

**UNDERSTANDING LIVELIHOODS  
DEPENDENT ON INLAND FISHERIES  
IN BANGLADESH AND  
SOUTHEAST ASIA**

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**BANGLADESH  
COUNTRY  
SUMMARY  
REPORT**

Prepared by:  
**Md. Liaquat Ali,**  
**Bangladesh Centre for Advanced Studies  
(BCAS)**

**P.M. Thompson**  
**WorldFish Center**  
**Sarder Shafiqul Alam**  
**Shah Asad Ahmed**  
**(BCAS)**

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## **1. INTRODUCTION**

The Department for International Development (DFID) of the United Kingdom has identified fisheries as an entry point for its strategic policy of reducing by 50% the number in extreme poverty by 2015 – a challenge of the 21<sup>st</sup> century. The fisheries sector can have a significant impact on the number of those in poverty in countries such as Bangladesh where there is a significant inland aquatic resource base and a considerable number of poor people who are dependent on these resources, and who are disproportionately disadvantaged due to loss and degradation of habitat, lack of management or mismanagement of the resource or inappropriate institutional and policy frameworks.

Inland fisheries are a potential entry point through which the livelihoods of poor people can be improved in the South and Southeast Asian countries of Bangladesh, Cambodia, Vietnam and Laos, where there are important inland fisheries resources and a considerable portion of the population are dependent on inland capture fisheries for their livelihoods. Before taking any measure to improve the livelihoods of poor people dependent on inland fisheries, a better understanding of the resource status and management regimes, and of the users' livelihood status, needs, problems and constraints is needed. In the past there has been more emphasis on the resources and less on the issues affecting poor people dependent on them. In view of the above a research project entitled "Understanding Livelihoods Dependent on Inland Fisheries in Bangladesh and SE Asia" has been undertaken by WorldFish Center in collaboration with Government/NGOs/Universities in Bangladesh, Cambodia, Laos and Vietnam. In Bangladesh, the BCAS has been sub-contracted as local collaborator or partner organization. The project period is from February 2002 to May 2003.

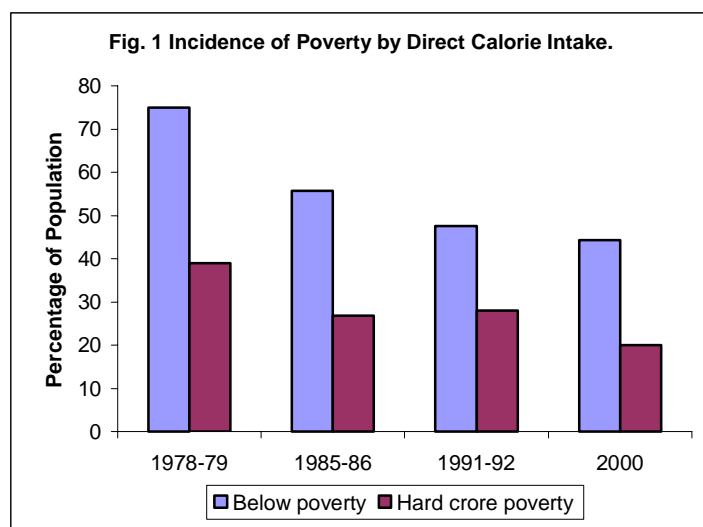
The project aimed to characterise the poor, identify their dependence upon aquatic resources, the nature and status of those resources, and their vulnerabilities in relation to loss or mismanagement. Constraints and possible research priorities have been identified through consultations with poor fishers and other aquatic resource users, and with other organizations. Fisheries resource status has been summarized.

The national studies have (i) reviewed the existing literature and conducted stakeholder discussions resulting in a country status report, and (ii) conducted Participatory Rural Appraisals (PRAs) with fisheries stakeholders to fill information gaps and obtain opinions resulting in a country PRA report. This country summary report is prepared on the basis of those two reports.

## **2. POVERTY**

Bangladesh is one of the most densely populated countries in the world, with on average 834 people per km<sup>2</sup>. Total population is about 130 million with an annual growth rate of 1.48% (BBS 2002). The annual population growth rate fell from 2.35% during 1974-1981 to 1.48% during 1991-2001.

