-10
Table 2.3.1 Poverty/Wealth categorization (% of the population) Subsistence fisher	2-12
Table 2.3.2 Human Capital Subsistence fisher	2-12
Table 2.3.3 Physical Capital Subsistence fisher	2-12
Table 2.3.4 Social Capital Subsistence fisher	2-13
Table 2.3.5 Financial Capital Subsistence fisher	2-13
Table 2.3.6 Natural Capital Subsistence fisher	2-13
Table 2.3.7 Trends Subsistence fisher	2-13
Table 2.3.8 Problems Subsistence fisher	2-14
Table 2.3.9 Vulnerability Subsistence fisher	2-14
Table 2.4.1 Poverty/Wealth categorization (% of the population) Fish trader	2-16
Table 2.4.2 Human Capital Fish trader	2-16
Table 2.4.3 Physical Capital Fish trader	2-16
Table 2.4.4 Social Capital Fish trader	2-17
Table 2.4.5 Financial Capital Fish trader	2-17
Table 2.4.6 Natural Capital Fish trader	2-17
Table 2.4.7 Trends Fish trader	2-18
Table 2.4.8 Problems Fish Trader	2-18
Table 2.4.9 Vulnerability Fish trader	2-18
Table 3.1.1 Reservoir Poverty/Wealth categorization (% of the population)	3-1
Table 3.1.2 Reservoir Human Capital	3-1
Table 3.1.3 Reservoir Physical Capital	3-1
Table 3.1.4 Reservoir Social Capital	3-2
Table 3.1.5 Reservoir Financial Capital	3-2
Table 3.1.6 Reservoir Natural Capital	3-2
Table 3.1.7 Reservoir Trends	3-2
Table 3.1.8 Reservoir Problems	3-2
Table 3.1.9 Reservoir Vulnerability	3-3
Table 3.2.1 Poverty/Wealth categorization (% of the population)	3-3
Table 3.2.2 Human Capital	3-3

<b>Table 3.2.3</b>	<b>Physical Capital</b>	3-3
<b>Table 3.2.4</b>	<b>Social Capital</b>	3-3
<b>Table 3.2.5</b>	<b>Financial Capital</b>	3-4
<b>Table 3.2.6</b>	<b>Natural Capital</b>	3-4
<b>Table 3.2.7</b>	<b>Trends</b>	3-4
<b>Table 3.2.8</b>	<b>Ranking of Problems</b>	3-5
<b>Table 3.2.9</b>	<b>Vulnerability</b>	3-5
<b>Table 3.3.1</b>	<b>Poverty/Wealth categorization (% of the population)</b>	3-5
<b>Table 3.3.2</b>	<b>Human Capital</b>	3-5
<b>Table 3.3.3</b>	<b>Physical Capital</b>	3-5
<b>Table 3.3.4</b>	<b>Social Capital</b>	3-6
<b>Table 3.3.5</b>	<b>Financial Capital</b>	3-6
<b>Table 3.3.6</b>	<b>Natural Capital</b>	3-6
<b>Table 3.3.7</b>	<b>Trends</b>	3-6
<b>Table 3.3.8</b>	<b>Problems</b>	3-7
<b>Table 3.3.9</b>	<b>Vulnerability</b>	3-7
<b>Table 3.4.1</b>	<b>Livelihoods pattern</b>	3-10
<b>Table 3.4.2</b>	<b>Housing and Sanitation</b>	3-14
<b>Table 3.4.3</b>	<b>Educational Institution in the study area and level of education</b>	3-15
<b>Table 3.4.4</b>	<b>Cooperation and conflict (averaged self assessment scores, out of 10)</b>	3-16
<b>Table 3.4.5</b>	<b>Changes in natural resources use and access</b>	3-17
<b>Table 3.4.6</b>	<b>Changes in rank of importance of fish species in catch</b>	3-18
<b>Table 3.4.7</b>	<b>Income sources and Income (Taka/household in 12 months 2001-2002)</b>	3-19
<b>Table 3.4.8</b>	<b>Changes in fishing gear use</b>	3-19
<b>Table 3.4.9</b>	<b>Vulnerability of households – livelihood stresses and trends</b>	3-20
<b>Table 3.4.10</b>	<b>Problems faced by the fishers</b>	3-21
<b>Table 3.4.11</b>	<b>Problem/Constraints and opportunities (scores from different stakeholder groups, most important problem has highest score)</b>	3-22
<b>Table 3.4.12</b>	<b>Overview of problems reported by PRA participants</b>	3-22
<b>Table 3.4.13</b>	<b>Example of problem analysis by stakeholders</b>	3-23
<b>Table 3.5.1</b>	<b>Types of poverty categories identified by the stakeholder</b>	3-30
<b>Table 3.5.2</b>	<b>Livelihoods Pattern (% of all income from main sources)</b>	3-31
<b>Table 3.5.3</b>	<b>Educational status of all households</b>	3-33
<b>Table 3.5.4</b>	<b>Contribution of fishing and agricultural income to the livelihoods of the people in 2001-2002</b>	3-34
<b>Table 3.5.5</b>	<b>Housing (% households owning)</b>	3-35
<b>Table 3.5.6</b>	<b>Sanitation (% households owning)</b>	3-35
<b>Table 3.5.7</b>	<b>Percentages of households under different categories having land</b>	3-36
<b>Table 3.5.8</b>	<b>Percentage of household with fishing gears</b>	3-36
<b>Table 3.5.9</b>	<b>Changes in gear use (Scores accordingly: 1=mostly used, max no = least used)</b>	3-37
<b>Table 3.5.10</b>	<b>Cooperation and conflict</b>	3-38
<b>Table 3.5.11</b>	<b>Frequency of fishing by different stakeholder category</b>	3-39
<b>Table 3.5.12</b>	<b>Changes in access to natural resources</b>	3-40
<b>Table 3.5.13</b>	<b>Changes in importance of the natural resources for different stakeholder groups</b>	3-41
<b>Table 3.5.14</b>	<b>Changes in Fish Species significance/importance to stakeholders (average over stakeholders)</b>	3-42
<b>Table 3.5.15</b>	<b>Main problems faced by the different stakeholder groups (consolidated)</b>	3-43
<b>Table 3.5.16</b>	<b>Vulnerability</b>	3-45
<b>Table 3.6.1</b>	<b>Poverty/Wealth categorization (% of the population)</b>	3-47
<b>Table 3.6.2</b>	<b>Human Capital</b>	3-47

<b>Table 3.6.3</b>	<b>Physical Capital</b>	3-47
<b>Table 3.6.4</b>	<b>Social Capital</b>	3-47
<b>Table 3.6.5</b>	<b>Financial Capital</b>	3-48
<b>Table 3.6.6</b>	<b>Natural Capital</b>	3-48
<b>Table 3.6.7</b>	<b>Trends</b>	3-48
<b>Table 3.6.8</b>	<b>Problems</b>	3-48
<b>Table 3.6.9</b>	<b>Vulnerability</b>	3-49
<b>Table 3.7.1</b>	<b>Poverty/Wealth categorization (% of the population)</b>	3-49
<b>Table 3.7.2</b>	<b>Human Capital</b>	3-49
<b>Table 3.7.3</b>	<b>Physical Capital</b>	3-50
<b>Table 3.7.4</b>	<b>Social Capital</b>	3-50
<b>Table 3.7.5</b>	<b>Financial Capital</b>	3-50
<b>Table 3.7.6</b>	<b>Natural Capital</b>	3-50
<b>Table 3.7.7</b>	<b>Trends</b>	3-50
<b>Table 3.7.8</b>	<b>Problems</b>	3-50
<b>Table 3.7.9</b>	<b>Vulnerability</b>	3-51
<b>Table 3.8.1</b>	<b>Poverty/Wealth categorization (% of the population)</b>	3-51
<b>Table 3.8.2</b>	<b>Human Capital</b>	3-51
<b>Table 3.8.3</b>	<b>Physical Capital</b>	3-51
<b>Table 3.8.4</b>	<b>Social Capital</b>	3-52
<b>Table 3.8.5</b>	<b>Financial Capital</b>	3-52
<b>Table 3.8.6</b>	<b>Natural Capital</b>	3-52
<b>Table 3.8.7</b>	<b>Trends</b>	3-53
<b>Table 3.8.8</b>	<b>Problems</b>	3-53
<b>Table 3.8.9</b>	<b>Vulnerability</b>	3-53

## List of Figures

	Page	
<b>Figure 1.1</b>	<b>Locations of PRA sites in Bangladesh</b>	1-2
<b>Figure 3.1</b>	<b>1 Floodplain PRA wealth categories</b>	3-9
<b>Figure 3.2</b>	<b>Livelihoods Pattern of all stakeholders (% income from main sources)</b>	3-10
<b>Figure 3.3</b>	<b>Seasonal activity calendar</b>	3-11
<b>Figure 3.4</b>	<b>Hydrology and fishing activities</b>	3-13
<b>Figure 3.5</b>	<b>Seasonal disease calendar</b>	3-14
<b>Figure 3.6</b>	Proportions of households by wealth category	3-30
<b>Figure 3.7</b>	<b>Seasonal activity calendar</b>	3-32
<b>Figure 3.8</b>	Seasonal disease calendar	3-33
<b>Figure 3.9</b>	<b>Hydrology and fishing activities</b>	3-39

## **Executive Summary**

In order to understand the livelihood strategies, asset patterns, level of dependence on fisheries and aquatic resources, recent trends, vulnerabilities, their problems and priorities, different fisheries stakeholders in representative environments took part in focus group discussions and Participatory Rural Appraisal (PRA) exercises. In each case separate meetings were held with people from one class of stakeholder. Here due to space constraints in some tables we focus on the most important stakeholder categories and environments that are common to the four countries in the study: full-time fishers, subsistence fishers and fish traders in main river, deeply flooded (haor), seasonal floodplain and reservoir environments.

Each stakeholder type is not in itself homogenous, typically the participants in each PRA group categorised themselves into three wealth levels according to their assets, food security, diversity of income and indebtedness (Table a). As can be seen most of the people using and to a greater or lesser extent dependent on fisheries and aquatic resources categorise themselves as poor to very poor.

Each stakeholder category depends on fishing to a different extent, but all have to some extent diversified livelihood strategies based on several income sources as shown in Table b (and also make use of other aquatic resources for own use).

The endowments of assets currently held by the various stakeholder categories are generally low irrespective of environment. For example, full time fishers generally have low literacy and poor health, modest housing, have few organisations and networks outside of their own communities, no savings and limited access to credit. Their access to fisheries depends on the existence of leasing, but in any case their fishing incomes are strongly seasonal.

In the PRAs the participants undertook a more detailed analysis of natural resource use and trends. This revealed that a wide range of natural resources are used – not just fish but also aquatic plants, and of course water and land remain the basis for livelihoods in these wetland areas. Table c illustrates the key resources used by haor inhabitants, and changes in access and significance for livelihoods. It is notable that although they reported declining fish catches, for example, that their significance for livelihoods has increased – more people depend for a greater share of their income on fishing and prices have risen. The same is true for other resources with higher ranks now compared with 20 years earlier.

The vulnerabilities of poor people using aquatic resources vary between environments in terms of the lean seasons for fishing income and also factors such as natural hazards – with erosion a problem in the main rivers, and cyclones in the coastal zone. But they are also common in the sense that a majority of the people dependent on inland fisheries have no savings and so rely on selling their labour, mortgaging whatever they have, taking credit from moneylenders and traders, migrating, and simply eating less when they face a crisis. For subsistence fishers the fishery and wetland resources themselves are to some extent a safety net when there is little labouring work.

**Table a Wealth Category of Different Fisheries Stakeholders.**

Stakeholder Type	Wealth Category with percentage	Criteria/wealth
Full time Fishers	1. Very poor; >50%	Landless, some have no homestead land or house. Some have small gear, some catch fish on share basis or as labours. Live hand to mouth, in debt
	2. Poor; 20%	Have homestead land no agricultural land. Have gear but no boat. No savings
	3. Average 20%	Have some agricultural Land, own gear, break even
	4. Better off; <10%	Have agricultural land, food surplus. Have fishing gear and boats. Have savings.
Part time Fishers	1. Poor; 50– 70%	Some have no homestead or agricultural land (live on others' /khas land). Have gear, some fish on share basis as labourers
	2. Moderately poor; 25 – 30%	Have some agricultural land, homestead, house Have poultry and livestock, have gear but no boat. Have diversified source of income
	3. Better of; 10 - 25%	Have agricultural land, boats & nets
Subsistence Fishers	1. Very Poor; 15 – 50%	Landless, most of them have no homestead land Most depend also on labour, rickshaw, poultry, share cropping
	2. Poor; 25 – 50%	They do not have agricultural land, Mostly labour
	3. Moderately poor; 15-20%	Have some agricultural land but income is insufficient, no savings
	4. Rich; 10 – 15%	Have agricultural land and business, some have government job
Fish Trader Small Retailers	1. Very poor; 30 – 80%	Most do not have homestead land Live on others' land or khas land, some have no houses
	2. Poor; 30 – 50%	They some homestead land and houses. They can maintain family some how Depend on others for running business
	3. Better off; 10 – 20%	Some have agricultural land (<1acre). Have capital to run business
Fish Trader Aratdar	1. Poor ; 25%	Have some agricultural land, livestock, and house. Mainly depend on loan to run business. 10-15 fishers attached with one's Arat.
	2. Moderately Poor; 50%	Have some agricultural land and house Dependent on credit to run business. 15-20 fishers attached.
	3. Better off; 50%	Have agricultural land, good houses and sufficient capital to run business. 20-30 fishers attached.
Fish Fry Catchers	1. Poor; 20%	Work as labour fry catcher, do not home agricultural land, depend on other.
	2. Moderately Poor; 50%	Have agricultural land, house and net and boat. Have other source of income
	3. Better off; 30%	Sufficient agricultural land, some of them are educated. Have net and boat to catch fry, and pond for nursery.
Fish Worker	1. Very poor	Most have no homestead land and house, live on others' land
	2. Poor	Have homestead land and house, some have small amount of agricultural land. Have other source of income like poultry.

**Table b Livelihood Strategies of Different Stakeholder**

Stakeholder Type	Sources of Income	
	Main sources	Other sources
Full time Fisher	Fishing 70-95%	Agri, poultry business, wage labour poultry rearing shrimp fry collection, shrimp farmer 5-25%
Part time Fisher	Fishing 25 – 60%	Agri, wage labour, 15 – 50%
Subsistence Fishers	Agri - 50 – 80%	Poultry, business, Fishing, Wage labour, Shrimp fry collection 20 – 50%
Fish Traders	Fish trader 95%	Agri, livestock, poultry 10 – 20%
Fish Fry Catcher	Fry Catch .70	Agri, live stock 10 – 20%
Fry Raisers	Fry rearing & selling 60%	Fish farming, Agri 40%



Fish workers	Fish labour 25 – 80%	Agri, Fishing, Livestock, poultry 20 – 75%
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**Table c Example of user analysis of natural resource status and contribution to livelihoods from Haor PRA consolidated over stakeholders.**

Type	Use	Access status (now)	Rank now	Access status (20 years ago )	Rank 20 yrs ago
Water	Irrigation, Bathing, Drinking, Household use, Water transport, Fish culture	No restriction to use water for irrigation, There is restriction for fish culture	10	No restriction	10
Fish	Eat, Sell/income	Restriction on fishing	10	less restriction	5
Tree	Rest underneath, Furniture making, Fuel, Boat making, Sell/ income, Eat fruit	No forest on public land. Restriction to cut trees from others' land, Restriction to eat fruits from others' trees, No restriction to cut trees from own land	10	Could collect fire wood, there were forests	6
Land	Agriculture/grow crop, Prevent flood, Road construction, Homestead work, Pottery (clay),	Less land available for agriculture, No restriction to road construction, Restriction to use khas land, Restriction to use others' land, No restriction in using own land	10	Less restriction in agriculture, No restriction on use of khas land,	10
Water hyacinth	Cattle feed, fuel, Compost	No restriction but less available, now used as compost	3	No restriction, plenty available, only used as cattle feed	2
Grass	Cattle feed, fuel, Sale/ income, house making	No restriction, less available as fallow land is restricted, less cattle	2	No restriction, grass available	2
Lily/ lotus	Food, cattle feed, Sale/ income	No restriction, less available but poor people sell	3	No restriction, only for food	1
Cane/ string	House/ mattress making, Sale/ income	Restriction	1	No restriction	1
Hogla plant	House/ mat making, Fuel	No restriction, less available, more competition for collection, can sell each mat at the rate of Tk. 25-35	1	No restriction, plenty available, only used for personal use	1
Birds	Food, Sale/ income	No restriction, now for sale	1	No restriction, only for food	1
Black soil	Fuel	No restriction	3	Was not available /people did not use	2
Arraila/ Chaila grass	Homestead fencing, fuel, livestock feed, protect homestead from erosion	Restricted, less available	6	No restriction, plenty available	0

Note: rank is importance for livelihoods out of maximum of 10 for each resource (Averaged over all stakeholders)

## 1 General

### 1.1 Methodology

The method adopted was to undertake participatory assessments of livelihood strategies with each stakeholder group separately using typical PRA tools including seasonal charts, rankings and matrices and focus group discussions. In two locations the PRAs were linked with CBFM project activities and were undertaken by experienced WorldFish Center staff. In the seasonal floodplain it formed part of participatory action plan development (PAPD) which elaborated much further the possible solutions to problems identified. In this case there was already a census of households and random samples from each stakeholder category were invited to the workshop. In the haor site it was a first stage in working with the community to then be covered under CBFM-SSEA project again households were invited to the focus group discussions based on a census of households. We thank our NGO partners in these two sites – Banchte Sheka and ERA – for their help in making arrangements. The remaining PRAs were undertaken by BCAS staff and there were no census or planned project activities in any of these areas, so the focus groups were more opportunistic and depended on locating suitable villages with the help of DOF staff and local informants, and then inviting a small group of respondents to gather for the discussion.

### 1.2 Site selection

Through discussion in the planning workshop and characterisation of the fishery environments of Bangladesh, the following sites were selected for the PRAs (fisheries environment and sites covered):

1. Reservoir (Kaptai Lake)
2. Oxbow lake (Simulia Baor, Jessore)
3. Enhanced (stocked) Beel (Hilna Beel)
4. Seasonal floodplain (Sular, Narail)
5. Haor (Derai, Sunamganj)
6. Main River (Jamuna confluence)
7. Estuary (Bhola)
8. Sundarbans (Khulna)

Their locations are shown in Fig. 1.1. The choices were intended to reflect the geographical spread of fisheries in Bangladesh, key environments in the most typical regions, and to include at least two sites with enhanced inland fisheries (oxbow lake and stocked beel, in fact the reservoir site – the only one in the country also is stocked).

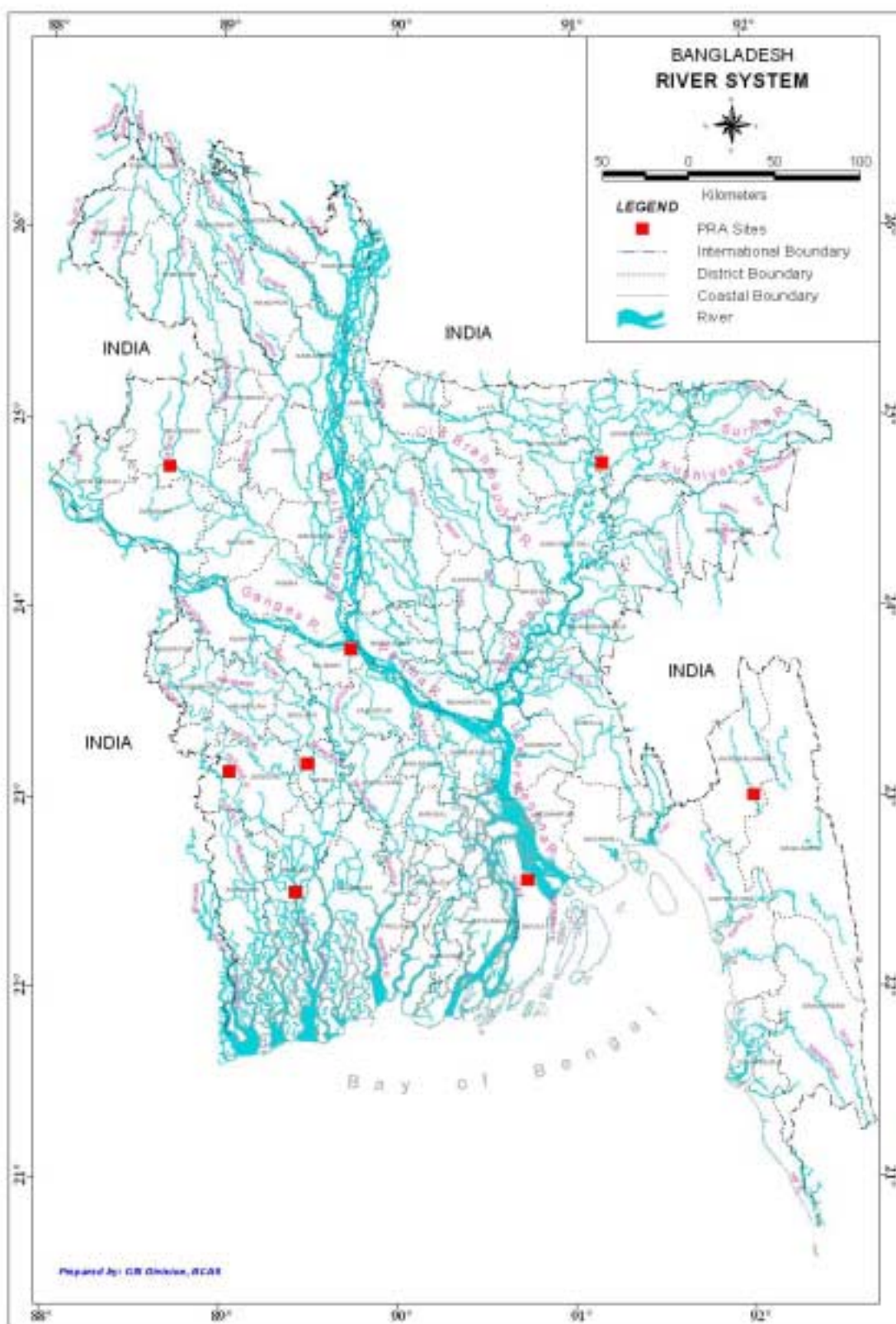
### 1.3 Stakeholder definition

The following fisheries stakeholders were identified and focus groups were arranged for those present in each site (\* indicates a category covered in all sites).