Bangladesh is one of the world's poorest countries on international measures. According to national figures, about 44.3% of people are 'poor' (with an energy intake of less than 2122 K.cal/person/day) of which 20% are 'hard core poor' (with an energy intake of less than 1805 K.cal/person/day) (BBS 2000). Over 75% of the poor (some 43 million) live in rural areas but are classed as functionally landless (owning less than 0.2 ha of land for cultivation). Landholding size is gradually decreasing rendering more people landless. These people adopt diversified livelihood strategies for their survival, as will be seen seasonally they depend on common pool aquatic resources to save expenditure, improve their diet, and to earn some extra cash.



The proportion in poverty has reduced gradually in recent decades; in 1985-86 about 55.7% people were poor and 27% people were hardcore poor, but absolute numbers in poverty still remain high. In 1979, about 75% people were below the national poverty line (per capita energy intake less than 1900 K.cal) (the World Bank gives slightly different figures to BBS due to differences in the definitions used). The incidence of poverty calculated by Direct Calorie Intake (DCI) methods for different years is shown in Fig. 1.

Some regions of the country are poorer than others. In particular the majority of the poor continue to live in rural areas, with the trend in poverty reduction being more pronounced in urban areas. The rural poor are concentrated in the environmentally vulnerable low-lying areas of the *charlands* close to major rivers and in the delta region, and also in the northwest of the country. Despite improvements in recent years, women remain particularly disadvantaged with 95% of female-headed households in poverty (Rahman 1998; World Bank 1998; Ashley et al. 2000).

**Table 1 Distribution of households by main occupation.**

Occupation	Percentage of households		
	HES 95-96	HES 91-92	HES 88-89
Farmer	28.8	33.3	16.5
Tenant Farmer	5.0	5.3	16.2
Tenant	2.4	1.6	2.7
Agricultural Labourer	14.7	18.0	19.0
Fisher	2.5	2.6	1.5
Professional/Executive	2.4	2.5	2.6
Executive/Administration	0.4	0.5	0.4
Other Office Staff	4.2	5.3	5.1
Business	16.0	14.2	12.7
Transport/Communication	6.7	4.9	4.8
Production Labourer	4.4	2.8	5.9
Construction Labourer	2.2	1.3	-
Electricity, Water & Gas Labourer	0.4	0.2	-
Manual Labourer	3.5	2.3	-
Others	6.4	5.2	12.6
Total	100	100	100

About 80% of people live in rural areas and the country's economy remains based on agriculture. The agricultural sector (inclusive of fisheries) contributes 24% of GDP of which 6% comes from fisheries. Although the contribution of agriculture to the national economy has been declining, it is still very important in the livelihoods of the rural people.

**Table 2 Poverty Indicators.**

Indicator	1981	1991	2001
Per capita land availability (ha)	0.10	na	0.06
Per capita annual income (GDP) in US\$	130	203	363
Percentage of population below poverty line (calorie intake below 2122 K.cal)	75	47.5	44.3
Caloric intake (K.cal/person/day)	1,925	2,266	Na
Protein intake g/person/day	63.5	62.7	62.5
Fish intake g/person/day	22.0	34.5	Na
Literacy rate (% population)	19.7	24.9	44.9
Access to safe drinking water (% population)	56.7	80.0	96.7
Access to sanitary latrine (% population)	50.2	66.0	80.7
Access to electricity (% population)	6.6	14.6	31.2
Life expectancy (years)	54.8	56.1	61.0

More than 50% of households in rural Bangladesh are dependant on agriculture and 2.5 percent are fishers. Recent changes in the distribution of households by main occupation are shown in Table 1. Table 2 shows the trend of some national poverty and livelihood indicators.

The incidence of poverty in households with agriculture, forestry, and fishing as major

occupations is much higher than the overall national average (BBS 2000). About 40% of these households are below the poverty line (taking the lower poverty line) compared to the national average of 34%. The highest percentage (50%) of households below the poverty line is for landless households. In the 1995-96 Household Expenditure Survey (BBS 1997) 75% of landless agricultural workers and 45% of fishers were below the lower poverty line against the national rural average of 40%. Poverty is also associated with illiteracy: in the same survey 49% of illiterate household heads were found to be below the lower poverty line.

### 3. FISHERIES RESOURCE STATUS AND IMPORTANCE

#### 3.1 Importance of Fisheries Sector

The fisheries sector of Bangladesh plays a vital role in the country's economy, employment generation and supply of animal protein in the diet of people.