1. Full-time fishers\*
2. Part-time fishers
3. Subsistence fishers\*
4. Ditch (kua) owners
5. Fish/shrimp fry collectors
6. Fish fry producer
7. Fish traders (aratdars and retailers)\*
8. Fishery workers
9. Poor women

## 10. Fishing gear maker

Fig. 1.1 Locations of PRA sites in Bangladesh.



## **2 Stakeholder Livelihood Characterization**

The following profiles of livelihoods strategies, assets and trends are a summary for each of the main stakeholder groups. They are supported by sets of tables, each set makes comparisons across environments.

### **2.1 Full time fishers**

The majority of full time fishers categorise themselves as very poor – typically having no agricultural land, and in many cases neither owning the homestead land they live on nor the fishing gear that they use. Hence they are highly dependent on others – on better off members of the fishing community (who comprise no more than 10% of full time fishers) and on fishing financiers such as leaseholders, moneylenders, and large traders.

Full time fishers of course in many cases have inherited their occupation and have substantial knowledge about the resource and how best to fish. They can also access information through the mass media, but hardly any have benefited from specific skill training and literacy and health are poor.

Physical assets reflect those of the wider community – which vary between case studies, but sanitation is poor across all environments and gear ownership varies – towards the coast in the estuarine and sundarbans areas most full time fishers do now own the gears they use (which tend to be larger and higher valued than those used in some environments).

Social capital appears very varied according to the fisher community, in most cases fishers report good cooperation within their communities and resolve conflicts internally through traditional means. There are few formal organizations, and in the floodplain case study low trust among a range of villages with people who farm and fish.

NGOs are making a difference in access to credit for fishers, although some are still dependent on moneylenders and arotdars (wholesale consolidator traders). Very few have savings.

Access to fishing grounds is a key livelihood issue for full time fishers, in the river-estuarine-mangrove areas access is reported to be open, in the other environments leasing and licensing restrict access to those who pay, and in the floodplain landowners now make some restrictions on fishing. The seasonality of peak fishing times varies greatly between environment, and in some cases traditional fishers make seasonal migrations to take advantage of this.

There was almost universal agreement among fishers that catches were declining, in several environments species diversity was also reported to have fallen in the last 20 years. Only in the deeply flooded haor area does the environment appear to be more stable, and fish are increasing in their importance in fisher livelihoods.

Despite the trend reported in fish catches, this was the top ranking problem reported only in the floodplain site. Common problems reported include lack of capital and gear, poor communications (roads), fears over the safety of drinking water and dependence on untrusted sources, insecurity (robbery), and in the inland beel-floodplain systems siltation of rivers, canals and beels.

Crisis times reported are a mixture of natural hazards and seasonal problems due to poor fishing or bans on fishing. Dependence on moneylenders for credit in crisis times is high and fishers also mortgage what little physical assets they have.

**Table 2.1.1 Poverty/Wealth categorization (% of the population) Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Very poor	75% - food shortages	No gear or home-stead	37%	60% - no agricultural land; no loan, fully depend on fishery; day labourer during lean period	70% - no agric land, in debt, must buy rice all year	50%, dependent on others, no land, squatters, no gear, VGD card holder, food shortages throughout the year	No gear or agri land, food insecure	75% - no gear, no homestead
Poor		Gear but low income	26%		20% - have some agric land, better tin roofed house, no food shortage	30%, few have fishing gear, no agricultural land, live on physical labour, shortage of food	No net or agri land	20% - some gear, no savings, homestead
Average	20% - good earning but in debt, occasional shortage	-	37%	30% - have some agric land, no outstanding loan, main income from agriculture and petty trade		20%, have some agric land, have fishing gears		5% - homestead, tin roof, gear
Better off	5% - own gear, self reliant, no shortage	Own gear, Agri land	0	10% - good salaried job, remittances, have more than 7 acres of agric land and kuas	10% - food surplus, lease in beels, big houses, diverse income, remittances		Own gear and agri land, food secure	

**Table 2.1.2 Human Capital Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Health	Poor	Good	Poor	Ill	Ill	Ill	Good	Ill
Literacy	10% (children)	No	10%	40%	30%	10%	10%	Illiterate
Fishery skill	Traditional	Yes	Yes	yes	Yes	Yes		DOF conservation training
Skill training		No	No		No	Fish cultivation	None	
Access to information			Radio, GO and NGO		Radio, neighbours	Radio, television	UFO (DOF)	Radio, TV, markets, NGOs, GO

**Table 2.1.3 Physical Capital Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Housing	Mixed	Mixed	Straw	Tin roofs	mixed	90%- Kuccha	Kutchra	Poor
Road	None, use river/lake		Kuccha	Yes	No	Kuccha	Good-poor, school, NGOs	pucca surfaced road link to market; school, temple
Sanitation		No	Poor	Poor	poor	Open latrine	None	No
Gear/Boat		Most	80%	100% have smaller gear	100% have boat and gear	50% owns gear, 20% have boat	10% own boat, 40% own nets	50% nets, no boats
Infrastructure		Katcha, primary school, madrasha, mosque						

**Table 2.1.4 Social Capital Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Cooperatives			Yes	Some NGO	No	Yes		One, many NGOs
Association			Yes	No	no			Hindu samaj
Conflict resolution	Among themselves		Leader of the fisher community	Village court	Village court		Among themselves	
Samaj				Yes		Yes		
Cooperation	High within themselves and with GO		High within themselves and with GO and NGO	Low trust	Conflicts with non-fishers	Good	High within themselves	

**Table 2.1.5 Financial Capital Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Credit	NGO, moneylender	Money-lenders, banks, NGOs	NGO, Arottdar, moneylender	Some NGO		Informal credit from Araotdar at high interest rate	moneylender	Easy
Savings			NGO members	No	no	None	Some have	Few

**Table 2.1.6 Natural Capital Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Land Ownership	Homestead	Little	Homestead	None	none	25% have agric land	Some	75% homestead
Fishing access	Limited – if pay license and government prevents fishing in some months	Only samity members	Limited	Open but landowners limit	Leaseholder limits	Open access	River is open	Open in river, some bribes
High Water level	Aug-Sept	Sept-Oct	September	Jul-Oct	Jul-Aug	July-August		
High Fish catch/availability	Jul-Sept		Dec-Mar	Nov-Dec	May-Jul	September-October	Apr-May, Aug	Nov-Apr
Fish consumption			February-March	Sep-Dec (3 times/day)	May-Oct (3 times/day)			

**Table 2.1.7 Trends Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Fish resources	Declining, lost some native fishes	20 years ago open access, last 15 years restricted, decline in no. of species	Declining	Declining	Increased importance	Declined 50%	Declining	Declining last 15 years, fewer species
Trees			Declining	Stable	Stable (few)			Declining – saline waterlogging
Aquatic plants			Declining	Increased importance	Stable	Declined		
Grasses			Declining	Available but livestock less	Stable			

**Table 2.1.8 Problems Full time fisher**

Rank	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
1	Hill erosion	Homestead	Lack of educational institute	Fish declined	Roads	Lack of capital for purchasing fishing gear	Capital	Lack of gear
2	Crime e.g. kidnapping	Roads	Lack of safe drinking water	Fish recruitment declined	Lack of fuel wood and livestock feed	Fish declined	Fish decreased	River bank erosion
3	Capital	Fish decline	Beel dries up in dry season	Roads	Fishing by dewatering beels	Lack of homestead land and houses	Drinking water	Robbery
4	Hygiene	Fish disease		Canal silted up	Access to fishery	Robbery when fishing	No ice plant	Fish declined
5	Drinking water	Capital		Lack of electricity	Siltation of river and canal			No other jobs
6	Health care	Sanitation		Drinking water (arsenic)	Drinking water			
7		Drinking water		Water pollution in beel	Poaching of fish			
8		Healthcare			Water pollution			
9		Employment			Lack of industries			
10		Electricity			Problem of fish movement			



**Table 2.1.9 Vulnerability Full time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Vulnerability	Dec-Jan, May-Jul no income as – BFDC bans fishing	Jun-Sept & Feb-Mar	Lack of opportunity for work resulting low income	Embankment, Drought, Storm, Hail storm, Diarrhea	Flood, Cholera, Paddy disease, Cyclone, Hail, fish disease	Low income in April, July and August due to less availability of fish	Oct-Mar	Cyclone, erosion, seasonally Vadra, Ashin, Kartic
Coping Strategy	Loan, mortgage goods, starve	Loans – NGOs, moneylenders, mortgage valuables	Loan, purchase on credit, Reduce household expenditure, mortgage household assets			Loan from Aratdars and from other money lender of the village	Loan from moneylenders, sell assets, eat less	Loan, purchase on credit, reduce household expenditure, mortgage household assets, women work as labour

## **2.2 Part time fishers**

The majority of part time fishers categorise themselves as poor or very poor – those in areas near the coast appear to be poorer. Typically they have no agricultural land but most own their own homestead land although fishing gear ownership is limited. They mainly depend on agricultural labouring as their other source of income with some farming or if richer involved in trade.

Part time fishers vary in their fishing skills – some have inherited the occupation and are very knowledgeable. Most are illiterate and health varies by environment.

Physical assets reflect those of the wider community – which vary between case studies, but sanitation is poor across all environments. Gear ownership varies in the reservoir few of these people own their own gear, but almost all other part time fishers have their own gear – often small individual gears such as fish traps.

Social capital appears very varied according to the community. In most cases they report good cooperation within their communities and resolve conflicts internally through traditional means, in the haor area there is high cooperation through a system of voluntary labour to build bunds to protect the rice crop from early flash floods just before harvest. There are virtually no formal organizations covering these people.

NGOs are making a difference in access to credit for some part time fishers, although most are still dependent on moneylenders and arotdars (wholesale consolidator traders). More of them have savings than do part-time fishers.

Access to fishing grounds is an issue for part time fishers, in the river-estuarine-mangrove areas and floodplain access is reported to be open, in the other environments leasing and licensing restrict access to those who pay. Peak fishing times are mostly in the monsoon except in enhanced beels (dry season catching of fish as it dries up) and in the estuary – a second run of fish at the start of the monsoon.

There was almost universal agreement among part fishers that catches were declining and that larger higher values fish such as hilsa are declining faster than other species. Access in the floodplain and haor areas appears to also have fallen for part time fishers. Where asked (in most environments this was not asked) other aquatic resources have also been declining although they remain increasingly important as sources of income.

Despite fish only being a part time income source for this stakeholder category, this was the top ranking problem reported in four only environments out of seven covering floodplain-haor systems and river and mangroves. Other common problems reported include lack of public services (health, electricity, roads, etc) low returns from agriculture and environmental problems such as waterlogging and erosion.

Crisis times reported are a mixture of natural hazards and seasonal problems with the emphasis on floods and erosion. Compared with full time fishers, NGOs are more important as a source of support and credit in times of crisis, but moneylenders and migrating to find work elsewhere are also important indicating a lack of alternatives within their localities.

**Table 2.2.1 Poverty/Wealth categorization (% of the population) Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Very poor		No homestead	50%		20% - have no agric land, money, assets may not have own homestead, always deficit		60% - more dependents, no homestead land, no gear – fish on share basis	60% - homestead but many dependents, no/little gear
Poor		Some land	25%	70%, no agric land, loanee, fishing half of the time, sharecrop per	55% have little agric land, own homestead, fishing and labouring is main occupation, sometimes food shortage	75%, few have fishing gear, no agricultural land, live on physical labour, shortage of food	30% - own gear bought on credit	30% -own nets, rent boats, agri land <1 acre
Average		-		20%, some land, have tin roofed house and pond	15% - have some agric land and tin-roofed house, no food shortage	25%, have some agric land, have fishing gears		
Better off		More land, credit access	25%	10%, service, trade, diverse sources of income, influential	10% - have big bank balance, land, business, higher education, job, remittances, sell food surplus		10% - own homestead, 2-7 acres land, own gear, diverse incomes	10% - shrimp farming, av 2 acres land, own gear

**Table 2.2.2. Human Capital Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Health		Good	Poor	Poor	Poor	Healthy	Ill	Ill
Literacy		30% primary education+	10%	90% illiterate	48%	20	20%	20% illiterate
Fishery skill				Yes	Yes	Yes	High	
Skill training		No	Yes	None	None	No		
Access to information				Radio	Radio, neighbour	Radio, television		Elites, DOF, radio

**Table 2.2.3 Physical Capital Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Housing	10% tin roof	Mixed	Straw	Straw	>50% straw roof	Kuccha	Mixed	Kutchra
Road	None, use river/lake		Kuccha	Kuccha	None	Kuccha	Good-poor, school, NGOs	pucca surfaced road link to market; school, temple
Sanitation		No	Poor	Poor	Open latrine	Open latrine	Poor	
Gear/Boat	10% boat, 30% net	Most	75%	50%	100% have boat and gear	Bamboo trap, net, 100% have boat		100% nets, 25 boats
Infrastructure		Katcha, primary school, madrasa, mosque		Primary school	Embankment, school			

**Table 2.2.4 Social Capital Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Cooperatives				None	None	No		Most in NGO groups
Association				None	None			
Conflict resolution			Samaj	Local government representative	Village head and influentials		Samaj	Among themselves
Samaj			Yes	Yes	Yes	Yes	Yes	
Cooperation			High	Low	During vulnerable period build temporary embankment together	Good	High	

**Table 2.2.5 Financial Capital Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Credit		Money-lender, Bank, NGO	NGO, moneylender	Moneylender	Moneylenders	Arotdar, NGO	NGO, moneylender	Arotdars, NGO, moneylender
Savings		Some	NGO	Personal	Personal	NGO	With NGO	With NGOs

**Table 2.2.6 Natural Capital Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Land Ownership		50% own some	Homestead and Agric	10% have land	100% own agric land and homestead,	25% have agric land	Homestead and Agric	90% homestead, 10% agri land
Fishing access		Mainly not baor	Restricted, fees-300/yr	Open	Restricted during post monsoon	Open access	Open – river, improved	
High Water level		Jun-Aug	July-August	August-September	Jul-Aug	August-September	Jun-August	Jun-Sept
High Fish catch/availability			February-March	Everyday, September-December	Jul-Aug	September-October	Apr-May, Aug-Sept	Jun-Sept
Fish consumption			February-March	7 days a week November	Jun-Sept (3 times/day)	February-March	Aug-Sept	

**Table 2.2.7 Trends Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Fish resources		No access now, fewer fish species now	Declining, large fishes non-existent	Access restricted in the ditch area, 2/3 fish declined	Restricted access, very few high value fishes	Declined 50%	Declining	Declining, hilsa declined
Trees				New plantations	None in the haor			Less trees as shrimp culture, land fertility declined
Aquatic plants			Declining	Declining	Declining			
Grasses			Rare	Mostly cultivated, limited area of grasses	Area restricted due to increase in cropping area			

**Table 2.2.8 Problems Part time fisher**

Rank	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
1		Road	Lack of safe drinking	Natural fish declined	Fish decline	Fish declining	Lack of gear	Fish decreased
2		Electricity	Siltation of Hilna beel	Lack of drinking water	Trees decline	Lack of capital for purchasing fishing gear	Lack homestead	Crop yields fell
3		Health care	Unemployment	Lack of land for housing	Flood	Lack of homestead land to live in	Fish declined	River erosion
4		Cattle disease		Lack of medical services	Transport	Lack of safe drinking water	Extortion	Trees decreased
5		Fish disease		Poor sanitation	Canals, beels dry up	Lack of sanitary latrine	Education	
6		Fish decline		Communication	Unemployment			
7		Capital		Water logging	Allocation of khas land			
8		Corruption		Lack of electricity	Low crop production			
9					Birds decline			
10					Pure water			
11					Livestock decline			
12					Lack of homestead land			

**Table 2.2.9 Vulnerability Part time fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Vulnerability		Jan-Mar	Flood, Diarrhoea	Flood, hail storm, Drought	Flood 1998, flash flood from hills every year, Cholera/ Diarrhea 1992, Hail storm, Drought 1998, Fish disease every year	Bank erosion, which affect their livelihood. Some of them are now living by the sides of roads due to erosion of homestead land	Fe-Mar, Sept-Nov	Flood, cyclone, Oct-Jan seasonal crisis
Coping Strategy		Loans – NGOs, moneylenders, mortgage valuables	Loan, less food intake, migrate, mortgage	Take loan, NGO support, sell livestock, and trees, plantation,	Migration to other area for work, loan, sell household assets	loan from fish aratdar, local money lender and from NGOs.	Eat less, moneylenders, mortgage household goods	NGO/arotdar loan, migrate

## **2.3 Subsistence fishers**

The majority of subsistence fishers (about 75% whatever the environment) categorise themselves as poor or very poor. Typically they have no agricultural land and the very poor often have no own homestead land. Their main income sources are as labourers and working for others, e.g. as rickshaw pullers. The remaining subsistence fishers are very different having land, businesses, assets and other income sources. Thus both better off and poorer households have diverse livelihood sources.

Subsistence fishers vary in their fishing skills – only in some places do they include traditional fishers, illiteracy is high and health mixed. Few received skill training from NGOs.

Physical assets reflect those of the wider community – which vary between case studies, but sanitation is poor across all environments. Gear ownership varies in the Sundarbans all subsistence fishers have their own gear.

Social capital appears to be very varied according to the community – out of four sites two have good cooperation and two depend on local leaders to resolve disputes but have tensions within the community. Cooperative membership is high in some areas.

NGOs are making a difference in access to credit for most subsistence fishers and the better off ones also have access to credit through the banking sector. Formal financial institutional coverage in the haor site is poor and moneylenders dominate there and in the ox-bow lake.

Access to fishing grounds is an issue for subsistence fishers who can access rivers and canals and floodplains during the monsoon, but face restrictions by lease holders in the peak fishing season and in areas dominated by others for example shrimp farmers. Peak fishing times are mostly in the monsoon and post-monsoon depending on the environment and at these times they are able to eat fish regularly – even more than once a day.

Most subsistence fishers say their catches have declined and that larger higher values fish are disappearing. Access for subsistence fishers in the oxbow lake is now prevented by leaseholders. Other natural resources are declining in some areas, but trees were reported to be increasing in beel and floodplain sites due to private planting (homesteads).

Despite fish only being a important for subsistence (own consumption plus at best occasional sale), these households reported fish declining to be one of their top two problems in all five sites. Other common problems reported include floods, lack of public services (health, electricity, roads, etc), and fishing access (Sundarbans).

Crisis times reported are a mixture of natural hazards and health problems. This stakeholder category is heavily dependent on loans to cope in crises and on selling their few assets (livestock and trees), and on migrating to find work.

**Table 2.3.1 Poverty/Wealth categorization (% of the population) Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Very poor		-	55	20% - live on other's land, rickshaw puller, landless, destitute, poor widow	20% - have no agric land, money, assets may not have own homestead, always deficit	58%, no agric land, buy food throughout the year, work as labour rickshaw puller, always under debt		15% - wage labour, kutcha house, always in debt
Poor		No agri land, wage labour	25	50% - have ≤0.5 acre land, work for others, manage food 6 months	55% have little agric land, own homestead, fishing and labouring is main occupation, sometimes food shortage			50% - homestead, share crop, shrimp culture, diverse jobs, NGO savings
Average		Land, no savings	15	20% - < 5 acre land, power tiller, shallow machine cattle, do small service	15% - have some agric land and tin-roofed house, no food shortage	35%, have some agric land, tin-roofed house, children go to school, can manage with own food grain, some trade		
Better off		Own land, business or service	5	10% - have lots of land shop, business, car, high level service, live in the town	10% - have big bank balance, land, business, higher education, job, remittances, sell food surplus	7% - Lots of agric land, lease in beels, big house; lot of income from different sources; food surplus; in service and business		35% - agri and shrimp land 2-3 acres, service, savings, buy land

**Table 2.3.2 Human Capital Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Health		Good	Poor	Good	Poor			Ill
Literacy		15% illiterate	10%	61%	67% illiterate			40% illiterate
Fishery skill				Traditional	Traditional			
Skill training			Yes		None			NGO & GO – livestock, shrimp
Access to information			Radio, Educated people, elites, and NGO	Radio, TV	Radio, TV			GO, NGO, elites

**Table 2.3.3 Physical Capital Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Housing		Kutcha	Straw	Straw, tin	>50%-tin roof			Kutcha
Road			Kuccha	Kutcha	None			pucca surfaced road link to market; school, temple
Sanitation		No	Poor	Poor	90% open latrine			No
Gear/Boat		Yes	40%	25%	Small boats, 43% have gear			100% nets
Infrastructure		Katcha road, primary school, madrasha, mosque		Primary & secondary Schools, Union Parisad office	Primary school, no teacher			



**Table 2.3.4 Social Capital Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Cooperatives				Yes	Yes for some beels			70% NGO members
Association				None	None			
Conflict resolution			UP chairman	Village head, UP chairman	Wealthy people patronage conflict and resist unity of the poor			Local arbitrators, occasional legal case
Samaj				Yes	Yes			
Cooperation			High	Low	Low			Good between Hindu and Muslim

**Table 2.3.5 Financial Capital Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Credit		Money-lender aratdar	NGO, Agricultural Bank	NGO, Agricultural Bank	Moneylenders			Easy - Banks, NGOs
Savings		Some	NGO	NGO	Personal			Bank, NGOs

**Table 2.3.6 Natural Capital Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Land Ownership		Yes	Homestead, Agric land	Homestead	30% homestead and agric land			50% agri land
Fishing access		Beel & canal	Limited	Open during flood, restricted in post-monsoon	Restricted during high fishing period			Open in river and canal; can't fish in beel due to shrimp culture
High Water level		Sept-Oct	October	Jul-Aug	Aug-Sept			Jun-Sept
High Fish catch/availability		Jul-Oct, Feb-Mar	November-December	Sept-Dec	May-Jun			Jun-Sept
Fish consumption		Aug-Oct, Feb-Mar	November-December	Oct-Dec (twice/day)	Oct-Jan (thrice/day)			

**Table 2.3.7 Trends Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Fish resources		Baor leased to outsiders last 10 years, lost some wild fish	Declining	Declining	High value fish declined			Declining, some native fishes disappeared
Trees			Increasing	Increasing	None			Declining – saline water
Aquatic plants				Declining	Declined			
Grasses				Declining	Limited area			Lost as land no longer fallow after paddy as used for shrimp

**Table 2.3.8 Problems Subsistence fisher**

Rank	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
1		Fish decline	Flood	Fish decrease	Flood			Fish decreased
2		Roads	Fish declining	Communication	Fish decrease			Can't fish in beel all year
3		Electricity	Other natural resources declining	Livestock	Lack of pure water			Livestock
4				Pure water	Medical problem			Trees decreased
5				Trees/plants decrease	Trees decrease			
6				Electricity problem	Fishing problem			
7				Water pollution in beel	Transport			
8				Don't get fair price of agric produces	Allocation of Khas land			
9				Medical problem	Education facility			
10				Encroachment of Khas land	Lack of unity			
11					Homestead building problem			

**Table 2.3.9 Vulnerability Subsistence fisher**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary	Sundarbans
Vulnerability			Flood, drought	Flood, thunder, Storm, Excessive rain, Pneumonia, Drought, Diarrhea, Pox	Flood, Hail, Diarrhea, Delivery complicacy of pregnant women/ lack of health care, fish disease			Apr-Jun, Jan-Feb
Coping Strategy			Loan, sell trees, poultry, eat less	Loan, Sell trees and household assets, migrate	Loan, selling livestock, homestead/ land			Reduce spending, loans, mortgage assets, migrate

## **2.4 Part time fishers**

Overall fish traders are better off than the other three common categories of inland fishery stakeholders and even some of the poorest have some more assets than the poorest of fishers. However, fish traders differ greatly in their self assessed wealth rating between environments- in the reservoir, river estuary and mangrove sites they are almost all very poor or poor – being dependent on others for credit, having no agricultural land. Particularly in the haor and to some extent estuary area the traders are better off having homestead and agricultural land and their own working capital.

Fish traders report being in good health and have higher literacy than fishers, but they have not received any skill training (except in the Sundarbans site). And depend largely on the local markets for information.

Physical assets reflect those of the wider community – which vary between case studies, but sanitation is poor across all environments. Some fish traders own fishing gear (in some cases leasing to fishers).

Social capital appears to be very varied according to the environment. In the river, estuary and mangrove areas fish traders are well organised in other areas they operate independently, but only in the river do they report problems over competition among fish traders.

Fish trading requires access to funds and credit. NGOs are making a big difference in helping fish traders access credit at lower interest than before, but traders also depend on larger traders/wholesalers/assemblers (aratdars). Most have some savings. Banks are relatively unimportant for this group.

Fish traders are mostly not involved in fishing, but some report fishing by paying leaseholders, and in the haor area they were once traditional fishers but changed occupation. Fish traders tend to have good fish consumption (presumably of unsold fish) throughout the year.

Fish traders in all the environments report that fish availability/catches have been declining, and in some cases that larger species have declined more. Only in the reservoir did they report cultured species replacing wild fish in their business.

Despite the reported declines in fish catches/availability, this was rated the most important problem only in the river and Sundarban areas. The main problem reported despite access to NGO credit was access to credit. Other problems were lack of public services (health, electricity, roads, etc).

Unlike fishers, fish traders reported seasonal vulnerability and that their incomes are low during times when there are less fish available depending on the location. They have coped mainly by obtaining loans from larger traders and other sources and by mortgaging their assets each year.

**Table 2.4.1 Poverty/Wealth categorization (% of the population) Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary
Very poor	33% -more dependents, some widows, in debt	No agric land, take govt. relief	88%			50% - dependent on others, no land, squatters, no gear, VGD card holder, food shortages throughout the year	
Poor	67% - own capital, some savings	Homestead, lease agric land			20%-own homestead, credit from Aratdar, no agric land	50% - few have fishing gear, no agricultural land, live on physical labour, shortage of food	60% live on land
Average					50%-own homestead, some land, own capital		30% own land
Better off		Agric land, savings	12%		30%-Own boat, own capital		10% own capital

**Table 2.4.2 Human Capital Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary
Health	Good	Average	Good		Good	Healthy	Good
Literacy	5%	70%	40%		50%	10	20%
Fishery skill					Yes	-	
Skill training		No	No		No	No	
Access to information	Among themselves				Radio	Aratdar, fishery department	

**Table 2.4.3 Physical Capital Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary
Housing	Tin roofs	Tin roofs	Tin/concrete		Tin roof	Kuccha	20% pucca kutha
Road	None, use river/lake		Kuccha		Kuccha	Kuccha	Good-pucca school, N
Sanitation	None	No	Poor		Poor	Open latrine	Poor
Gear/Boat	Few (most sold gear)		0%		None	Fishing gear, no boat	
Infrastructure		Primary school, madrasha, mosque			Primary school, madrasha, mosque		

**Table 2.4.4 Social Capital Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River	Estuary
Cooperatives					No	Yes	
Association					No	Yes	Yes traders association
Conflict resolution	Among themselves		Samaj leader, Outsiders		Local elites		Leaders
Samaj					Yes		
Cooperation	High within themselves and with GO		Low		Low	Competition	

**Table 2.4.5 Financial Capital Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River
Credit	Easy – NGOs	Money-lenders, banks, NGOs	NGO, moneylenders		Moneylender, Aratdar	NGO, traders association, Bank, relative

Savings	Yes – samity	Most have some	NGO		Private	NGO, Bank
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**Table 2.4.6 Natural Capital Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Floodplain	Haor	River
Land Ownership	Homestead	Land (only 10%)	Homestead, Agric land		100% have homestead, 50% have land	Homestead
Fishing access	Reduced	Pay leaseholder	-		They were all fisher before, now they sell fish	-
High Water level	Jun-Oct		-		August-September	-
High Fish catch/availability	Apr-May		-		September-October, 20kg/day/person	September-October
Fish consumption	3-4 days/week		-		3-4 days a week	

**Table 2.4.7 Trends Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Haor	River
Fish resources	Declining, large wild fish replaced with stocked fish	Decreased, fewer species, lessee restricts	Declining,	Declined by 90%	Declined
Trees				100% decreased	
Aquatic plants				Seasonal, declined 50%	
Grasses				Declined, more area under cultivation less area for grazing	

**Table 2.4.8 Problems Fish Trader**

Rank	Reservoir	Oxbow lake	Enhanced Beel	Haor	River
1	No homestead land	Capital	Lack of capital	Road communication	Fish availability declining
2	Low income	Roads	Lack of safe drinking water	Lack of boat	Lack of access to institutional credit
3	Lack fuel	Health care	Lack of fuelwood	Lack of capital	Lack of good house and homestead
4	Terrorism and kidnapping	Drinking water		Lack of ice for preservation of fish	Problems in communication and transportation
5	Sanitation	corruption		Decreased supply of fish	
6	Transport				

**Table 2.4.9 Vulnerability Fish trader**

	Reservoir	Oxbow lake	Enhanced Beel	Haor	River	Estuary
Vulnerability	Low income Jul-Aug	May-Aug		Low income during dry months	Low income in February to May due to less availability of fish	River business Sept-October
Coping Strategy	Credit from arotadar, mortgage gear, eat less	Money-lenders, mortgage valuables		Other petty trade, more loan	loan from different sources, reduced food intake	Loan from NGOs

### 3 Summary of PRAs by Environment

This chapter comprises of a section for each of the environments (locations) covered by the PRAs. Each gives a summary of the findings covering poverty categorization, five dimensions of capital assets that are the basis of livelihoods – human, physical, social, financial and natural capital; trends and dependence on wetland and fishery resources, problems and vulnerabilities. The policy and institutional context have been covered in the separate country report. The original detailed information from the PRAs is available in separate annexes, but for two of the environments a detailed write up has been prepared and is included in this report – for the Narail (southwest) floodplain site and for the Sunamganj (northeast) haor site.

#### 3.1 Reservoir (Kaptai Lake ) Summary of PRA information

**Table 3.1.1 Reservoir Poverty/Wealth categorization (% of the population)**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Very poor	75% - food shortages	70% - in debt, no gear or land	80% - in deficit, no savings	3% -more dependents, some widows, in debt	
Poor			20% - other income sources, food secure, children in school	67% - own capital, some savings	30% - limited capita, no agri land
Average	20% - good earning but in debt, occasional shortage	20% - own gear, no savings			40% - some capital, no agri land
Better off	5% - own gear, self reliant, no shortage	10% - more earners, surplus, own gear, savings			30% - have capital, agri land, other income sources

**Table 3.1.2 Reservoir Human Capital**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Health	Poor	Good	Ill but free health care	Good	Good
Literacy	10% (children)	10%	5%	5%	100%
Fishery skill	Traditional				From elders
Skill training					
Access to information				Among themselves	Among themselves

**Table 3.1.3 Reservoir Physical Capital**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Housing	Mixed	10% tin roof		Tin roofs	pucca
Road	None, use river/lake				
Sanitation				None	
Gear/Boat		10% boat, 30% net		Few (most sold gear)	Stores

**Table 3.1.4 Social Capital**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Cooperatives				Fisher society, NGOs	
Association			Labour association		Own association
Conflict resolution	Among themselves		Association		
Cooperation	High within themselves and with GO	High among selves, conflict with tribal people		High	High

**Table 3.1.5 Financial Capital**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Credit	NGO, moneylender	NGO, moneylender		Easy – NGOs	NGO, bank
Savings		Few		Yes – samity	Some plus remittances

**Table 3.1.6 Natural Capital**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Land Ownership	Homestead	Homestead		Homestead	50% have 2-3 acres agri land
Fishing access	Limited – if pay license and government prevents fishing in some months	Restricted - pay fees, excluded from tribal areas, 3 month ban by BFDC		Reduced	Decreased
High Water level	Aug-Sept	Aug-Oct	Aug-Oct	Jun-Oct	Jun-Sept
High Fish catch/availability	Jul-Sept	Mar-Apr		Apr-May	
Fish consumption				3-4 days/week	3-4 days/week

**Table 3.1.7 Trends**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Fish resources	Declining, lost some native fishes	More stocked fish	Large fish disappearing since mid 1990s	Declining, large wild fish replaced with stocked fish	Declining – less large fish, more fishers
Trees					
Aquatic plants					
Grasses					

**Table 3.1.8 Problems**

Rank	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
1	Hill erosion	Fishing ban by BFDC	No fixed working hours	No homestead land	Lack capital
2	Crime e.g. kidnapping	Fish decline	Low wages	Low income	Fish decline
3	Capital	No shelter in lake	No help if accident	Lack fuel	Insecurity
4	Hygiene	Tolls taken by tribal people		Terrorism and kidnapping	Poor business
5	Drinking water			sanitation	
6	Health care			Transport	



**Table 3.1.9 Vulnerability**

	FT fisher	Outsider fisher	Fish worker	Fish trader	Gear trader
Vulnerability	Dec-Jan, May-Jul no income as – BFDC bans fishing	May-Jul – fishing ban, Nov-Jan	Jun-Aug no work, Dec-Feb – low income	Low income Jul-Aug	Dec-Jan, May-Jul
Coping Strategy	Loan, mortgage goods, starve	Loan from aratdars mortgage ornaments, migrate	Loan from cooperative, food on credit, mortgage goods	Credit from arottdar, mortgage gear, eat less	Use savings, take loan

### 3.2 Oxbow Lake (Simulia Baor) - Summary of PRA information

**Table 3.2.1 Poverty/Wealth categorization (% of the population)**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence fishers	Net maker	Overall
Very poor	No gear or homestead	No homestead	No agri land, take govt. relief	-	-	No homestead, labourer	
Poor	Gear but low income	Some land	Homestead, lease agri land	72% - no agri land, no capital	No agri land, wage labour	Land (av 1 acre), no savings	
Average	-	-	-	-	Land, no savings	-	
Better off	Own gear, Agri land	More land, credit access	Agri land, savings	28% - agri land, business	Own land, business or service	Land (av 5 acres), savings, food secure	

**Table 3.2.2 Human Capital**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence fishers	Net maker	Overall
Health	Good	Good	Average	Ok	Ok	Good	
Literacy	No	30% primary education +	30% illiterate	98% illiterate	15% illiterate	Some	
Fishery skill	Yes						
Skill training	No	No	No	No		No	
Access to information							

**Table 3.2.3 Physical Capital**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence fishers	Net maker	Overall
Housing	Mixed	Mixed	Tin roofs	Mixed	Poor	25% tin	
Sanitation	No	No	No	No	No	Few	
Gear/Boat	30% own	Most		Few	Yes	All	
Infrastructure	Katcha, primary school, madrasha, mosque						

**Table 3.2.4 Social Capital**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence fishers	Net maker	Overall
Cooperatives							
Association							
Conflict resolution							
Cooperation				With fishers		Good – inter faith	

**Table 3.2.5 Financial Capital**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence fishers	Net maker	Overall
Credit	Money-lenders, banks, NGOs	Money-lender, Bank, NGO	Money-lenders, banks, NGOs	Money-lenders	Money-lender aratdar	Money-lender NGO	
Savings		Some	Most have some	Some	Some	Some	

**Table 3.2.6 Natural Capital**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence fishers	Net maker	Overall
Land Ownership	Little	50% own some	Land (only 10%)	Some, ponds for fry	Yes	50% own some	
Fishery Access	Only samity members	Mainly not baor	Pay leaseholder	Have ponds	Beel & canal	Low demand for nets as fishing access fell	
High Water level	Sept-Oct	Jun-Aug			Sept-Oct		
High Fish catch/availability					Jul-Oct, Feb-Mar		
Fish consumption					Aug-Oct, Feb-Mar		

**Table 3.2.7 Trends**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence fishers	Net makers	Overall
Fish resources	20 years ago open access, last 15 years restricted, decline in no. of species	No access now, fewer fish species now	Decreased, fewer species, lessee restricts		Baor leased to outsiders last 10 years, lost some wild fish	Less access to less demand for nets	
Trees							
Aquatic plants							
Grasses							

**Table 3.2.8 Ranking of Problems**

Rank	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence Fishers	Net makers	Overall
1	Homestead	Road	Capital	Capital	Fish decline	Flood	
2	Roads	Electricity	Roads	Poor fry quality	Roads	Low net demand	
3	Fish decline	Health care	Health care	Technical knowledge	Electricity	education	
4	Fish disease	Cattle disease	Drinking water			Livestock disease	
5	Capital	Fish disease	corruption			Drinking water	
6	Sanitation	Fish decline				Dowry	
7	Drinking water	Capital				Insecurity	
8	Healthcare	Corruption					
9	employment						
10	Electricity						

**Table 3.2.9 Vulnerability**

	FT fisher	PT fisher	Fish trader	Fry producer	Subsistence Fishers	Net makers	Overall
Vulnerability	Jun-Sept & Feb-Mar	Jan-Mar	May-Aug	Jun-Sept	Jun-Sept, Mar	Mar-Apr	
Coping Strategy	Loans – NGOs, moneylenders, mortgage valuables	Loans – NGOs, moneylenders, mortgage valuables	Money-lenders, mortgage valuables	Credit, sell livestock	Moneylenders, mortgage / sell valuables	Loans – moneylenders, mortgage valuables	

### 3.3 Enhanced Beel (Hilna Beel ) Summary of PRA information

**Table 3.3.1 Poverty/Wealth categorization (% of the population)**

	FT fisher	PT fisher	Fish worker	Fish trader	Subsistence fishers	Female net maker	Overall
Very poor	37	50	50	88	55	25	50
Poor	26	25	15		25	50	25
Average	37		35		15		15
Better off		25		12	5	25	10

**Table 3.3.2 Human Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Subsistence fishers	Female net maker	Overall
Health	Poor	Poor	Good	Good	Poor	Poor	Poor
Literacy	10%	10%	40%	40%	10%	0%	10%
Fishery skill	Yes						None
Skill training	No	Yes	Yes	No	Yes	No	None
Access to information	Radio, GO and NGO		Educated neighbour, radio and television		Radio, Educated people, elites, and NGO	Radio, neighbour	Radio, Neighbour, NGO

**Table 3.3.3 Physical Capital**

	FT Fisher	PT fisher	Fish worker	Fish trader	Subsistence fishers	Female net maker	Overall
Housing	Straw	Straw	Tin/straw	Tin/concrete	Straw	Straw	Straw
Road	Kuccha	Kuccha	Brick build	Kuccha	Kuccha	Kuccha	Kuccha
Sanitation	Poor	Poor	Poor	Poor	Poor	Poor	Poor
Gear/Boat	80%	75%	10%	0%	40%	80%	60%

**Table 3.3.4 Social Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Subsistence fishers	Female net maker	Overall
Cooperatives	Yes						None except FT fisher
Association	Yes		Yes				None except FT fisher & Fish worker
Conflict resolution	Leader of the fisher community	Samaj	Local elite in the market place	Samaj leader, Outsiders	UP chairman		Samaj
Cooperation	High within themselves and with GO and NGO	High	High	Low	High	Low	Average

**Table 3.3.5 Financial Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Subsistence fishers	Female net maker	Overall
Credit	NGO, Arotdar, moneylender	NGO, moneylender	NGO	NGO, moneylenders	NGO, Agricultural Bank	NGO	NGO, moneylender
Savings	NGO members	NGO	NGO	NGO	NGO	NGO	NGO

**Table 3.3.6 Natural Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Subsistence fishers	Female net maker	Overall
Land Ownership	Homestead	Homestead and Agric	Homestead, Sharecropped and leased-in land	Homestead, Agric land	Homestead, Agric land	Homestead	Homestead, Some agric land
Access	Limited	Restricted, fees-300/yr	Open for consumption	-	Limited	Open for consumption	Limited
High Water level	September	July-August	-	-	October	-	July-August
High Fish catch/availability	Dec-Mar	February-March	February-March	-	November - December	-	December-March
Fish consumption	February-March	February-March	February-March	-	November - December	June & September	February-March

**Table 3.3.7 Trends**

	FT fisher	PT fisher	Fish worker	Fish trader	Subsistence fishers	Female Net makers	Overall
Fish resources	Declining	Declining, large fishes non-existent	Declining	Declining,	Declining	Declining	Declining
Trees	Declining		Declining		Increasing	Declining	Declining
Aquatic plants	Declining	Declining	Declining			Declining	Declining
Grasses	Declining	Rare	Declining			Declining	Declining

**Table 3.3.8 Problems**

Rank	FT fisher	PT fisher	Fish worker	Fish trader	Subsistence Fishers	Female Net makers	Overall
1	Lack of educational institute	Lack of safe drinking	Low income	Lack of capital	Flood	Scarcity of food	
2	Lack of safe drinking water	Siltation of Hilna beel	Lack of crop cultivation inputs	Lack of safe drinking water	Fish declining	Lack of safe drinking	
3	Beel dries up in dry season	Unemployment		Lack of fuelwood	Other natural resources declining	Lack of fuelwood	

**Table 3.3.9 Vulnerability**

	FT fisher	PT fisher	Fish worker	Subsistence Fishers	Female Net makers	Overall
Vulnerability	Lack of opportunity for work resulting low income	Flood, Diarrhoea	Lack of opportunity for work resulting in low income	Flood, drought	Flood and loss of property	Flood and high water level resulting in low fish catch and very low income during Bhadra-Kartic and Baisak-Jaistra
Coping Strategy	Loan, purchase on credit, Reduce household expenditure, mortgage household assets	Loan, less food intake, migrate, mortgage	Other work, expend from savings, sell poultry, NGO loan	Loan, sell trees, poultry, eat less	Loan and selling livestock, sell household belongings	Loan, sell assets, reduce household expenditure

### 3.4 Floodplain (Sular Beel, Narail) Summary of PRA information

#### 3.4.1 Background

The floodplains support over 800 people per km<sup>2</sup>, but drainage has reduced aquatic resources and they are now used intensively for agriculture. The population (120 million) is 80% rural, of which more than 50% are functionally landless. With too little land to be food self-sufficient, the poor follow diverse livelihood strategies, depending on agricultural wage labour, non-agricultural labouring, urban employment and fishing. About 52% of rural households (the moderately and extremely poor) subsist below the poverty threshold, another 23% are classed as “tomorrow’s poor”. Wetland resources including fisheries are a safety-net for these poor households

Floodplain fisheries are a vital but declining component of the traditional floodplain livelihood systems of Bangladesh. Over half of the country comprises floodplains, and in the past some 6.3 million ha of agricultural land were regularly inundated (Master Plan Organisation (MPO), 1987; Ali, 1997). These wetlands contribute about 46% of all fish consumed (DOF 2000). Over 70% of households in the floodplains catch fish at some time each year (Minkin et al. 1997; Thompson et al. 1999). These floodplains support a dense human population (over 800 people per km<sup>2</sup> and are intensively used for agriculture, fishing and other aquatic resources. In these open floodplains, agriculture and natural fisheries complemented one another. As is typical of floodplain fisheries (Welcomme, 1985; Payne, 1997), in the dry season (approximately December-May), most land was cultivated and fish were restricted to *beels* (floodplain depressions and lakes) and rivers, which are government property and here fish were caught by professional fishers working for leaseholders. In the monsoon to post-monsoon (June-November), the private land of the floodplain was inundated but much was still cultivated with deepwater rice. This provided an ideal habitat for the wide diversity of fishes, some 260 species (Rahman, 1989), that inhabit this riverine floodplain system, and during this period anyone from the rural areas could catch fish. Dependence on rice and fish helped to even out annual variations: in drier years, rice yields might be higher although there was less habitat for fish, in flood years, crops might be damaged but fish catches would be higher. Seasonal access patterns benefited poor people who were able to catch fish and other aquatic resources for food as well as obtain an additional income in the monsoon and post-monsoon period.