The fisheries sector as a whole contributed 4% of national GDP in 2000 (World Bank et al. 2003) and 6% of export earnings (BBS 2002). This sector provides employment to about 1.2 million full time and part time fishers, of which 0.77 million are engaged in inland open water fisheries and 0.51 million in marine fisheries. In addition, about 70% of rural households in floodplains (one-third of the country) are involved in subsistence fishing for their own consumption. A significant number of people are engaged in related activities such as fish and fry production, aquaculture and enhanced fisheries, fish trading, processing, and net/trap and boat making. According to Department of Fisheries (DOF 2001), there are about 1.93 million fish farmers, 1.15 million shrimp farmers and 0.44 million fishing fry collectors.

In the last national survey, fish contributed 6% of total protein intake, but 84% of animal protein intake (Ahmad and Hassan 1983). Fish play a vital role in supplying nutrients such as calcium, phosphorous, iron and vitamin A. Small (wild caught) fishes are the major source of calcium providing about 44% of total calcium intake; they are also major sources of Vitamin A, iron and zinc (Thompson et al. 2002).

#### 3.2 Fisheries Resource

##### 3.2.1 Physical Resource

Being situated in the deltaic plain of three river systems - the Ganges, Brahmaputra and Meghna - Bangladesh is one of the richest countries in the world. Box 1 explains the local terms for inland fisheries, to these can be added the single reservoir in the southeast region (Kaptai Lake) and innumerable closed water bodies – man-made ponds with high potential for aquaculture. In addition to inland waters the country has along its 710 km coastline extensive marine

#### Box 1: Water Body Complexity

Inland fisheries in Bangladesh are physically very diverse, and this diversity has implications for fisheries management and livelihoods.

**Baors** are oxbow lakes – old river channels that now at best have limited connections to their parent rivers through channels in the monsoon season. Many are partly closed as fisheries by fences or netting so that they can be stocked. They are mainly concentrated in the southwest of the country.

**Haors** are extensive low lying and deeply flooded areas of floodplain bounded by natural river levees often now raised by “submersible embankments”. They may contain several beels, some of which are perennial. They cover a significant part of greater Sylhet and Mymensingh.

**Beels** are usually perennial deep depressions in the floodplain. Some are “open” being linked through canals to other water bodies, others are “closed” or separate from other water bodies (oxbow lakes outside the southwest region are usually called beels). Some beels have sited up and are now largely seasonal. Man-made ditches or catch-ponds in the seasonally flooded areas of beels are called **pagars** or **kuas**.

Natural canals (**khals**) link water-bodies to rivers and provide a channel for fish and water movements.

There are three main **rivers** in Bangladesh: the Jamuna-Brahmaputra, Ganges-Padma, and Meghna. There are also many other smaller rivers, tributaries and distributaries that cover the countryside.

Source: Campbell and Thompson (2002)

waters extending up to 200 nautical miles in the Economic Exclusion Zone (EEZ) in the Bay of Bengal. The 1 million ha of perennial inland water bodies (15% of Bangladesh's area) and the over 3 million ha of floodplains form extensive inland fisheries. The areas and catches from the main types are summarised in (Table 3).

**Table 3. Water Area and Fish Production of Bangladesh in 2000-2001.**

Type of Fishery	Area (ha)	Fish production (M. ton)	% of Fish production
<b>Inland open waters</b>			
(i) Rivers, canals and estuaries	1,031,563	162,163	9.1
(ii) Depression (beel and haors)	114,161	74,527	4.2
(iii) Reservoir (Kaptai lake)	68,800	7,051	0.4
(iv) Flood lands	2,832,792	445,178	25.0
Inland Openwater Total	<b>4,047,316</b>	<b>688,920</b>	<b>38.7</b>
<b>Inland closed waters</b>			
(i) Ponds	241,500	615,825	34.6
(ii) Ox-bow lakes	5,488	3,801	0.2
(iii) Coastal Shrimp ponds	141,353	93,014	5.2
Inland Closed Water Total	388,341	712,640	40.0
Inland Total	44,24,157	1,401,560	78.7
<b>Marine waters</b> (up to 200 nautical miles in the Economic Exclusion Zone)	16,607,00	379,497	21.3
<b>Country Total</b>		<b>1,781,057</b>	<b>100.0</b>

Source: DOF Fishery Statistical Year Book of Bangladesh. 2000-2001.