Although these livelihood systems still exist, the fishery sector has been modified and become more complex since the 1960s. Inland capture fisheries have been modified and encroached, and there is increasing competition for access.

Out of 6.3 million ha of floodplain agricultural land, about 0.8 million ha were reported to be inside flood control projects by 1985. This had probably risen to 3.3 million ha by 1990 (Ali, 1997), while the Department of Fisheries estimated that 1.7 million ha of wetlands would be lost as fisheries between 1990 and 2010 (Ahmed, 1999). This implies that most floodplain land is or will be affected by flood control and drainage. There is now a national policy not to further drain wetlands (National Water Policy 1998, see Habib, 1999), but past policies and water management projects have reduced the average depth and duration of monsoon flooding in much of the more shallow flooded parts of the floodplain. These shallow flooded areas have been shown by Environment and Geographic Information Systems (GIS) Support Project (1997) to be a vital habitat, supporting high densities of fish in the monsoon. Thus loss of wetlands and reduced access to waterbodies can have a negative effect on fish consumption in rural Bangladesh.

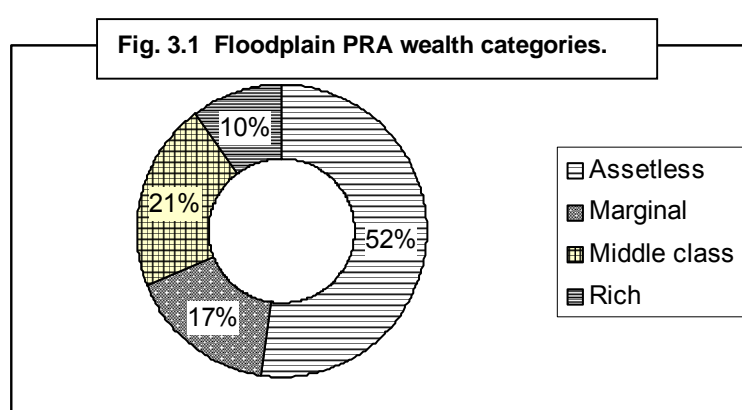
Not only has the area of fish habitat fallen, but embankments and water control structures have blocked the connections between rivers and the beels and floodplain land within embanked areas. This obviously affects the seasonal migrations of some fish species and

the composition and diversity of fish stocks. Fish catches relative to area are reported to have fallen by 81% where there is full flood protection, but did not differ consistently within the remaining water area between partial flood control and unprotected floodplains - catches of about 120 kg/ha/year (FAP 17, 1994; Overseas Development Administration (ODA), 1997). Major carps have fallen from about 47% of floodplain catches to only 3% due to several factors including loss of habitat, loss of river-floodplain connections and over fishing (Payne and Temple, 1996). Thus a loss of 95% of migratory species and a 33% reduction in fish diversity were reported for full flood protection by (ODA, 1997). Use of agro-chemicals, pesticides and industrial pollution also affect the fish habitat (Ali, 1997).

### 3.4.2. Livelihoods Background

#### Wealth/poverty criteria

Stakeholders categorized all the people in the community into 4 different categories - Assetless, Poor/Marginal, Middle class and Rich (Fig 3.1).



All stakeholders defined assetless poor as those who possess no land (agricultural and homestead), are destitute, have no able bodied men in the family to earn, no education, usually do manual labour or beg and always deficit in food.

According to stakeholder groups people under the poor/marginal category possess very little or no agricultural land, have loan on interest to cope

with their daily needs (income is not sufficient to feed and provide medical facilities to all the household members) and those who may be living on state land or on own land with a very small shack (thatched house). These people are fully dependent on fishery for livelihoods and when beel water recedes they have to work as labourers in others' land or sharecrop land.

People in their middle class category have less than 5 acre agricultural land, they have no outstanding loan to moneylenders, have cattle or can afford to rent power tiller for land cultivation, they also sharecrop other land. They do not have to buy food grain but can sell some. Their main income comes from agriculture and petty trade, and also from catching fish in their own ditches.

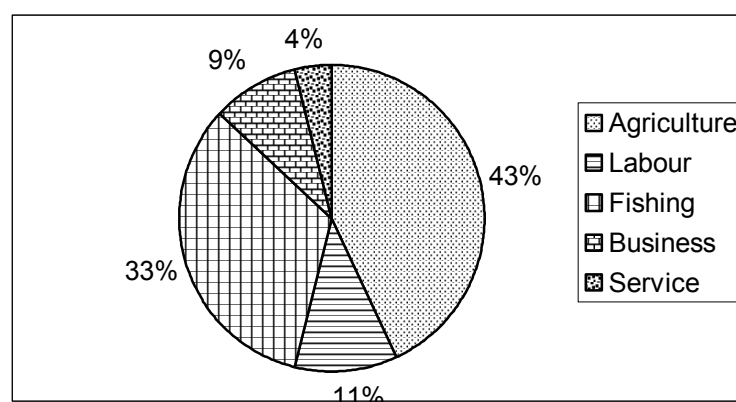
The rich class are those who enjoy all the comfort. They have a good service (salaried) job, they have remittances from in country and abroad, they have more than 7 acres of agricultural land, they have several kuas (ditches for trapping fish) and they live in big houses both in village and in the city. They have different sources of income and they are surplus in food.

#### Livelihoods sources/strategies

Farming is the main occupation of about half of the stakeholders. These people either cultivate their own land or they sharecrop in land for cultivation. Fishing is the main occupation of only one third of the stakeholders (Fig 3.2). There is heavy pressure on open water fisheries during the post monsoon period. As the beel area dries up during the dry

season, fishers have to move to the river for fishing where there are already people from other villages fishing. Therefore, during the dry season fishers have to do other jobs - like agricultural labour, non-farm labour, fish trade and a few sharecrop.

**Fig 3.2 Livelihoods Pattern of all stakeholders (% income from main sources)**



**Table 3.4.1 Livelihoods pattern**

Livelihoods strategy	Full time fishers	Part time Fishers	Subsistence fishers	Women	Better-off	All
Agriculture	4	13	74	50	75	43
Labour	4	25		25		11
Fishing	90	50		18	7	33
Business	2	12	13	8	8	9
Service			13		10	4

Only the assetless poor are fully dependent on wage labour, whereas marginal households have petty trade and sharecropping. Better-off groups still consider farming as their main source of income, although they have diverse categories of income sources. The overall livelihoods patterns are as follows:

- a) Fishing-wage labour/petty trade/sharecropping/handicraft
- b) Farming-ditch/service/trade

### Seasonality

Fig 3.3 shows the seasonal activity calendar of all stakeholders. Those who are full time fishers go fishing throughout the year. During monsoon they fish in the beel but in the dry season they fish in the river. During high monsoon period they fish in team because they use seine net which needs more than one person to operate. In post monsoon period when water starts to recede they fish alone. According to the fishers their peak fishing period is from November to January.

People who have an opportunity to sharecrop-in land, cultivate dry season rice (Boro) starting in December-January or other dry season crops (Rabi) from end of November to end of January. These are little higher land from where water recedes earlier. These lands are also used for growing transplanted Aman. However, most of the fishers work as wage labour in big farmers' fields during transplanting/sowing and harvesting. Some of them work planting Jute during April-May. During peak cultivation period they can earn Tk.60/day (without meal).



**Fig. 3.3 Seasonal activity calendar**

Sl. No		Baishak	Jaistha	Ashar	Sraban	Bhadra	Ashwin	Kartik	Agrahayan	Poush	Magh	Falgun	Choitra
1	Fishing	Fishing in the river	Beel fishing									Fishing in the river	
			Team fishing				Peak fishing						
2	Agriculture	Harvesting Boro		T. Aman cultivation					Rabi/Boro cultivation				Jute Cultivation
			Jute harvest										
3	Labour												
4	Trading	Paddy Business			Jute business							Rabi crop business	
5	Household help(Women)	Work for others		Jute processing									
6	Temporary emigration		Faridpur/ Bagharpara										
7	Service												
8	Kua fishing												
9	Snail and water lilly collection												

Trading of paddy and jute are done right after harvest. During the lean period (fishing in river and high water level) when fishing is not profitable some fishers manage loan from the moneylenders and buy products from the village and sell outside the area. They can make some profit but the interest for the borrowed amount is too high.

Women work as wage labourers during harvest period. They process paddy and jute. They are usually paid by month. These women get their wage in kind mostly (e.g. 2 kg rice for processing a sack of 55 kg) but for jute processing they get Tk. 30-40/day.

Emigration to other areas is very usual. Some fishers go to nearby district on a contract basis for boro paddy harvest in April-May. They get a share of the harvest (15% of the total harvest). Labourers go in a team and work for a month and then they share the income equally. During harvest they get food also.

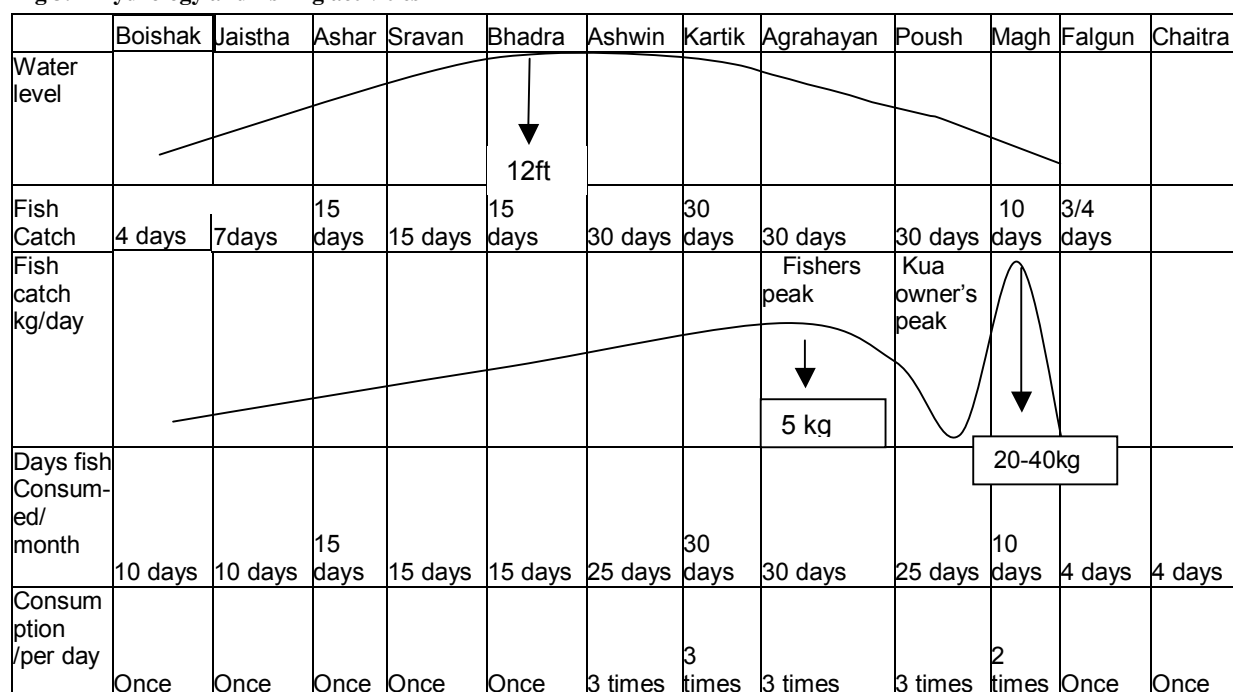
Kua owners dewater kuas and catch fish three times a year. They start after water from the beel starts to dry (when some water still left on the field). They also engage labour and finish the job in three months.

According to the fishers those who have alternate sources of income have better life than the full time fishers.

### **3.4.3 Hydrology and fishery**

Fishery depends on level of water in the beel (Fig 3.4). Water stays in the beel for about 10 months but the flow is low during early months of monsoon. However, the peak level does not go beyond 12ft. The fishers complained that due to embankment building the beel never receives sufficient water. Water is only trapped in the ditches (Kua) but owners dewater each ditch every year 3 times to catch all the fish they can get. Soil is fertile due to deposition of new silts every year but the beel basin is slowly silting up reducing the water level in the beel. Fishers start fishing in the beel as soon as the monsoon water starts to enter into the beel. Frequency of fishing increases with the water level although catch depends on the recession rate of the beel water. Fishers can fish in the beel every day for 4 months. The fishers reported highest amount of catch from the mid-November to mid-December. During that period each fisher can catch 5kg fish from the beel each day. However, peak fish catch for the kua owners is about 40 kg during the December/January. Fish consumption also depends on the fish catch. In the beel fishers don't usually catch big fishes. During peak fishing season they can eat fish everyday during all meals. Even the poor and assetless people catch fish by rod and line for consumption or if they get bigger amount, they can also sell. In other month's frequency of consumption is low and the number of days consumed also varies. During February to April frequency of fish consumption is low for all. During these months availability of fish in the market also low. Therefore, those who can afford to buy fish also cannot eat so much fish.

**Fig 3.4 Hydrology and fishing activities**



### 3.4.4 Human capital

#### Health and disease

All households suffer from different diseases but most of the diseases are linked to water (Fig 3.5). Fishers have to work in water most of the time. Constant contact with water causes serious ulceration on the foot and hand. This disease causes loss of nails. Disease sometimes results in loss of days work and cash income as well as extra cost for medicine. During recession of water level aquatic plants rot and also people rot jute in the beel water, which pollutes water. Touching this polluted water causes irritation of skin. During monsoon people face serious scarcity of pure drinking water, which causes gastro-intestinal diseases. Arsenic contamination of groundwater is another problem in the area for which most of the hand tubewells are now abandoned. Only few rich people have arsenic free hand-tubewell where access is restricted for the poor people. There is no health care center nearby most of the area. If there is a government health center doctor is not available or poor are not attended. If there are any free medicine sources poor do not get it free, they have to pay. Mud roads are not easy for local transports to run during monsoon so it is difficult to take sick people to the city health clinics. Average household size is 5.2. Family planning is hardly followed. But child mortality rate is high. Pneumonia is a fatal disease for the children during June-July. Malnutrition among all members of the fisher households is common. Rice is the main food to fill their stomach. Some fishes for some meals are available.

Fig 3.5 Seasonal disease calendar

Disease	Bai	Jai	Ash	Sra	Bha	Ash	kar	Agr	Pau	Mag	Fal	Cho
Cold and fever			■	■	■	■	■					■
Hand and leg ulcer due to polluted water			■	■	■	■						■
Diarrhea	■	■							■	■		
Dysentery									■	■		
Pneumonia			■	■	■	■						
TB/cough							■	■	■	■		
Gastric	■	■	■	■	■	■	■	■	■	■	■	
Chickenpox	■	■									■	■
Eye disease						■	■					
Scabies							■	■	■	■		

Note: Bai=Baisak (April 15-May 14), Jai= Jaistha (May 15-June 15), Ash=Ashar (June 15-July 14), Sra=Sraban (July 15-Aug 14), Bha=Bhadra(Aug 15-Sept14), Asw=Ashwin (Sept 15-October14), Kar=Kartik(Oct 15-Nov14), Agr=Agrahayan (Nov 14-Dec15), Pau=Paush(Dec14-Jan15), Mag=Magh(Jan 15-Feb14), Fal=Falgun (Feb15-Mar 14), Cho=Choitra(Mar14-Apr15)

### Housing and Sanitation

Table 3.4.2 Housing and Sanitation

	Poor fishers	Poor non-fishers	Middle class fishers	Middle class non-fishers	Better-off
Roof (%)					
Straw/leaves	20	20	10	0	0
Tin	80	80	90	100	100
Total	100	100	100	100	100
Latrine facility (%)					
None	50	40	30	20	10
Not water sealed	20	20	20	40	10
Water sealed	30	40	50	40	80
Total	100	100	100	100	100

On average all households have 1.1 to 1.4 houses according to the status. Poor have one thatched room for each household members. About 80% of households live cramped in one thatched room or in a small tin shed room, sometimes with small livestock in one side of the room, which is unhealthy. Almost 52% of the households have no sanitary latrine or do not use sanitary latrine. Poor housing, low sanitary standards, inadequate nourishment and use of impure drinking water lead to general weakness and fatigue and intestinal troubles and diarrhea among the poor people.

### Education

There are primary level schools in most of the villages, but secondary level school is far from most of the villages. Stakeholder households have very little education and about half of them are illiterate (Table 3.4.3). Access to education is not a problem but the idea of spending money for education is not so cost-effective for them. Uncertainty in access to job opportunity after finishing higher studies is a concern of the poor groups, but middle category and the rich have higher education and have access to high salaried jobs.

**Table 3.4.3 Educational Institution in the study area and level of education**

Village	Shulua, Atashpara, Balarampur, Charbila, Rameshorpur
Union	2 nos. (Maizepara, Shahbad)
Health Complex	1 no.
Road	Available Concrete road (Narail to Maizepara to Magura)
Student	There is no student an abroad
School	- 4 nos. (2 registration, 2 govt.) - There is no problem in admission - Location is good
Education (%)	
None	44
Read only	26
I-IV	2
V-IX	22
X+	6
Total	100

The poor and fisher households have less people in the households for help. Therefore, they are not so eager to send their children to the high school after primary education, although they said they don't want their children to be a fisher.

#### *Information sources*

Rich households have television. The most important source of information for others is the radio. They said that they could listen to radio even sitting in the tea stall. Although there is a programme on agriculture, fisheries are very seldom discussed or if it is discussed they miss it as they have to go for catching fish during that time. Fishers go to fisheries office for information but most of the time it is not easily available. In the PRA site, few years ago Bangladesh Institute of Development Studies has done some research, which is known by some fishers, but they don't know on which topics and what was the outcome.

#### *Training*

The fishers never received any training from any organization. They fish based on their indigenous knowledge and do what is profitable in short term. NGOs working in the area are only providing credit to the women. They are not providing any training to the men. However, some of the fishers complained that these NGOs are very rude and they don't consider any difficulties of the members for recovering installments. Therefore, most of the members quit NGO.

Some of the participants received leadership training, training on health and sanitation, poultry and livestock management training,

### **3.4.5 Social capital**

Almost 28% of all households are NGO members. About 10 NGOs work in the area. They receive credit from NGOs and use this for different purposes. The main use is to feed the family during lean period or during any crisis period. A fishers' cooperative was formed in 1990 with 108 members from 4 villages (Targhi, Balarampur, Solua and Magura) around the beel, but it is not so active now. Members are not willing to pay monthly fees of Tk.10. Only 40% of the fishers are now members of the cooperative.

In each village there is a village head who is the informal leader of the village. These are older people with knowledge and respect of people whom villagers listen to. There is a salish committee (village "court"), which works for conflict resolution within the village. In the village local government authorities also work for village conflict resolution.

In the past there were very good relations with each other in the village but now the level of trust for each other is very low. Now they don't want to help each other when needed. They said that social cohesion is only seen during any conflict between two villages. However, social conflict between villages decreased with time - it was higher in past. Even there were cases of murder. Conflict appears during the start of the monsoon over water sharing. Due to embankment fish recruitment is very low and during breeding period when river fishes enter into the beel, farmers want to keep the sluice gate closed to protect ripening crops from flooding which results in conflict. Conflict over land demarcation is common. Up to 50% of such cases go to the civil court for resolution. To run the case people have to borrow money from the local money-lender (mahajan) at a high interest rate and finally lose all the land.

**Table 3.4.4 Cooperation and conflict (averaged self assessment scores, out of 10)**

Trust	1
Unity	2
Empathy	2
Conflict	8

### **3.4.6 Natural Resources, Access and exploitation**

With the increase in population, natural resources are becoming scarce day by day (Table 3.4.5). Overexploitation, habitat destruction and change of wetland to agricultural lands have had a negative impact on natural resources. Among all the natural resources they mentioned, fish is the most important for the fishers. According to them fish were abundant 15 years back and other people (Muslim fishers) were fishing for food only. During that period importance of fish was less as there were no restrictions on access. Anybody could fish in any place. However, as the availability is now limited and the value is higher, and people fish for income, landowners do not allow people to fish in their water (land) area during late monsoon. During high flood period catching fish is difficult and one can only manage to catch a little even though access is easy, but when water starts to recede and fish get trapped in the kuas (ditches in private land), landowners guard their land. Fishers can then only fish in other area (khas land).

Among the natural resources water lily, snails, edible waterweeds, and mussels are common resources for all. Except for fish, access to all other natural resources is free. People can collect those for sale or for own consumption. Snail now is a valuable resource. With the increase in shrimp farming, demand for snail also increased. In the past children were collecting snails for feeding domestic ducks. Now snail collection on a commercial basis is common. A person can earn Tk. 4000-5000 per month during the peak season (June-August). As there is no restriction on collection, snail population has decreased compared to 15 years ago. Water lily is also a valuable product. Poor people collect those and sell for income. Fruits of giant lily are also used as human food and are sold for Tk.8-10 per kg. In the past people only collected those for their own food but now-a-days the amount available decreased due to overexploitation. However, better-off households do not collect those resources. In the past there were small areas of forest in the villages, which are now exploited fully. Common public land is either untraceable due to encroachment by the powerful people or the local authority has given use right illegally to some people. Now people only have trees in their own land. Poor people have no access to those. As the poor fishers have very little homestead land they have no or limited number of trees

**Table 3.4.5 Changes in natural resources use and access**

Natural Resources	Use	Rank (importance for livelihoods)		Status and Access	
		Now	15 years ago	Now	15 years ago
Fish	-Consumption -Sale for income	9	3	33% Less fish, more fishers. At present land owner resist fishing in their private land	100% There were abundant fish. Only traditional fishers were fishing. There was no restriction on fishing.
Water lily	-Consumption (Vegetable) -Sale & income	7	3	40% Free access	60% Free access
Snail	- Fish feed - Duck feed - Sale & income	8	2	30% Free access	65% Free access
Grass/Sechi/ Kolmi	-Cattle feed -Human consumption	2	7	25% There is no restriction on collecting for feeding livestock. However, livestock decreased	75% Free access, lots of livestock
Jhinuk (mussel)	-Fish feed -Duck feed -Lime production	2	10	7%, Use decreased, replaced by artificial products	93%, Free access
Shaluk (aquatic plant fruit)	-Sale (Tk.8-10 /kg) -Consumption	10	4	40% Land owners don't allow harvest	60% Free access
Trees/Plants (forest)	-Furniture, firewood, fruits, gives oxygen, cattle feed, fish feed	10	4	60% Good income source can cut trees from own land. Very few available as common property	30% Forest on public land, free access
Land (soil and agriculture)	-Crop cultivation -House building -Pottery	10	6	40% Very little common property, access to public land is controlled by the local influentials	60% Poor can use public land

*Rank = score out of 10 for importance to livelihood*

Table 3.4.6 shows the rank of fishes according to their availability/importance in the fishers catch. It is evident from the table that small fishes dominate in the floodplain beel environment now, whereas bigger and valued species were more dominant 15 years back. At that time the fishes could move freely from the river to the beel without any barrier. Bigger fishes, which move to floodplain for breeding cannot now enter the area due to embankment or fences raised by the rich and influential people across the entrance to the canal in the beel. Due to stagnant water the fishers say that fish disease has become severe in some years and certain species of fishes become severely affected. They hope that the species of carp can be replenished with proper installation and management of the right size of sluice gate. Furthermore, conserving fishes in the ditches for a few years may rehabilitate some species.

**Table 3.4.6 Changes in rank of importance of fish species in catch**

Sl. No.	Species (now)	Species (15 years before)
1.	Puti	<b>Galda Icha</b>
2.	Guraicha	Magur
3.	Taki	<b>Rui</b>
4.	Shoil	Shing
5.	Koi	Shoil
6.	Roina	Bele
7.	Shing	Tengra
8.	Tepa	Sarputi
9.	Tak Chanda	Falui
10.	Baji Tengra	<b>Gazar</b>
11.	Guchi Baim	Tarabaim
12.	Khalisa	Roina
13.	Pabda	<b>Boal</b>
14.	Falui	Bacha Mas
15.	Bara Baim	Chelenda
16.	Bele	Tepa
17.	<b>Gazar</b>	<b>Chital</b>
18.	Kakila	Puti
19.	Chela	Koi
20.	Chusro	Batasi
21.	Magur	Bashpata
22.	Gutum	Chela
23.	Sarputi	Kakila
24.	<b>Boal</b>	<b>Ayre</b>
25.	Chewa Bele	<b>Rita</b>

*Larger species are in bold*

### *Assets and Income*

Among household assets, two thirds of the fisher households have a cheap watch, more than one third have radio and bi-cycle (which is the main transport between the village and the town) and small boat (dinghy) or boat made of a hollowed out palm tree (donga). Although total net income from different sources decreased by 10%, income from fishing decreased by 25% during the last 15 years (to Tk.3000/household). Aquaculture and fingerling trading is one of the alternate livelihoods practiced by them now.

All of them have fishing gears. They do not use big gears in the floodplain. Gill net (“current net” – nylon monofilament gill nets) is widely used although they know it is harmful. There was no use of such gill nets 20 years ago. Traps, cast nets and rod and line were the main gears. However, gear use has not changed so much. Most of the Muslim fishers were not fishing for an income 15 years ago. Most of the traditional fishers either left the country or left their traditional job during this period as there is very little prospect in the floodplain for the full time fishers.



**Table 3.4.7 Income sources and Income (Taka/household in 12 months 2001-2002)**

Household category ->	I	II	III	IV	V
Net fishing income (includes value of own consumption of own catch)	20775	2230	13919	3706	9328
Cash income from collection of plants (not for food)	0	0	20	0	0
Imputed income collection of plants for food	143	143	125	115	88
Cash income from collection of aquatic animal	201	0	0	0	0
Imputed income from collection of aquatic animal	356	222	616	202	606
Fishing as wage labour	1249	0	0	16	25
Net agricultural income	2153	3073	3881	24308	21146
Agriculture labour	4744	5198	3995	3210	1348
Non-agriculture labour	746	1348	1092	546	606
Rickshaw/van	1063	4251	0	0	0
Handicrafts/petty trade	722	484	2549	0	475
Other (not specified) daily income	0	0	0	121	0
Singing	0	0	0	607	0
Rice mill	0	0	0	0	1818
Business	0	0	0	1699	0
Fish and fish related trading	1805	0	0	0	0
Fish pond/culture	0	0	0	202	980
Business	0	505	2731	4146	6867
Service	271	0	0	0	0
Hiring out draft power	0	121	0	0	101
Sale of goats/sheep, poultry birds, milk and eggs	160	131	698	1850	48
Jackfruit	0	182	0	0	0
Fruit selling	0	0	202	202	0
Shallow Machine	0	0	0	0	606
Remittances	0	0	0	0	2020
Total	34387	17888	29829	40931	46062
% from fishing and aquatic resources	66%	15%	49%	10%	22%

Categories are: I – no agricultural land or profession, fish for income; II - no agricultural land or profession, do not fish for income; III – up to 1 acre (0.4 ha) agricultural land and fish for income; IV – up to 1 acre (0.4 ha) agricultural land and do not fish for income; V – over 1 acre (0.4 ha) agricultural land or profession.

Source: unpublished data from CBFM-2 project baseline survey, sample of 30 households per category.

**Table 3.4.8 Changes in fishing gear use**

Sl. No.	Gear	Rank	15 years ago
1	Current jal (Gill net)	1	
4.	Ghuni (Trap)	2	1
3.	Doari (	3	2
20.	Fairoo	4	7
6.	Baina (fences)	5	5
5.	Borshi (rod and hook)	6	4
2.	Khepla Jal (Cast net)	7	3
8.	Veshal (Lift net)	8	6
9.	Suti (cotton thread woven net)	9	
13.	Koyra Jal (small lift net)	10	
15.	Duria	11	
16.	Ucha Jal	12	
17.	Goga Jal	13	
19.	Khunkhuni (trap)	14	
21.	Rabbani	15	
22.	Tupo	16	
18.	Dara Jal	17	
14.	Polo (trap)	18	
7.	Khadum (Trap)	19	
11.	Juti (spear)	20	
10.	Koch (spear)	21	
12.	Aro	22	

### 3.4.7 Services and service providers

In the village there is a block supervisor who acts as agriculture extension agent and helps farmers to adapt new technologies or in coping with agricultural problems. The Department of Fisheries has officials at upazila level to help fishers. But the fishers said that these officials are only to help advise on cultured fish. Cultivation of fish is in the hands of rich people who have ponds. Fisheries officials do not exercise their power in implementing fisheries rules. NGOs are providing credit through women groups.

### 3.4.8 Vulnerability and coping strategy

The embankment built 8 years ago had a very negative impact on the fishers. They said that the embankment now restricts the usual water flow from the river. The sluice gate is on higher ground than the adjacent canal linked to the river and the flap gate of the sluice gate is not sufficient to receive water from outside. Therefore, poor planning of the embankment and undersized sluice gate stop water from entering into the beel during fish recruitment and breeding period. Now the beel water depth depends mostly on rain. If there is a drought, fishers are in trouble. In drought years they cannot catch enough fish to earn a living from fishing, get into debt and ultimately have to borrow money from moneylender. Hail storm is also a problem for them. Diarrhea is a common problem but it sometimes appears as epidemic.

**Table 3.4.9 Vulnerability of households – livelihood stresses and trends.**

Embankment (Beri badh)	10	They have been affected from embankment building for last eight years. Nobody consulted them about the embankment. Fish cannot enter to the beel from the river due to the embankment.
Drought	9	Two droughts in last 10 years. Last in 1999
Storm	6	There was a storm 3 years ago
Hail storm	7	They were affected more by hail in 1998
Diarrhea	8	5 years ago there was diarrhea in the form of epidemic

### 3.4.9 Problem/constraints and opportunities

Fishers identified 7 major problems, which are critical for their livelihoods (Table 3.4.10). The major problems for fishers are: obstruction due to embankment for fish recruitment, catching brood fish, and dewatering and catching all fishes three times in ditches after monsoon. Problems associated with other needs, such as lack of roads, electricity and safe drinking water, were also mentioned by the fishers.

As the land is mostly private in the floodplain beel, fishers have no control over it. However, they think if they can motivate all categories of people from all the villages around, so that all come in a consensus and form a committee they will be able to manage the beel properly. Kua owners claimed that kuas are the main source of income for their households. Dewatering is needed for harvest. However, they can harvest without complete dewatering of the kuas. Although they mentioned electricity as one of the main barrier for irrigation of the agricultural land, they are not directly suffering from the problem. Those who work as labour may face problem if landowners cannot cultivate.

**Table 3.4.10 Problems faced by the fishers**

Rank	Problem	Reason	Impact	Solution	Affected group
1.	Fish decreasing in the beel	-Fish cannot enter into the beel because of flap gate on Sarashpur river -Soluar sluice gate is obstructing water from entering into the beel in proper time -Catching brood fish in the months of Falgun-Chaitra by dewatering from the privately owned Kuas -Use of destructive gear -Indiscriminate catch of fingerlings -Fishing with fences (Charpata) -Fishing by dewatering private kuas in the month of Poush -Fish dies of ulceratic syndrome	-Brood fish cannot enter the beel -Income from fishing decreasing -Fish consumption decreasing -Snails, mussels, lily decreasing	-Keep the Solua sluice gate open during new moon and full moon of Boishak-Jaishtha -Or Complete removal of Sarashpur Flap gate -Stop fishing in Chaitra, Boishakh and Jaishtha -Stop using Chotjal, Netjal -Conserve fish in 1 or 2 kuas of the beel by making them sanctuary -Provide alternate IGA for fishers in the closed season	-Poor people -Fishers
2.	Fish recruitment declined	-Embankment building. -People fish separately	Small and brood fish can't enter in the beel	Prevent building of embankment across Chitra river	Fisher Small/ large farmer
3.	Lack of communication (roads)	Muddy road in rainy season No transport in dry season	-Problem in movement, carrying goods and crops -Problem in carrying farm tools to field -Problem in bringing patient to hospital	-Build concrete road from Shahabad to Arhamgacha -Increase sluice gate doors (to permit boat movement)	Everybody, School going children
4.	Silting up of canal adjacent to Sholuar sluice gate	-Straws filling up canal -Water hyacinth coming from river -Sluice gate is 2 feet higher than canal so water does not come to canal -Erosion of canal bank	-Water hyacinth can't go out due to narrow sluice gate -Boats can't ply for carrying harvested crops from the beel -Less crop due to delayed drainage	-Widen sluice gate, re-excavate old canal and change sluice gate of new canal	Farmer, fisher
5.	Lack of electricity	No govt. initiative	-Problem for student to study -Problem in STW operation -High price of kerosene	-Arrange electricity from REB with common fund raised from the villagers -Other villages/areas have electricity	Poor people
6.	Lack of pure water/arsenic	-Poor don't have tubewell, have to go fetch water from long distance -Arsenic problem in Solua/Charabil village -Water level goes down in dry season	-Very little water in Chaitra -Everybody drinks tube well water	-Need tube well in all villages -Use water filter in big ponds of village -Use deep tube well to supply water	Poor people
7.	Water pollution in Beel	-Use of chemical fertilizer and pesticide -Water logging, -Decomposition of water hyacinth and straw -Jute retting -Bad water outlet system	-Skin diseases -One kind of plant causes skin irritation -Duck rearing and jute retting causes water pollution	-Use larger gate to clear water out -Canal excavation -Clean weeds -Preserve high tide water -Stop jute retting in stagnant water	Farmer Poor fisher

As opportunity they see the beel as a great asset. Fish population can be doubled through closed season, establishing winter shelter for brood fishes and proper water management. Conservation can also increase other aquatic resources in the beel. Commercial culture of snails for duck rearing and shrimp cultivation is another opportunity. They said that the old cooperative could be re-organised as a management committee co-opting people from all status and that will work on consensus and cooperation of other villagers. Fish processing is another opportunity they identified, but they need proper training. As government has banned use of current (nylon gill) net, cotton thread net can be woven during their lean period.

### 3.4.10 Conclusion

Livelihoods of the poor fishers are related to water and fish. Water management for better fish conservation and better life of the people dependent on inland fisheries is an essential part of the fishery management. For the floodplain fisheries it is important to have consensus of all classes of people for conservation and management of fisheries. The following tables show the outputs from consensus building with the PRA participants under CBFM-2 project.

**Table 3.4.11 Problem/Constraints and opportunities (scores from different stakeholder groups, most important problem has highest score)**

Problem	Group 1	Group 2	Group 3	Group 4	Group 5	Total
Encroachment of Khas land	1	1	5	4	1	12
Decreasing natural fish	7	7	7	6	7	34
Decreasing plants	2	2	1	1	2	8
Siltation (water logging) - river, canals buried	6	6	6	7	3	28
Aquatic plant and snails mussels and other aquatic animals of the beel are decreasing	5	4	4	5	4	22
Expenditure is access to product crops	4	3	2	3	6	18
There is no equitable price on crops	3	5	3	2	5	18

**Table 3.4.12 Overview of problems reported by PRA participants**

Rank	Problems related to natural resources
1.	Wild fish decreasing
2.	Water clogging (filling up of river/canal)
3.	High crop production cost
4.	Trees and plants decreasing
5.	Aquatic plants and snails/mussels and other aquatic animals of beel has decreased
6.	Do not get fair price of crop
7.	Encroachment of khas land
	<b>Development problems</b>
8.	Transport problem
9.	Want of electricity
10.	Problem of pure drinking water
11.	Lack of homestead land
12.	Lack of healthcare service
13.	Problem of education
14.	Problem of sanitation
15.	Problem of justice
16.	Social conflict
17.	Poverty

**Table 3.4.13 Example of problem analysis by stakeholders**

Sl. No.	Problem	Reason	Impact	Solution	Affected group
1.	Sluice gate is not used properly	<ul style="list-style-type: none"> <li>• Improper operation of sluice gate</li> <li>• Incomplete sluice gate and adjacent road</li> </ul>	<ul style="list-style-type: none"> <li>• Crop is affected</li> <li>• Water clogging</li> <li>• Fish can't come to the beel</li> </ul>	<ul style="list-style-type: none"> <li>• Needs sluice gate operation committee</li> <li>• Needs completion of road construction from Benehati to Hatiara</li> </ul>	<ul style="list-style-type: none"> <li>• Farmers</li> <li>• Fishers</li> </ul>
2.	Filling up of canal in Kathuria beel	<ul style="list-style-type: none"> <li>• Canal filled up by siltation</li> <li>• Re-excavation not done of canal of Kathuria beel</li> <li>• Erosion of canal bank due to agriculture</li> </ul>	<ul style="list-style-type: none"> <li>• Fish production decreasing</li> <li>• Crop damaged by flood and drought</li> <li>• Water clogging and pollution</li> </ul>	<ul style="list-style-type: none"> <li>• Re-excavation of canal from Hatiara to Kamlapur</li> <li>• Control of water by completing construction of sluice gate of 'Shashan Ghat'</li> </ul>	<ul style="list-style-type: none"> <li>• Fishers</li> <li>• Farmers</li> <li>• Day labourers</li> </ul>
3.	Lack of unity	<ul style="list-style-type: none"> <li>• Grouping among the villagers</li> <li>• Lack of mutual cooperation</li> <li>• Lack of awareness</li> </ul>	<ul style="list-style-type: none"> <li>• Development work restricted by mutual conflict</li> <li>• Poor people are deprived of rights</li> </ul>	<ul style="list-style-type: none"> <li>• Forming united group</li> <li>• Inspire people by mutual discussion</li> <li>• Increase awareness</li> </ul>	<ul style="list-style-type: none"> <li>• Poor people</li> </ul>
4.	Production of natural fish decreasing	<ul style="list-style-type: none"> <li>• Over-fishing</li> <li>• Filling up of canal in the beel</li> <li>• Use of pesticide and chemical fertilizer</li> <li>• Catching of brood fish and fingerling</li> </ul>	<ul style="list-style-type: none"> <li>• Fish consumption decreasing</li> <li>• Income from fishing decreasing</li> </ul>	<ul style="list-style-type: none"> <li>• Stop fishing in breeding period</li> <li>• Re-excavation of canal in the beel</li> <li>• Conserve brood fish by establishing sanctuary</li> <li>• Use less pesticide and chemical fertilizer</li> </ul>	<ul style="list-style-type: none"> <li>• Fishers</li> <li>• Farmers</li> </ul>

### 3.5 Haor (Fainda Beel, Derai, Sunamganj) Summary of PRA information

#### 3.5.1 Overview of haor fisheries

##### Background

The Sylhet Basin is a self-contained drainage basin or 'inland delta' of a large number of small and large rivers descending from the Garo Hills in Meghalaya State of India right across the border from Bangladesh. The Sylhet Basin roughly covers the area between Mymensingh in the west, Sylhet in the east and Bhairab Bazar in the south. Within the Sylhet Basin, the main seasonally inundated area covers large parts of Sunamganj District (NE), Netrakona District (NW), Kishoreganj District (SE) and Habiganj District (SW).

The haor basins are not clearly delineated. During the high flood (June – October), all the haors are covered under 3 to 6 m of water, forming one single inland ocean. When the waters recede, however, the various haor basins can be roughly recognised. During the dry season (December to March), only a number of slightly deeper shallow depressions (beels) in the haor basins contain water. Villages in the haor areas are built on privately initiated and manually raised hills.

Since the early 1970s, large polders are constructed in the haor basins by the Bangladesh Water Development Board (BWDB) with the objective of extending the growing period for the rice crop. In Sunamganj district, there are at present 24 completed haor submersible embankments and 3 embankments under process. Plans for more embankments in the few remaining un-protected floodplain areas are apparently underway. The total area under the completed polders are 145,047 ha and total area benefited is 128,537 ha.

**While normally the haors would gradually flood from March onwards, the embankments prevent flooding until the end of April. The annual flood pattern has four distinct phases in Sunamganj district:**

- (a) **Early flash flood** (pre-monsoon flooding). Extremely high water levels in the Surma River and other rivers occur for a fortnightly period at the end of the dry season, generally between first three weeks of April for a period of about 15 days. This is a common phenomenon and has occurred 9 times in the last decade. Only in one year did the peak of the flash flood occur around 20 February. During this period, water levels may rise with several meters in 48 hours, causing 'flash floods'. After this short interval, waters recede again until the arrival of the main flood. The single objective of the BWDB embankments around the haor basins is to prevent the paddy crop from being drowned. The phenomenon of flash floods is exacerbated by the resulting lack of water storage capacity resulting from the haor embankments.
- (b) **Main deep monsoon flood**, starting from the end of May. Following the backing-up of the monsoon floodwaters from the Meghna river system, the haor areas become a single deeply flooded sheet of water. Average annual rainfall in Sunamganj is over 5,000 mm per year, while in the adjacent hills annual rainfall is up to 12,000 mm per year<sup>1</sup>. As a result, all BWDB embankments, as well as most roads, submerge.
- (c) **Early dry period**, starting from the end of October. The floods over the haor basins begin to recede, but water remains in the lower-lying parts of the haor basins and in numerous smaller depressions called 'beels' as well as in the channels connecting the deeper areas in each haor basin.
- (d) **Late dry period**, starting from February. With the rising temperatures, the inundated beel areas shrink as the dry season advances, and some of them dry out completely,

<sup>1</sup> Cherrapunji in Meghalaya State is officially 'the wettest place on earth'.

due to siltation and water extraction for surface irrigation. Lack of surface water during the dry season is a direct effect of draining the maximum area possible for transplanting.

### *Leasing of Open Water Bodies*

Sunamganj has one of the largest concentrations of *beels* in the country. There are a total of 1,093 *beels* in the District. The total area occupied by the beels exceeds 16,300 ha. Of the 1,093 beels, 686 are below 8 ha and 407 are above 8 ha. While the beels in the haor basin are smaller or larger permanent *beels*, which get deeply inundated during the wet season, in the limited dry land areas of these Upazilas *jalmohals* may be seasonal *beels* (which dry out) or even large tanks (*dighi*).

The actual present area of the *jalmohals* is often considerably less than mentioned in the lease documents. In some cases, this is due to siltation and overall changes in hydrology resulting from the BWDB embankments. In other cases, fringe areas of *jalmohals* have been given in settlement or have been encroached upon.

In the haor basins, which are presently clearly defined by the BWDB embankments, all or nearly all water areas as they show up after the floods have receded in October-November, are listed as a *jalmohal* or 'fishery estate'. Although the area of the *jalmohal* is mentioned in the lease document, usually the exact location is not clearly indicated in the document nor is the *jalmohal* physically demarcated by marker pillars.

The total area designated as *jalmohal* within a certain haor basin, is often considerably less than the total surface area encircled by the BWDB embankment. The remaining areas, much of which was wilderness up to the 1970-80s, have been mostly given out in settlement<sup>2</sup> to private individuals for paddy cultivation. Quite a number of influential families, through the 'benami-system'<sup>3</sup>, have obtained control of vast tracts of haor land.

**As the haors are deeply inundated during the wet season, and further, since there was little farming activities in the haor basins until very recently, some lessees claim a customary if not legal right to the sole exploitation of the haor fisheries, which they enforce by various means (including intimidation). Often the lessees use outside fishers to harvest the fish catch on a contractual basis, which is a violation of the lease terms that require that the lessees employ members of the local community.**

In most larger haor basins, several *jalmohals* over 8 ha are leased in a so-called 'group fishery'. It is up to the discretion of the Deputy Commissioner to include or exclude a certain *jalmohal* from the group fishery.

Lease fees, expressed in BDT (Bangladesh Taka) per acre, vary widely. As the recorded area of the *jalmohal* often does not correspond to the real area, there is no relation between lease fee and total area (assuming that fish yields are correlated to total area, which is broadly agreed upon by most fisheries scientists). Further, the general principle is that the present year's lease fee should be 10% above the previous year's lease fee. Only if no party has come forward for tender, can the proposed lease fee be revised by the District *Jalmohal* Committee (often on recommendation by the DFO).

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<sup>2</sup> Land given by the Deputy Commissioner in settlement is legally not the same as privately owned land. Normally, small areas of khas land are given in settlement to well-defined categories of landless impoverished farmers. A peculiarity of land given in settlement is that it cannot be sold.

<sup>3</sup> Legally an individual can own max. 20 acres of land. By having pieces of land in name of family members, relatives or even trusted outsiders, some 'landlords' hold control over much larger areas than was intended by the law makers.

### Conflicts with Paddy Cultivation

Practically, only paddy can be cultivated during the prevailing growing season in the low lying haor basins. Other crops, e.g. pulses, cannot be planted 'in time', i.e. before early December, as the haor basins are still muddy at that time, while other crops like e.g. potatoes, if planted in January, cannot complete its cycle before the end of the cold season. Two main varieties of rice are grown:

- (a) Traditional *boro* rice varieties can be transplanted as soon as the waters have receded, generally from early November onwards. Boro typically yields 2 t/ha. Traditional *boro* varieties have medium straw height, which make them somewhat resistant to mild flash floods. *Boro* has a growth period of approx. 105 days after transplanting. It follows that most of the boro rice can be harvested just before the flash floods occur, i.e. in late February or early March.
- (b) Modern HYV boro rice varieties can only be transplanted from the middle of December onwards. HYV yields vary between 3 and 6 t/ha, depending on the appropriate use of fertilisers and proper pest management. HYV generally has a growth cycle of approx. 120 days after transplanting. It follows that HYV cannot be harvested before the middle of April. Due to the short straw of most HYV varieties, even mild flooding destroys the harvest.

As boro rice is most appropriate for the Haor basins, there is a strong lobby from paddy cultivators for extending the growing season at the cost of expensive BWDB embankments, in order to produce much larger harvest. In this respect, it was estimated by the Deputy Director of DAE that almost 50% of the area under paddy cultivation in the haor basins was owned by absentee landlords, directly or indirectly owning vast areas of paddy land, which are cultivated on share-cropping arrangements.

Under the prevailing sharecropping arrangements, the tenants contribute all labour and input costs, for a 50% share in the harvest. While such arrangements undoubtedly discourage the use of sufficient and balanced doses of fertiliser (leading to sub-optimum yields), it would still bring a handsome dividend to the landowners at virtually no risk other than flooding. Thus, while the tenants may be inclined to produce traditional boro varieties with a relatively low risk profile and the additional advantage of larger yields of straw, the landowners would prefer HYV varieties for their much higher yield potential and demand the construction of ever-higher embankments for crop protection. But this is not without cost to the eco-system as a whole, as it interferes with migration of fish and its production.

### Loss of Biodiversity

As lands have been cleared for paddy cultivation, there has been a loss of the bio-diversity that provided shelter to the native species. With this loss, the main problems of the haor fisheries are:

- Recruitment of eggs, larvae and fingerlings into the haor basins as a result of present water management practices favouring paddy cultivation above fisheries.
- Overfishing of so-called resident species, following from a lack of fish refuges or sanctuaries.
- Destruction of habitats by siltation due to man-made causes, including e.g. cutting of forests upstream in Meghalaya State leading to higher silt loads, and changed water flow patterns leading to locally concentrated deposits of silt, as well as washing away of BWDB embankments in to the haor basins at the same locations year after year.



- Natural swamp vegetation, providing shelter, spawning areas and substrate for natural feed eaten by fish, has all but disappeared, thereby greatly reducing the fish yield potential of the haor fisheries.

**There is general consensus that, in the haor areas, fish yields are related to the existing remaining swamp forest cover. A telling sign is that the lessee of Tanguar Haor, in a bid to improve the fisheries, has planted thousands of swamp trees. Submerged vegetation provides shelter for fish, allowing them to reach maturity ('spawning age') before capture and thereby contributing to the natural recruitment necessary for sustaining the fishery. Submerged vegetation also provides substrate for natural feed eaten by fish, while decomposition of organic material in general increases fish yields. In other words, reeds left to rot in the water rather than taken out by the villagers, contribute to the overall fisheries yields.**

Similarly, the beels that remain inundated after the main floods have receded, have an important function as a sanctuary especially for the non-migratory, so-called 'resident fish species'. Research in a different floodplain environment<sup>4</sup>, has shown that reducing the beel area by flood control and drainage results in lower fish yields as well as a reduction in fish biodiversity.

#### Haor Fisheries<sup>5</sup>

Approx. two-thirds or more of Sunamganj District can be considered as haor area, i.e. deeply inundated for 5-7 months of each year.

In general, during the pre-monsoon and early monsoon period, fish migrate into shallow areas, and when the floodwaters recede, they migrate back to deeper areas. River migrations are usually counter-current during the pre-monsoon and monsoon period, while lateral migrations in to the haor basins are often with the flow. Fish are very sensitive and by the time the waters start receding, they attempt to make their way out. This is well-known by the local population, and during this time there is intense fishing around the outlet channels.

The 'fish year' can be divided in to four seasons:

- (a) December - March: Over-wintering (dry season).** Broodstock and juveniles approaching recruitment size are concentrated in the deeper parts of the rivers and beels.
- (b) April - June: Spawning-migration season (pre-monsoon).** This season usually starts with the pre-monsoon flash floods, which are a peculiar hydrological feature of the Sylhet Basin. Fish generally move to shallow, newly inundated areas to spawn.
- (c) June - September: Nursery/grow-out season (monsoon).** This fish season corresponds to the high monsoon flood ('high-water'). The fingerlings of fish species, which breed in the rivers, now need to enter the floodplain for feeding and growth. This may only happen if (a) the BWDB embankments are overtopped through inundation or (b) if the BWDB regulator has one gate permanently open for allowing fish hatchlings, fry and fingerlings to be swept in to the haor basins. Any flood control structure should

<sup>4</sup> Compartmentalisation Pilot Project (FAP-20), Tangail, de Graaf et al. (2001)

<sup>5</sup> An in-depth analysis of the haor fisheries, including fish species, migration pattern, spawning sites etc. is presented in: Fisheries Specialist Study, Vol. 1: Main Report (1994). Northeast Regional Water Management Project (FAP 6), 299 pp.

be 'fish-friendly', allowing the flood waters to enter the haor basins as early as possible.

- (d) **September - December: Out-migration season (flood recession).** When floodwaters start draining out, fish move into deeper beels, some must be allowed to survive in fish sanctuaries. Big fish migrating back to the rivers ought to be able to pass the BWDB embankments through appropriate FCDI structures, and have a chance to pass the temporary embankments put up by some lessees in order to concentrate the fish in the main khal and 'catch the last fish out'.

With regards to spawning, there are basically two 'categories' of fish:

- Species, which breed in the river. This group includes the Indian Major Carps (rohu, catla, mrigal, kalibaus) as well as a number of smaller fish species. Species that overwintered in the beels rather than in the river, need to swim out of the beel for successful spawning and FCDI structures should allow for this movement.
- Species, which breed on the floodplain. The great majority of small fish species are so-called floodplain resident species, which start breeding as soon as the water level rises in the beels. There is some evidence from the Compartmentalisation Pilot Project in Tangail (FAP-20) that this increase should be at least one meter within two-three weeks, and FCDI structures should be designed taking this requirement in to consideration.

### *Fish Yields in Haors*

Based on estimates from sampling sites on floodplain and beels, the total annual catch of Dekhar Haor (2,081 ha) was extrapolated at 301 t (107 kg/ha), compared to the extrapolated annual catch of Shangair Haor (3,737 ha) of 384 t (103 kg/ha) in 1993-94. The catch per unit of area averaged 56 kg/ha for floodplains of Dekhar Haor and 64 kg/ha for floodplains of Shangair Haor, compared to 180 kg/ha for beels in Dekhar Haor and 195 kg/ha for beels in Shangair Haor<sup>6</sup>. It should be noted that shrimps and prawns contributed 23-24% to the total catch.

In contrast, in Chalan Beel on the Atrai river in the Northwest Region of Bangladesh, the extrapolated yields from unregulated floodplains was calculated at 68 kg/ha per year. Remarkably, it was reported that the yield from the regulated floodplain was 189 kg/ha, mainly due to the increased fishing pressure inside the polder<sup>7</sup>.

The main gears used on Shangair Haor and Dekhar Haor are large seine net, which is used to land 30-40% of the total catch. Push nets account for some 18 to 25% of the catch. The species include *rohu*, which was more abundant in Shangair Haor, while *chapila* and *kalibaus* were more abundant in Dekhar Haor. Of the floodplain resident species, the most important species in Dekhar Haor were *guchi baim*, *kaikka*, *baral baim*, *foli*, *kanchan puti* and *baila*, while in Shangair Haor *puti* and *kaikka* dominate.

### **3.5.2 Livelihoods Background**

The pattern of the livelihoods of the people of haor area is determined by the availability and extent of the water in the area. As the area remains under water all the people - poor or rich, Hindu or Muslim, original residents or settlers (Abadi), fish at some times of the year. Fish

<sup>6</sup> Fisheries Study: Shangair Haor Project and Dekker Hoar (1994). Fisheries Study and Pilot Project (FAP 17), Supporting Vol. No. 9, 89 pp + 5 appendices.

<sup>7</sup> Fisheries Study Chalan Beel Polder B (1994). Fisheries Study and Pilot Project (FAP 17), Supporting Vol. No. 7.

enter the area from river and hill streams; water for crop irrigation is pumped from the waterbodies; aquatic resources are collected for food and for income; people are involved in duck and duckling raising using waterbodies and aquatic plants; boat and trawlers ply in the water for taking people to and from the area providing income for the owners as well as the drivers, mechanics and fuel traders; and people engage in fish trade and duck trade. Although women are not directly involved in the fishing activities, their contribution cannot be ignored. They are involved in fish drying and net making, even making bamboo traps for income.

The stakeholders were identified through census of the area. PRA was done with 5 different stakeholder groups - poor (full time fishers), assetless and lower middle class (part time fishers), subsistence fishers (high middle class, rich), and women (fish processor, net and trap maker). The number of sub-leasees and kua owners are very few in the area and they are hard to reach, information was collected from them through Focus Group Discussion.

The stakeholders identified five different poverty level for the haor area: assetless, poor, lower middle class, upper middle class and rich (Fig 3.6). They defined the different categories and the combinations of the definitions are given below:

Assetless:

- sick/weak and destitute
- no agricultural land
- live on others land
- work as wage labour whenever they can
- do some fishing during monsoon, but no net or boat
- have debt, always deficit in food
- self excluded from all developmental initiatives
- no access to education

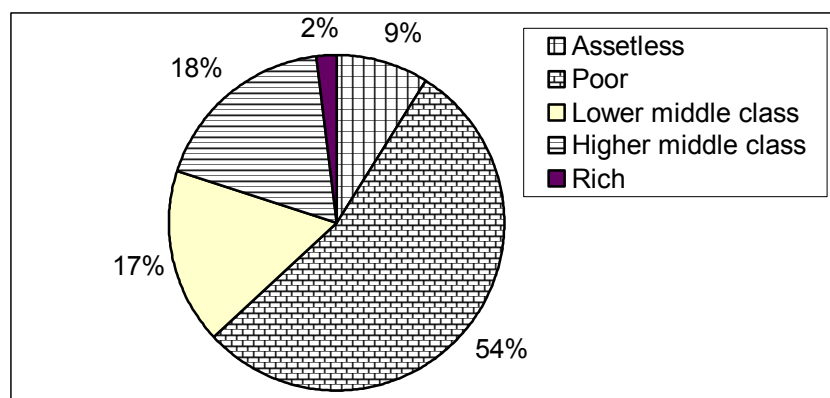
Poor:

- have no agricultural land
- very little education
- may be full time fisher, but also work as wage labour in the lean period, some sharecropping during dry season (local boro paddy)
- very small homestead, live in thatched house or one-room tin-roofed house
- have some debt, mostly food deficit, buy food
- primary education among the young generation

Lower middle class

- have some land (less than 5 acres), mostly sharecropping-in land
- breakeven between income and expenditure
- most of the income come from agriculture and petty trade, some work in the town
- have some education
- some live on seasonal petty trade

**Fig 3.6 Proportions of households by wealth category**



Each stakeholder group categorized themselves (Table 3.5.1) under the above criteria and identified the percentages of households under each poverty category. It is obvious that the full time fishers were poorer than other stakeholders. The poorest class do not want to depend on full time fishing as it is risky. They prefer to depend more on labouring which provides them daily cash income.

**Table 3.5.1 Types of poverty categories identified by the stakeholder**

Stakeholders groups	% households under each poverty category				
	Assetless	Poor	Lower Middle class	Higher Middle class	Rich
Full time fishers	7	68	25		
Part time fishers	5	55	40		
Subsistence fishers	20	30	40	10	
Poor women	12	75	13		
Non-fisher better-off				90	10
All	9	54	17	18	2

Higher middle class:

- have more than 5 acres land,
- mostly literate
- most land share-crop out
- live on agricultural income/business and service
- get some remittances
- sell agricultural products
- have trawler/tractors/power tiller
- sub-lessee/kua owners

Rich:

- have more than 10 acres of land
- lessee/kua owners
- all land under share-cropping
- live most of the time in the town
- have political connection
- income from different sources
- educated
- in well-paid services
- surplus in foodgrain

*Livelihoods sources/strategies*

Among all the stakeholders about 40% live on fishing, about 60% of fishers are full time fishers, 20% are part-time and about 10% are subsistence fishers. Stakeholders livelihoods follow different patterns (Table 3.5.2):

- fishing
- fishing-farming (share-cropping)
- fishing-labour (agriculture-fishery-petty trade)
- farming-trade-fishery (from lease/ditches)
- wage labour-fishing .

**Table 3.5.2 Livelihoods Pattern (% of all income from main sources)**

Livelihoods strategy	Full time	Part time	Subsistence	Poor women	Better-off
Fishing	60	20			
Farming				34	
Fishing-farming			92		
Fishing-labour					
Farming-trade-fishery					96
Wage labour-fishery	25	60	2	41	
Petty trade-fishing	15	20		2	
Service holder-fishery			6	23	4

However, about 90% of the poor fishers and more than 50% of the part-time fishers depend on fishing for their livelihoods. These poor people also depend on wage labour for some months when access to fishing is restricted by the leaseholders. Some of the full time fishers also work for the leaseholders or kua owners during harvest. However, it only happens for the small beel lessees. Large beel lessees usually hire labour from outside the area and those people work as fully equipped guards. About 12% of the stakeholders said that they earn more from working as contract labour for the kua owner and as agricultural labour. A number of fisher households' main source of income is from sharecropping rather than their own fishing activities. Fish trade is also a secondary source of income of 10% of the households. Women and men of 5% of households also make net and trap for sale. About 5% of the higher middle class stakeholders have a combination of different livelihood sources. This varies from household to household, but they all have income from agriculture and fishery. They also rent out agricultural machineries and are involved in service (salaried) occupations.

Fig 3.7 shows a general seasonal activity calendar of the stakeholder groups of the haor area. Those who are full time fishers go fishing throughout the year, some of the time either by poaching or by bribing the guard. The legal fishing season in the haor for them is in the monsoon. They fish individually. People who fish for the lease holders fish in team because they use seine net which need more than one person to operate.

Farming activity starts in December-January and ends in the middle of May. Usually water starts to enter the area from May. However, some of the fishers work as wage labour in big farmers' fields during transplanting/sowing and harvesting. During peak cultivation period they can earn about Tk.60/day (without meal). Labour shortage during harvest in haor is a regular phenomenon. People from different areas come to harvest paddy on contract basis. They get share at the proportion of 1:8 of the total harvest.

**Fig 3.7 Seasonal activity calendar**

Description	Cha	Bai	Jai	Ash	Sra	Bha	Asw	Kar	Agr	Pau	Mag	Fal
Fishing		■	■	■	■	■						
Farming	■	■								■	■	■
Farm Labourer		■	■							■	■	■
Non-farm labour	■	■	■	■	■	■	■	■	■	■	■	■
Business								■	■	■	■	■
Service	■	■	■	■	■	■	■	■	■	■	■	■
Fishery labour										■	■	■

Note: Cho=Choitra(Mar14-Apr15), Bai=Baisak (April 15-May 14), Jai= Jaistha (May 15-June 15), Ash=Ashar (June 15-July 14), Sra= Sraban (July 15-Aug 14), Bha=Bhadra(Aug 15-Sept14), Asw=Ashwin (Sept 15-October14), Kar=Kartik(Oct 15-Nov14), Agr=Agrahayan (Nov 14-Dec15), Pau=Paush(Dec14-Jan15), Mag=Magh(Jan 15-Feb14), Fal= Falgun (Feb15-Mar 14)

Peak trading of paddy is done right after harvest. However, fish trading is done often from the fishing boat. The traders buy fish and take those to the nearby wholesale trader. During the lean period (fishing in river and high water level) when fishing is not profitable some fishers manage loan from the moneylenders and buy products from the village and sell outside the area. They can make some profit but the interest for the borrowed amount is too high.

Women work as wage labourers during harvest period. They process paddy. They are usually paid by day's work. They also make traps made of bamboo during October-February. They take advance from the moneylender and sell their products at about one third of the market retail price. Moneylenders do not give them loan on fixed interest because the borrowers usually cannot pay interest, even sometimes they cannot return the original amount.

### 3.3.5 Capital Assets

#### i) Human Capital

##### Health and disease

Fisher households suffer from different diseases but most of the diseases are linked to water (Fig 3.8). Fishers have to work in water most of the time. Constant contact with water causes serious ulceration on the foot and hand. This disease causes loss of nails. Disease sometimes results in loss of a day's work and cash income as well as extra cost for medicine. During recession of water level aquatic plants rot, which pollutes water. Touching this polluted water causes irritation of skin. During monsoon fishers face serious scarcity of pure drinking water, which causes gastro-intestinal diseases. Arsenic contamination of groundwater is another problem in the area for which most of the hand tubewells are now abandoned. Only A few rich people have A safe hand-tubewell where access is restricted for the poor people. There is no health care center nearby most of the area. If there is a government health center a doctor is not available or the poor are not attended. If there are any free medicine sources fishers do not get it free, they have to pay. Mud roads are not easy for local transports to run during monsoon so it is difficult to take sick people to the city health clinics. Average household size is 5.2. Family planning is hardly followed. But child mortality rate is high. Pneumonia is a fatal disease for the children during June-July. Malnutrition among all members of the fisher households is common. Rice is the main food to fill their stomach. Some fishes for some meals are available.

**Fig 3.8 Seasonal disease calendar**

	Bai	Jai	Ash	Sra	Bha	Ash	Kar	Agr	Pou	Mag	Fal	Cha
Cold/ Fever			■									■
Diarrhea	■						■					
Hand and leg ulcer due to polluted water*		■	■	■	■		■					■
Dysentery							■					■
Skin diseases*	■	■	■	■	■	■	■	■	■	■	■	■

Note: Bai=Baisak (April 15-May 14), Jai= Jaistha (May 15-June 15), Ash=Ashar (June 15-July 14), Sra=Sraban (July 15-Aug 14), Bha=Bhadra(Aug 15-Sept14), Asw=Ashwin (Sept 15-October14), Kar=Kartik(Oct 15-Nov14), Agr=Agrahayan (Nov 14-Dec15), Pau=Paush(Dec14-Jan15), Mag=Magh(Jan 15-Feb14), Fal=Falgun (Feb15-Mar 14), Cho=Choitra(Mar14-Apr15)

\*Due to water pollution from dead aquatic plants in peak period

### Education

There are primary level schools in most of the villages, but secondary level school is far from most of the villages. All households have very little education and more than half of them are illiterate (Table 3.5.3). Access to education is not a problem but the idea of spending money for education is not so cost-effective for them. Uncertainty in access to job opportunity after finishing higher studies is a concern of the fishers group. But non-fishers group usually send their children to school as they think their children should not do the same thing as them. Also fishers have less people in the households for help. Therefore, they are not so eager to send their children to the high school after primary education, although they said they don't want their children to be a fisher. However, in better-off households education is a main target.

**Table 3.5.3 Educational status of all households**

	Poor full time fishers	Subsistence fishers	Part time fishers	Women	Better off	Total
None	70	68	52	65	25	50
1-5 grade	23	5	36	26	20	24
6-10 grade	6	21	12	9	41	20
11-12 grade	0	5	0	0	12	5
More than 12 <sup>th</sup> grade	1	0	0	0	2	1

### Access to Information

Most stakeholders cannot read a newspaper. Neighbours and influentials in the area are one of the information sources. Those who live in the town and those who go to the town frequently are familiar with all types of current news. Radio is the most important source of information. They said that they could listen to radio even sitting in the tea stall. Although there is a programme on agriculture, fisheries are very seldom discussed or if it is discussed they miss it as they have to go for catching fish during that time. In every village one or two persons have TV run by battery. The main question is whether poor people have access to it or not.

### Training

The fishers never received any training from any organization. They fish on the basis of their indigenous knowledge and do what is profitable in short term. The men have not received any training. Fish related awareness campaign is seldom arranged by any NGO. NGOs working in the area are only providing credit to the women for Income Generating Activities (IGA), but training on the IGAs are not always followed. Even if they provide training, the

substances are mostly theoretical and not in the line of beneficiary need. In most of the cases, training is given during the credit operation day when all the beneficiaries come to repay loan.

ii) *Financial Capital*

Assets and Income

Among household assets, one third of all households have a cheap watch, more than one third have radio and bicycle (which is the main transport between the village and the town during the dry season) and small boat (dingy). Although overall net income from different sources doubled in the last 5 years, income from fishing increased by 45% during the last 5 years. (Tk.6,000/household/year).

From household surveys in the PRA location, there were no large differences in total income of the different household categories (Table 3.5.4), but the contribution of fishing was of course higher for households fishing for an income, and these include many of the “better off” households (in this survey with landholdings of over 1 acre, 0.4 ha). Landholders of course derive more income from farming, but also have diversified into other occupations. The value of wild plants and resources used by the haor households such as grasses for thatching and homestead protection is high – about 25% of the annual income in terms of cash income and produce eaten, while wild plants for food are important for the poorest fishers.

**Table 3.5.4 Contribution of fishing and agricultural income to the livelihoods of the people in 2001-2002.**

Contribution by source to net income	Poorest fisher	Part-time fisher	Subsistence fisher	Women	Better off	Total
Net fishing income	51.3	37.7	0.1	6.7	40.0	29.9
Net agricultural income	2.6	20.0	3.8	38.9	36.7	19.3
Value of wild plants sold or eaten	9.8	0.0	0.0	0.0	0.1	2.3
Agriculture labour	17.9	20.3	21.1	14.8	6.1	15.8
Non-agriculture labour	2.3	1.4	4.5	0.0	0.0	1.7
Rickshaw/van/boat	0.0	0.0	18.6	7.2	3.2	5.4
Handicrafts/petty trade	0.0	4.7	33.5	0.0	4.5	8.6
Domestic service for others	0.4	0.0	0.0	0.0	0.0	0.1
Begger	0.0	0.0	0.0	7.2	0.0	1.0
Mechanic/power tiller	0.0	0.0	8.3	0.0	1.7	2.0
Fish and fish related trading	0.0	1.6	0.0	10.0	0.0	1.7
Fish pond/culture	4.0	0.5	0.0	0.0	0.0	1.0
Business/service	0.0	0.0	0.0	15.1	5.1	3.2
Remittances	0.0	5.9	8.3	0.0	0.0	2.8
Other income	11.7	7.8	1.8	0.0	2.6	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Services and service providers

Fisheries extension and regulation in the area is very limited. According to the District and Thana level Officers including Fisheries Officers, there is no scope for open water fisheries development as fisheries are in the hand of lessees. Although there are laws and instructions against certain activities, such as dewatering of ditches and use of destructive gears, it is impossible for them to enforce those laws. Fisheries extension activities are mostly oriented around stocking and aquaculture. In the village there is a block supervisor who acts as agriculture extension agent and helps farmers to adapt new technologies or in coping with agricultural problems. NGOs are providing credit through women groups.



iii) *Physical Capital*

Housing and Sanitation

Usually in the haor area houses are built in the middle of the haor on artificially raised hills. Each homestead has a very small area. About 80% of the households live in less than 5 decimal land. During monsoon besides human being, all the livestock become stalled in the homestead. Overall sanitation becomes a very serious problem during monsoon. On an average fisher households and poor non-fishers have 1 room for all the household members (Table 3.5.5). About 90% of households live cramped in one thatched room or in a small tin shed room sometimes with small livestock in one side of the room, which is unhealthy.

**Table 3.5.5 Housing (% households owning)**

	Poorest fisher	Subsistence fisher	Part-time fisher	Women	Better off	Total
None	1	16	2	4	0	2
One thatched bed/storage room	23	26	24	22	3	16
Multiple room with thatch roof	15	5	28	39	18	19
One room with tin roof	51	32	37	35	41	43
Multiple room with tin roof	11	21	9	0	39	20

Poor households have very limited number of water-sealed latrine, most of them have none (Table 3.5.6). They use open are for defecation. Poor housing, low sanitary standards, inadequate nourishment and impure drinking water lead to general weakness and fatigue and intestinal troubles and diarrhea.

**Table 3.5.6 Sanitation (% households owning)**

	Poorest fisher	Subsistence fisher	Part-time fisher	Women	Better off	Total
Latrine facility						
None	0	22	22	22	30	20
Not water sealed	89	78	78	78	40	72
Water sealed	11	0	0	0	30	9
Total	100	100	100	100	100	100

Land

Poor fishers and subsistence fishers have no agricultural land (Table 3.5.7). Ownership of 50 or 100 decimal land is not a symbol of prosperity in the haor areas although in other areas ownership of 50-100 decimal considers to be marginal category. Farmers can only grow one crop in the area and the chance of crop damage to flooding is high. Crop yield per unit area also is not so high. Homestead area is small for all except better-off households. In the haor area the villages are in the permanent raised land. With the increase in households the area of villages have not been increased. During monsoon, within this small area, people also stall their livestock. Vegetable cultivation in the homestead area is almost impossible and they have to buy all vegetables for consumption.

**Table 3.5.7 Percentages of households under different categories having land**

		Poorest fisher	Subsistence fisher	Part-time fisher	Women	Better off	Total
Agricultural land	None	100	100	0	70	6	44
	<=50 dec	0	0	16	26	1	4
	50-100 dec	0	0	84	4	2	19
	101-250 dec	0	0	0	0	46	17
	251-750 dec	0	0	0	0	33	12
	>750 dec	0	0	0	0	13	5
Homestead land	None	12	26	8	9	2	8
	1-10 dec	67	53	78	78	55	65
	>10 dec	20	21	14	13	43	27

### Boats

Boat is the only transport during the monsoon. Therefore all the households have boat, the size varies with wealth. Better-off people have big boats with high speed engine and also have trawlers for carrying goods or passengers. Fishers have small boats, or they rent boats for fishing.

### Gear

Almost all households in all stakeholder categories have fishing gears (Table 3.5.8). As poor fishers fish individually, they do not use big gears in the haor. Only lessees use big gear to catch fish. Gill nets ("current net" – nylon monofilament gill nets) are widely used although they know it is harmful. There was no use of such gill nets 20 years ago. Traps, cast nets and rod and line were the main gears then. In the past, fishers only used few gears. Nets were made up of cotton threads. Fishers reported that it was easy to catch fish as there were plenty in the haor. However, gear use has not changed so much (Table 3.5.9). Most of the Muslim fishers were not fishing for an income 20 years ago. Most of the traditional Hindu fishers are now fishing in the river or work as fishery labour.

**Table 3.5.8 Percentage of household with fishing gears**

Poorest fisher	Poorest non fisher	Medium fisher	Medium non fisher	Better off	Total
99	32	99	43	73	85

**Table 3.5.9 Changes in gear use (Scores accordingly: 1=mostly used, max no = least used)**

Gear	Rank	
	Now	20 years ago
Current jal (Gill net)	1	
Ghuni (Trap)	2	4
Doari (Trap)	3	5
Fairoo	4	11
Baina (fences)	5	8
Borshi (rod and hook)	6	7
Khepla Jal (Cast net)	7	6
Veshal (Lift net)	8	9
Thela jal (push net)	9	10
Suti (cotton thread woven net)	10	
Lathi jal	11	
Koyra Jal (small lift net)	12	
Duria (trap)	13	
Ucha Jal (Cone-shaped Trap)	14	
Goga Jal (Drag net)	15	
Khunkhuni (trap)	16	
Rabbani (box trap)	17	
Tupo (trap)	18	
Dara Jal (small seine net)	19	
Polo (trap)	20	
Khadum (Trap)	21	
Juti (spear)	22	
Koch (spear)	23	
Aro (trap)	24	
Chanda Jal	25	12
Pine jal (gill net for catching carp)	26	2
Golfa Jal (gill net)		3
Nanid jal		1

iv) *Social capital*

Only 8% of all the households are NGO members. Very few NGOs work in the area. As most of the fishers do not have land which is a basic eligibility criteria for people to be a NGO member. Usually most of the poor fishers and non-fishers have no land and they are not the NGO members. A limited number of fishers (3%) are NGO members because even if they can be members often they are defaulters. Because of defaults, NGOs do not want to continue with the credit operations (which is their main activity) in this area in a large scale. Only 30% of the medium category of fishers are NGO members – those who have some land. They receive credit from NGOs and use this for different purposes. There are some fishers cooperatives which are not active by themselves but work as a signboard for the leaseholders who use their name to get access to waterbodies for their own interest. There are group fisheries (a group of linked waterbodies leased out to one lease holder).

In each village there is a village head who is the informal leader of the village. These are older people with knowledge and respect of people whom villagers listen to. There is a salish committee (village “court”), which works for conflict resolution within the village. In the village local government authorities also work for village conflict resolution.

According to the elderly people, there were always conflict on the access and ownership of the waterbodies, but the poor have some access. Now the situation become tough and people have very little trust on each other. The powerful people use the weak section of the people as their loyal group. They give them some privilege and use them for their interest against other people. As a result these poor people never unite to do something in favour of their own group interest. Empathy was high among the people before but now that

competition over survival is high the good attitude to help each other decreased. Moreover, everybody is busy with their own work. Level of cooperation depends on people's attitude and clan in the village. People from own line of clan has some cooperation but it is not so high. Empathy and empowerment are completely absent.

However, social conflicts between different interest groups in the villages are severe (Table 3.5.10). In Haor area traditional fishers have conflict with the non-traditional fishers. Non-traditional fishers now took over the place of traditional fishers and some of the traditional fishers have had to change their profession. In some cases they are even not allowed to fish in the waterbodies, whereas the new fishers live in adjacent village and they know that these fishers are traditional fishers. Conflict increased with time as the value of fish in the people's livelihoods increased over time. In current years for the possession and fishing access in the beels it was reported that the lessees killed people fishing in the haor.

**Table 3.5.10 Cooperation and conflict**

	Rank	Description
Unity	2	In case of common interest 10 e.g. embankment raising)
Trust	1	
Empathy	0	Only family & friends
Cooperation	2	
Empowerment	0	Are always controlled by someone
Conflict resolution	8	Within & outside of village They have to go to court in case of serious problems. Small problems they resolve by themselves with the help of village heads and influential people
Cooperation	7	<b>Embankment:</b> When embankment needs to be repaired announced by Masjid Committee, but initiated by someone who saw the embankment is about to collapse. Sometimes some people have to go for work. If someone doesn't take part in the collective work due to his own work he gets scolded within community.
Cooperation	10	<b>Water sharing:</b> Lessees want to keep water standing for longer in the beel for fish but small land owners want to cultivate land as soon as possible. This creates conflict among lessees and farmers.
Cooperation	1	<b>School related:</b> School committee doesn't do its job properly. Teachers do not attend students on time but complaining to the committee never resolves the problem. This creates conflict between general public and school committee.
Cooperation	2	<b>Masjid committee:</b> Not so strong, negative for the people. They raise fund from auctioning rights to small beels but general view is that they are for the common use of the people. They are supposed to do development work in the area with the money. But they show more expenditure than they incur. Usually they spend the money to repair roads near to or connecting to the committee members' houses.
Conflict	10	<b>Fishing:</b> Usually lessees do not allow poor fishers to fish in their area during post monsoon period. But fishers poach. If they get caught, their gear and boat are confiscated. Poor fishers have to lose everything.

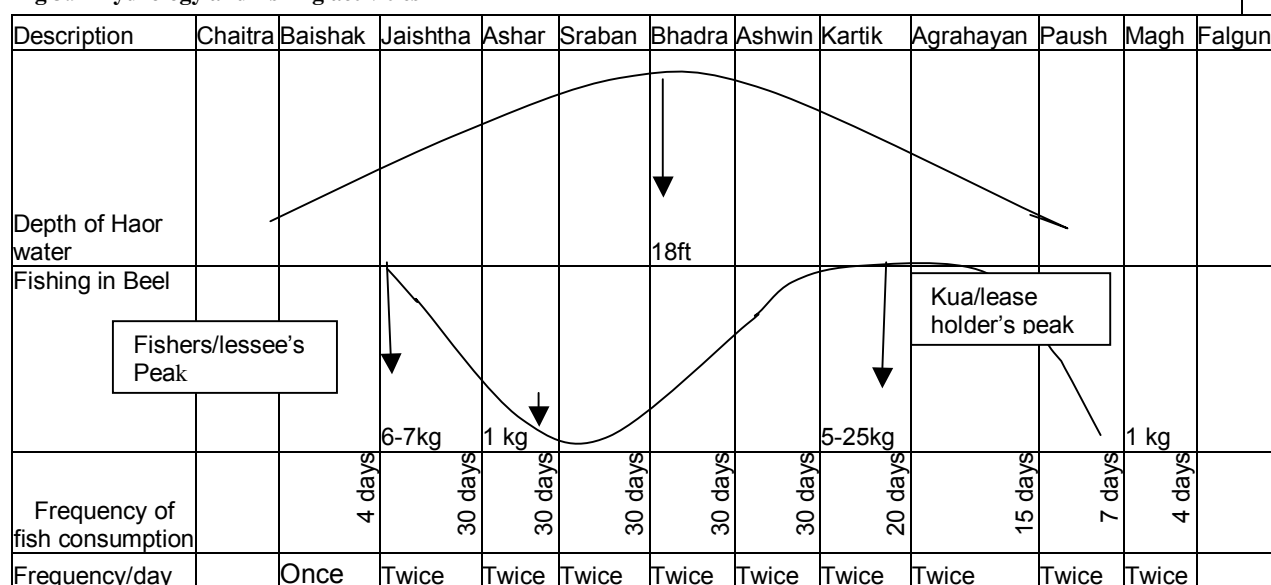
Note: rank = score out of 10, where 10 is maximum.

### 3.5.4 Natural Capital

Fishing depends on the level of water in the beel (Fig 3.9). Water in the haor stays for about 8 months starting from April. During April-May sometimes flashfloods wash away all the crops but it is good for fish to enter in the area. However, the peak level does not go beyond 18ft (6m), some years it is less. The fishers complained that due to improper installation of sluice gate and building of embankment, they do not get sufficient water when needed. Siltation near the hills is high and the area of waterbody is declining every year. In the downstream areas siltation is not so obvious. The bigger beels retain water throughout the year. Big farmers have ditches to trap fish. They try to keep fish for as long as possible and make bunds in their land, but the smaller farmers are not able to cultivate their land early. Fishers start fishing as soon as water enters into the haor. They get their maximum catches

during the early monsoon when leaseholders do not restrict them from fishing. Leaseholders also fish with the help of their hired fishermen but their catch is much higher in the post monsoon period. For the fishermen as monsoon water starts to reduce in the haor, leaseholders restrict fishing in the haor for the fishers. At the same time ditch owners also start fishing. Frequency of fishing increases with decrease in water level although catch depends on the recession rate of the haor water. Fishers can fish in the beel every day for 5 months. The fishers reported highest amount of catch from mid-May to mid-June. During that period each fisher can catch 5-7 kg of fish from the haor each day. Fish consumption also depends on the fish catch for the fishers households, but the other households, such as better-off and middle class people who have fixed income sources can buy fish for food. In the beel, fishers don't usually catch big fish, their families eat only small fishes. During the peak fishing season every stakeholder group can eat fish everyday during all meals (Table 3.5.11). In the other months the frequency of fish consumption is low and the number of days consumed also varies. During February to April frequency of fish consumption is low for the fishers and other poor households. During these months fisher households can eat fish once a week only for one meal only.

**Fig 3.9 Hydrology and fishing activities**



**Table 3.5.11 Frequency of fishing by different stakeholder category**

	FT fishers	PT fishers	Subsistence fishers	Better-off
No of months peak fishing	4	2	1	2 (kua) 3 (leased beels)
Catch (kg)/day	6	6	3	25
No of some fishing	4	4	5	2
Catch(kg) /day	2	1	0.5	2-7
No months no fishing	4	6	6	7

### 3.5.5 Trend in Natural Resources

With the increase in population, natural resources are becoming scarce day by day (Table 3.5.12). Overexploitation, habitat destruction and constant siltation of canals and rivers have a negative impact on the extent of the wetlands. Among all the natural resources mentioned by the stakeholder groups, water and land are the commonly important ones. To the better

off farmers land is the most important natural resource as their income comes from farming. They need water for irrigation also to grow winter crops. This group has valued trees at the same level as water and land. For the part-time fishers grazing land along with water is important. To them livestock raising is important for their livelihoods. These people graze livestock in the open fallow land during beginning of winter and at the beginning of monsoon sell them. Therefore, it is important for them to have open grazing land. Fish is still their next important resource. They think it is hard to live on only fishing. For poor fishers still fish and water are important. Subsistence fishers put water at the top of their list of natural resources. They use water for irrigation, ply boat to earn money, and they do fish culture. The women's group, however, put water at the top of the list of resources for a range of reasons: domestic use to fish culture. However, they also considered grasses at the top of the list as grasses are important for house building, to use as wave break for homesteads, and to feed livestock.

**Table 3.5.12 Changes in access to natural resources**

Type	Use	Access status (now)	Rank now	Access status (20 years ago )	Rank 20 yrs ago
Water	Irrigation, Bathing, Drinking, Household use, Water transport, Fish culture	No restriction to use water for irrigation, There is restriction for fish culture	10	No restriction	10
Fish	Eat, Sell/income	Restriction on fishing	10	less restriction	5
Tree	Rest underneath, Furniture making, Fuel, Boat making, Sell/ income, Eat fruit	No forest on public land. Restriction to cut trees from others' land, Restriction to eat fruits from others' trees, No restriction to cut trees from own land	10	Could collect fire wood, there were forests	6
Land	Agriculture/grow crop, Prevent flood, Road construction, Homestead work, Pottery (clay),	Less d land available for agriculture, No restriction to road construction, Restriction to use khas land, Restriction to use others' land, No restriction in using own land	10	Less restriction in agriculture, No restriction on use of khas land,	10
Water hyacinth	Cattle feed, fuel, Compost	No restriction but less available, now used as compost	3	No restriction, plenty available, only used as cattle feed	2
Grass	Cattle feed, fuel, Sale/ income, house making	No restriction , less available as fallow land is restricted, less cattle	2	No restriction, grass available	2
Lily/ lotus	Food, cattle feed, Sale/ income	No restriction, less available but poor people sell	3	No restriction, only for food	1
Cane/ string	House/ mattress making, Sale/ income	Restriction	1	No restriction	1
Hogla plant	House/ mat making, Fuel	No restriction, less available, more competition for collection, can sell each mat at the rate of Tk. 25-35	1	No restriction, plenty available, only used for personal use	1
Birds	Food, Sale/ income	No restriction, now for sell	1	No restriction, only for food	1
Black soil	Fuel	No restriction	3	Was not available or people did not use	2
Arrailla/ Chailla grass	Homestead fencing, fuel, livestock feed, protect homestead from erosion	Restricted, less available	6	No restriction, plenty available	0

Note: rank is importance out of maximum of 10 for each resource (Averaged over all stakeholders )

In the haor area everybody fishes for some part of the year either for food or for income. According to them fish were abundant 20 years back and other people (Muslim fishers) were fishing for food only. During that period the importance of fish was less as there were no restrictions on access. Anybody could fish in any place. However, as the availability is now

limited and the value is higher, and people fish for income, leaseholders do not allow people to fish in their territory or even in the private land as they claim fish to be their property and wherever fishes go lessees own them during late monsoon. During high flood period catching fish is difficult and one can only manage to catch a little even though access is easy, but when water starts to recede and fish get trapped in the beels and kuas (ditches), the lessees guard their fish. Fishers can only catch fish through poaching.

Other natural resources, such as black earth (can collect from the bottom of the beel, mixed with rotten aquatic plants) were either not available for people never used. Now people collect those, dry and use as fuel.

Grasses (chailla/arrailla) were used as fodder, fuel, fencing for protection of households from wave action. However, these grasses are rare and the landowners keep for their own use. General public has no access to those.

There is not much differences between stakeholder groups in terms of importance of different natural resources for their livelihoods (Table 3.5.13). Fish is most important resource for all categories of stakeholders as in haor environment there is very little scope for other livelihoods activities. Land is equally important to Landowners and landless people. Landless people need land for living and landowners depend on land for income. Trees are most important for the landowners as they have trees and the price of trees are high. Full time fishers consider birds important for their aesthetic values. Hogla leaves are important for the making mats which they can sell. Full time fishers and landless women consider hogla important for their livelihoods. Grasses are important for the part-time and subsistence fishers as usually keep cattle for dry seasons on fellow land and at the onset of the monsoon season they sell all their cattle.

**Table 3.5.13 Changes in importance of the natural resources for different stakeholder groups**

	FT fishers		PT fishers		Subsistence fishers		Poor women		Better off	
	Now	Before	Now	Before	Now	Before	Now	Before	Now	Before
Water	10	10	6	3	10	10	10	10	10	8
Fish	10	7	10	3	10	5	8	2	8	4
Tree	7	5	7	3	6	6	7	5	10	5
Land	8	7	8	2	10	10	7	5	10	10
Water hyacinth	0	0	0	0	3	2	0	0	0	0
Snails/mussels	6	4	0	0	8	3	10	2	0	0
Lily/ lotus	5	5	6	3	1	1	4	2	3	1
Cane	0	0	0	0	1	1	0	0	0	0
Hogla plant	3	5	0	0	1	1	6	3	0	0
Birds	10*	1	5	3	1	1	0	0	2	1
Black soil	6	0	0	0	0	0	0	0	0	0
Arrailla/ Chailla grass	3	4	7	4	0	0	9	2	0	0
Grazing land (grass)	0	0	10	4	2	2	0	0	0	0

\*Don't kill birds

Among the natural resources water lily, edible water plants, and grasses are common resources accessible for all categories of people. Except for fish, access to all other natural resources is free. People can collect them for sale or for own consumption. Water lily is a valuable product which poor people collect to sell for income. Fruits of giant lily are also used as human food and are sold. In the past people only collected them for own consumption but now-a-days the amount available decreased due to overexploitation. Better-off households do not collect those resources. In the past there were small areas of forest in the villages, which are now exploited fully and disappearing. Common public land is untraceable due to encroachment by the powerful people or the local authority has given the use right illegally to

some people. Now people only have trees in their own land. Poor people have no access to those. As the poor people have very little homestead land they have few or no trees.

High value fishes have been decreasing over time and the diversity of fish of importance to the community has fallen (Table 3.5.14). Big fishes were breeding in the haor in the early monsoon. But due to decrease in the fish population in the river, those fishes are not available to enter into the haor. In the haor, from the end of monsoon, lease holders and ditch owners harvest so much fish that the brood fishes cannot survive.

Table 3.5.14 Changes in fish species importance to stakeholders (average over stakeholders).

Rank	Now	20 years ago
1	Puti	<b>Rui</b>
2	Boicha	<b>Catla</b>
3	Veda	<b>Nanida</b>
4	Chanda	Khaila
5	Koi	<b>Chital</b>
6	Shing	<b>Goinna</b>
7	<b>Magur</b>	<b>Boal</b>
8	Tengra	Gaghot
9	Chingri/ Icha	<b>Pangus (local)</b>
10	<b>Golsha</b>	<b>Mirka (Mrigal)</b>
11	Baila	Pabda
12	Kaikla	<b>Rita</b>
13	Bacha	Gagra
14	<b>Soal and Gojar</b>	Elong
15	Chela	Lachchu
16	Bailla	Bacha
17	<b>Pabda</b>	Magur
18	Boal	Koi
19	Khaila	Meni
20		Puti
21		Kaikla
22		Soal and Gojar
23		Tengra
24		Chingri/ Icha
25		Boicha
26		Chela
27		Golsha
28		Khea
29		Khangla
30		Fuka
31		Baim
32		Foila
33		Chanda
34		Sherputi
35		Baila

**Bold** indicates large high value fish

Table 3.5.14 gives a comparative picture of the change in status of fishes. The species which were important 20 years ago for people's livelihoods are not available now, rather the status of other previously low value fishes has risen and they are becoming high value now. It is evident from the table that small fishes dominate in the haor environment now, whereas bigger and higher valued species were more dominant 20 years back. At that time the fishes could move freely from the river to the haor without any barrier. Bigger fishes, which move to floodplain for breeding cannot now enter the area due to submersible embankment which



resists entry of big fishes during the breeding period. Due to stagnant polluted water after the recession of monsoon water, fish disease has become severe in some years and certain species of fishes become severely affected. They hope that the species of carp can be replenished with proper management of the water and link between river and haor. Furthermore, conserving fishes in the ditches for a few years may rehabilitate some species.

### 3.5.6 Problem/Constraints and opportunities

The common problems identified by the stakeholder groups have been presented according to the scoring in Table 3.5.15. Problems were first stated and then each of the participants voted to prioritize problems. On the basis of all the votes the problems are ranked. After prioritization they stated the reasons, impacts, probable solutions and the groups who will be adversely affected if the solutions are not implemented.

All the groups identified that fish have been declining and some measures need to be taken. They realized that a local body needed to be formed which will be able to manage the fisheries in the each beel in the haor. The second problem is trees disappearing. To control erosion they need tree barriers, for fish refuge they need trees, for fish food they need trees, and also for fuel wood. Trees are essential. Certain local types of trees (Hijal, Korosh) can survive high flood and the leaves are good forage for the fish also. Water pollution due to rotting of aquatic weeds was said to be common especially at the end of the monsoon, causing skin diseases which prevent poor people from working with a loss of daily income.

**Table 3.5.15 Main problems faced by the different stakeholder groups (consolidated)**

Rank	Problem	Reason	Impact	Solution	Affected group
1	Fish declining	-Use of harmful gear -Catching brood fish - Fishing by dewatering private kuas -Fish dies of ulcerative syndrome disease -Indiscriminate catch of fingerlings -Lack of fish recruitment passage	-Income from fishing decreased -Fish consumption decreased	-Enforce fishery laws - Establish local level management body -stop dewatering of beel - prevent fish disease - stop use of current jal and moshari jal - release fingerlings - establish fish sanctuary	-Fishers -Consumers
2	No trees or refuge/ breeding ground for the fish	-Indiscriminate harvest of trees -Common property are under the control of powerful people -No initiative to plant trees in the haor	-Early flash flood -Lack of fish breeding ground as well as shelter	-Plant trees	-Fishers -Community
3	Water pollution	-Dead weeds -Dead fish due to disease -Unused/torn monofilament net under the water -Duck rearing	-Skin disease -Fish disease	-Clean weeds and other debris -Limit duck rearing	Fishers -Community
4	Siltation of water-bodies	-High silt load from the upper riparian country -Washed off submersible embankments	-Water logging	-Canal re-excavation - Better compacted roads	-Fishers -Community
5	Early flash flood	-Lack of trees in the upper catchment area in India -Siltation of canals and rivers	-Crop damage -Homestead damage	-Early crop cultivation -Plant trees	-Farmers - Community
6	Indiscriminate catch of water birds	-Poverty - No law enforcement	-Bird population declining -Natural imbalance	-Strict law enforcement -Alternate livelihoods for the poor	-All
7	Lack of	-Grabbing land by the	-No land for public	-Retrieve land from the	-All

Rank	Problem	Reason	Impact	Solution	Affected group
	common property resources	powerful people	works	land grabbers through government initiatives	
8	Fishing not allowed in leased beels	-Lease holders enforce their rights on the waterbody -Poor fishers cannot pay fees	-Genuine fishermen loosing their livelihoods	- Genuine fishermen should get the lease	-Fishers
9	Communication problem	-Low lying area -Flood -Siltation of canal	-School going children have to go by boat and sometimes cannot go to school -Marketing of products is a problem -Have to sell products at a lower price	- Construct permanent submersible embankment cum road	-Students
10	Lack of pure drinking water	-Shortage of tubewell -Lack of money to buy tubewell -Polluted surface water	-Increased water borne disease	-Government initiative for installing public water sources	-All
11	-Lack of drainage facility	- Canals silted - Kua owners make bund to store water	-Late transplanting/sowing of crop exposed to early flood	-Re-excavation of canal	-Small and marginal farmers
12	Lack of employment	-No opportunity for jobs -Low rate of education	-Low income -Free time for destructive politics	-Create job opportunity through establishment of factory/mills	-Poor people
13	Poor education facility	-Lack of educational institution -Lack of teacher or reluctance of the teachers to teach	- High illiteracy rate - Unemployment	- Increase number of educational institutions	
14	Lack of health care facilities	-No health care center -Lack of doctors and lack of medicine -Lack of roads	-Poor health -High child/ prenatal mortality rate	-Government initiative to provide health care facilities to all	-Poor people
15	Scarcity of firewood	-No trees -No space in the homestead for tree plantation	- Cannot cook more than once a day creating health hazard	-Plant more trees in the public places	-Poor people
16	Small homestead	-High population growth -Low lying land -Small area for living	- Many people to live in a small area. -Health hazard - No trees - No garden	- Government initiative for flood proofing	-Poor people
17	Erosion of homestead	-High wave action -No trees around the homestead	- Area of homestead decrease	-Plant trees around the village mounds	
18	Crop pest and diseases	- Alternate shelter available -HYVs are susceptible to pests and diseases	- High crop damage	-Cultivate improved crop variety	-Big farmers -Small farmers
19	No land for graveyard/ playground	-Low lying area -Flood -Siltation of canal	-Problem to bury dead during monsoon -No place for recreation	-Government should take initiative to raise low land to make high land	-All

**As opportunities they see the beel as a great asset. Fish population can be doubled through closed season, establishing winter shelter for brood fishes and proper water management.**

Conservation can also increase other aquatic resources in the beel/haor. Fish processing is another opportunity for the area. For example, they proposed that if they can have a small scale ice factory nearby they can preserve their fish and sell at a later period. The fishers cooperatives can jointly start duck farm, duckling raising farm and fish nursery, tree nursery, and winter vegetable gardening on the high ground. Tree saplings have high demand as well as high price. Net making and trap making are other opportunities for the women.

### 3.5.7 Vulnerability and coping strategy

The submersible embankment built years ago needs repairing every year (Table 3.5.16). These submersible embankments cannot resist water flow from flash flood. This is good for the fishers as they catch maximum fish during this period. However, farmers are not happy as they lose crop. They build temporary embankment to save their crops as well as to keep water for fish after monsoon. This type of embankments create water logging problem for the small farmers who cannot cultivate land early and become victim of flash flood more than the big farmers.

Diarrhea is a common problem but it sometimes appears as epidemic. Use of polluted water, unhealthy environment, eating cold/long-left cooked food causes diarrhea and dysentery every year. For these diseases they have to spend money for medication and they also lose income. Hail storms damage crops in most years at the end of the crop season. Cyclone is not common but may be severe. Although water is the main and most abundant resource during monsoon, during dry season it is in shortage. In the haor area ground water level goes down very fast and installation of deep tubewell is not possible due to gravel at the underground level. Other hazards are major problems but can be handled with some means.

**Table 3.5.16 Vulnerability**

Vulnerability	Rank	Extent of damage
Flood	10	Every year flash flood damages some crop, some year they loss 100% crop.
Cholera/Diarrhea	9	Every year outbreak due to unhealthy living condition and polluted water use
Hail storm	8	Damages 50% crop, severe in 2001
Cyclone	5	1998, 2000
Drought	2	Two droughts in last 10 years. Last in 1998, damaged 75% crop
Crop disease	2	Damages 40% crop
Crop pest	1	Every year, need to use pesticide, increases production cost

To cope with disasters and related problems, they usually take the following measures:

- take loan from moneylenders
- sell fixed assets
- migrate for work to the city where they can work for money
- sell labour in advance
- sell crop in advance
- sell fish in advance
- do other business.

### 3.6 River confluence (Manikgangj) Summary of PRA information

**Table 3.6.1 Poverty/Wealth categorization (% of the population)**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Very poor	50%, dependent on others, no land, squatters, no gear, VGD card holder, food shortages throughout the year		50%	50%			30%
Poor	30%, few have fishing gear, no agricultural land, live on physical labour, shortage of food	75%	50%	50%	25%	20%	42%
Average	20%, have some agric land, have fishing gears	25%			25%	50%	15%
Better off					50%	30%	13%

**Table 3.6.2 Human Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Health	Ill	Healthy	Healthy	Healthy	Healthy	Healthy	Healthy
Literacy(%literate)	10	20	10	10	95	40	Low except traders
Fishery skill	Yes	Yes	-	-	Yes	-	Yes
Skill training	Fish cultivation	No	No	No	No	No	No
Access to information	Radio, television	Radio, television	Radio, television	Aratdar, fishery department	DoF, TV, Radio	Radio, Television, NGO, Government officials.	DoF, TV, Radio, Aratdar

**Table 3.6.3 Physical Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Housing	90%- Kuccha	Kuccha	Kuccha	Kuccha	Semi Pucca	Kuccha	Kuccha
Road	Kuccha	Kuccha	Kuccha	Kuccha	Brick road	Kuccha	Kuccha
Sanitation	Open latrine	Open latrine	Open latrine	Open latrine	Some	Open latrine	Open latrine
Gear/Boat	50% owns gear, 20% have boat	Bamboo trap, net, 100% have boat	Owns, net, no boat	Fishing gear, no boat	Fishing gear and boat	Fishing gear and boat, 50% have ponds	Have gears and boats

**Table 3.6.4 Social Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Cooperatives	Yes	No		Yes		Mosque committee	
Association			Yes	Yes	Yes	Yes	
Conflict resolution							
Samaj	Yes	Yes				Yes	
Cooperation	Good	Good	Bad	Competition	Competition	Good	Cooperation and Competition

**Table 3.6.5 Financial Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Credit	Informal credit from Araotdar at high interest rate	Arottdar, NGO	-	NGO, trader's association, Bank, relatives	NGO, trader's association, Bank, relatives	Agricultural Bank, Nursery	
Savings	None	NGO	-	NGO, Bank	NGO, Bank	Bank	Bank, NGO

**Table 3.6.6 Natural Capital**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Land Ownership	25% have agric land	25% have agric land	25% have agric land	Homestead	Homestead & agric land	Homestead land & agric land	
Fishing access	Open access	Open access		-	-	Licence fees according to size and number of gears	
High Water level	July-August	August-September		-	-	August-September	
High Fish catch/availability	September-October	September-October	August-September	September-October	September-October	August-September	
Fish consumption		February-March	February-March		Once in a week during rainy season	5/6 days/week during rainy season	

**Table 3.6.7 Trends**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Fish resources	Declined 50%	Declined 50%	Declined 33%	Declined	Fish landing decreased	Fish declined, fees increased	
Trees							
Aquatic plants	Declined						
Grasses							

**Table 3.6.8 Problems**

FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Lack of capital for purchasing fishing gear (nets and boats)	Fish declining	Income decreased because of less fish landing	Fish availability declining	River silted up near Aricha ghat creating problem in fish landing	Flood damages their nursery	
Availability of Fish has declined water bodies of the locality	Lack of capital for purchasing fishing gear	Unemployment problem	Lack of access to institutional credit	Fish declined	lack of capital for purchasing fry catching equipment	
Lack of homestead land and houses	Lack of homestead land to live in	Flooding	Lack of good house and homestead land	Lack of capital	Unemployment	
Robbers and mastans during fishing	Lack of safe drinking water		Problems in communication and transportation	Lack of truck stand for loading & unloading fish		
	Lack of sanitary latrine			Influence of outsider businessman		

**Table 3.6.9 Vulnerability**

	FT fisher	PT fisher	Fish worker	Fish trader	Aratdar	Fry collector	Overall
Vulnerability	Low income in April, July and August due to less availability of fish	Bank erosion, which affect their livelihood. Some of them are now living by the sides of roads due to erosion of homestead land	Low income in February to May due to less availability of fish	Low income in February to May due to less availability of fish	Low income due to less landing of fish during December-March	Low income due to low catch during October-November, and seasonal flood	
Coping Strategy	Loan from Aratdars and from other money lender of the village	loan from fish aratdar, local money lender and from NGOs.	I loan from Aratdar, NGOs and relatives, working in another area or out of Aricha ghat and using their savings	loan from different sources, reduced food intake	Loan from relatives, banks and NGOs and use their savings.	take loan, sell trees & livestock, and mortgage household belongings	

### 3.7 Estuary (Bhola) - Summary of PRA information

**Table 3.7.1 Poverty/Wealth categorization (% of the population)**

	FT fisher	PT fisher	Fish trader
Very poor	No gear or agri land, food insecure	60% - more dependents, no homestead land, no gear – fish on share basis	
Poor	No net or agri land	30% - own gear bought on credit	60% - no agri land, live on government land
Average			30% - own homestead, no agri land, need credit
Better off	Own gear and agri land, food secure	10% - own homestead, 2-7 acres land, own gear, diverse incomes	10% - up to 0.5 acres agri land, have capital, can save

**Table 3.7.2 Human Capital**

	FT fisher	PT fisher	Fish trader
Health	Good	Ill	Good, some illness
Literacy	10%	20%	20%
Fishery skill		High	
Skill training	None		
Access to information	UFO (DOF)		

**Table 3.7.3 Physical Capital**

	FT fisher	PT fisher	Fish trader
Housing	Kutcha	Mixed	20% pucca, 80% kutha
Road	Good-poor, school, NGOs		
Sanitation	None	Poor	Poor
Gear/Boat	10% own boat, 40% own nets		

**Table 3.7.4 Social Capital**

	FT fisher	PT fisher	Fish trader
Cooperatives			
Association			Yes traders association
Conflict resolution	Among themselves	Samaj	Leaders
Cooperation	High within themselves	High	

**Table 3.7.5 Financial Capital**

	FT fisher	PT fisher	Fish trader
Credit	moneylender	NGO, moneylender	NGO, aratdars, moneylenders
Savings	Some have	With NGO	Some have

**Table 3.7.6 Natural Capital**

	FT fisher	PT fisher	Fish trader
Land Ownership	Some	Homestead and Agric	90% landless
Fishing Access	River is open	Open – river, improved	Open – river
High Water level		Jun-August	
High Fish catch/availability	Apr-May, Aug	Apr-May, Aug-Sept	
High Fish consumption		Aug-Sept	Apr-Jul

**Table 3.7.7 Trends**

	FT fisher	PT fisher	Fish trader
Fish resources	Declining	Declining	Declining, less Hilsha
Trees			
Aquatic plants			
Grasses			

**Table 3.7.8 Problems**

Rank	FT fisher	PT fisher	Fish trader
1	Capital	Lack of gear	Capital
2	Fish decreased	Lack homestead	Homestead
3	Drinking water	Fish declined	Fish declined
4	No ice plant	Extortion	
5		Education	

**Table 3.7.9 Vulnerability**

	FT fisher	PT fisher	Fish trader
Vulnerability	Oct-Mar	Fe-Mar, Sept-Nov	River erosion, business poor in Sept-Nov & Feb
Coping Strategy	Loan from moneylenders, sell assets, eat less	Eat less, moneylenders, mortgage household goods	Loan from arotdar & NGOs, mortgage

### 3.8 Sundarbans (Khulna) - Summary of PRA information

**Table 3.8.1 Poverty/Wealth categorization (% of the population)**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Very poor	75% - no gear, no homestead	60% - homestead but many dependents, no/little gear	15% - wage labour, kutcha house, always in debt		90% - other's land or just homestead, kutcha house
Poor	20% - some gear, no savings, homestead	30% - own nets, rent boats, agri land <1 acre	50% - homestead, share crop, shrimp culture, diverse jobs, NGO savings	90% - homestead, no agri/shrimp land, no savings, depend on credit, women work	10%
Average	5% - homestead, tin roof, gear			10% - av 2 acres land, can save, more than one earner	
Better off		10% - shrimp farming, av 2 acres land, own gear	35% - agri and shrimp land 2-3 acres, service, savings, buy land		10% - agricultural land, some shrimp culture

**Table 3.8.2 Human Capital**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Health	Ill	Ill	Ill	Some illness	Some illness
Literacy	Illiterate	20% illiterate	40% illiterate	50%	50%
Fishery skill	DOF conservation training				
Skill training			NGO & GO – livestock, shrimp	NGOs	
Access to information	Radio, TV, markets, NGOs, GO	Elites, DOF, radio	GO, NGO, elites	Markets, radio, TV, arotdars	Husbands, radio, NGO

**Table 3.8.3 Physical Capital**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Housing	Poor	Kutcha	Kutcha	Kutcha	Kutcha
Road	pucca surfaced road link to market; school, temple				
Sanitation	No		No		
Gear/Boat	50% nets, no boats	100% nets, 25 boats	100% nets	Some have	



**Table 3.8.4 Social Capital**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Cooperatives	One, many NGOs		70% NGO members	75% members of fisher association; most in NGO groups	Most in NGO groups
Association	Hindu samaj	Festival committee			
Conflict resolution		Samaj arbitrates	Local arbitrators, occasional legal case	Elder traders	Among themselves
Cooperation		Good	Good between Hindu and Muslim	Good	

**Table 3.8.5 Financial Capital**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Credit	Easy	Arotdars, NGO, moneylender	Easy - Banks, NGOs	Easy: NGOs, arotdars	NGOs, fry traders
Savings	Few	With NGOs	Bank, NGOs	Some savings - NGOs	None/little

**Table 3.8.6 Natural Capital**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Land Ownership	75% homestead	90% homestead, 10% agri land	50% agri land	90% landless	Most no land
Fishery Access	Open in river, some bribes		Open in river and canal; can't fish in beel due to shrimp culture	Regaining land from big shrimp farmers for own shrimp farming	Open in river
High Water level		Jun-Sept	Jun-Sept		
High Fish catch/availability	Nov-Apr	Jun-Sept	Jun-Sept		Jan, Apr
Fish consumption				3-5 days/week all year	

**Table 3.8.7 Trends**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Fish resources	Declining last 15 years, fewer species	Declining, hilsa declined	Declining, some native fishes disappeared	Declining,	Fry decreased
Trees	Declining – saline waterlogging	Less trees as shrimp culture, land fertility declined	Declining – saline water	Declining due to salinity	Decreased due to salinity
Aquatic plants					
Grasses			Lost as land no longer fallow after paddy as used for shrimp		

**Table 3.8.8 Problems**

Rank	FT	PT fisher	Subsistence fisher	Fish trader	Female fry collector
1	Lack of gear	Fish decreased	Fish decreased	Fish decreased	Health care
2	River bank erosion	Crop yields fell	Can't fish in beel all year	Trees decreased	Employment
3	Robbery	River erosion	Livestock	Low sale prices	River erosion
4	Fish decrease	Trees decreased	Trees decreased		Low wages
5	No other jobs				Fish fry declined
6					Drinking water

**Table 3.8.9 Vulnerability**

	FT fisher	PT fisher	Subsistence fisher	Fish trader	Female fry collector
Vulnerability	Cyclone, erosion, seasonally Vadra, Ashin, Kartic	Flood, cyclone, Oct-Jan seasonal crisis	Apr-Jun, Jan-Feb	Low income during March-May, October-December	Aug-Dec
Coping Strategy	Loan, purchase on credit, reduce household expenditure, mortgage household assets, women work as labour	NGO/arotdar loan, migrate	Reduce spending, loans, mortgage assets, migrate	Credit from arottdars, use savings,	Moneylender, mortgage ornaments, eat less