During the last 50 years there has been a considerable loss and degradation of inland water bodies (fish habitat) due to man made and natural causes. Siltation is natural but abstraction of water for irrigation and fishing in the dry season reduces critical habitat. Flood Control, Drainage and/or Irrigation (FCD/I) projects and poorly planned roads constrain the high sediment loads. Some 8,888 km of embankments affecting 62% of cultivable land have helped increase agriculture production, but 0.814 million ha of floodplain wetland was lost up to 1985 and by the year of 2005 2 million ha of seasonal wetlands are expected to be lost (MPO 1988) with potential adverse consequence for fisheries.

The water quality in the inland water has been degraded due to water pollution causes by discharge of untreated industrial effluents, domestic organic waste and agro-chemicals (Ali 1997). There have been incidences of fish mortality due to water pollution in different water bodies associated with industries. Pollution due to use of chemical fertilizers and pesticides/insecticides for production of HYV rice and other crops is reported to have affected fisheries (ISPAN 1992). Annual pesticide use is around 12,000 t and includes a number that are banned in other countries. Residual concentrations of DDT and Dieldrin (non-degradable), were detected in the tissue of *Puntius* species in Tangail district at levels within the carcinogenic risk range for humans.

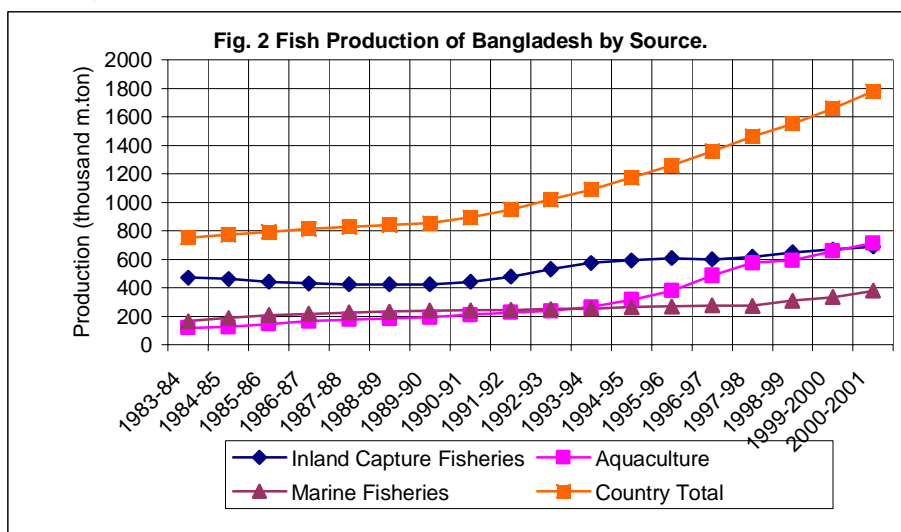
### 3.2.2 Biological Resources

Inland waters of Bangladesh are inhabited by 260 native species and 13 exotic species of fish and 20 species of prawn (Rahman 1989). The marine waters are inhabited by 475 species of fish and 56 species of shrimp.

Additionally there are other aquatic resources: crabs, both freshwater and marine mussels and snails (molluscs), amphibians and reptiles (frogs, crocodiles, and turtles), and others such as dolphin and seaweeds with commercial, environmental and nutritional values. Crabs and turtles are harvested for local consumption and export. Freshwater mussels bear famous pink pearl naturally and are collected by a group of tribal people called Badi for their pearls. Their shells are used for making button, toys, flower vase, etc. Frogs were collected for export of frog legs until 1991 when it was banned apprehending a declining population and imbalance in the environment. Large numbers of freshwater snails are collected and broken mostly by poor women and children for use as feed in freshwater prawn farms and

for duck rearing. PRAs have indicated local concerns that snails are disappearing in the southwest (Sultana et al. 2002).

Total fish production of the country in 2000-2001 was 1.78 million t of which inland open water contributed 0.69 million t (39%), aquaculture 0.713 million t (40%) and marine water 0.380 million t (21%).



DOF data shown in Fig. 2 indicates that overall production increased at an average rate of 7%, during the last 16 years. However, production in inland open water gradually declined until a claimed increase in the early 1990s. This has been attributed by the DOF to public sector flood plain stocking with carp fingerlings.

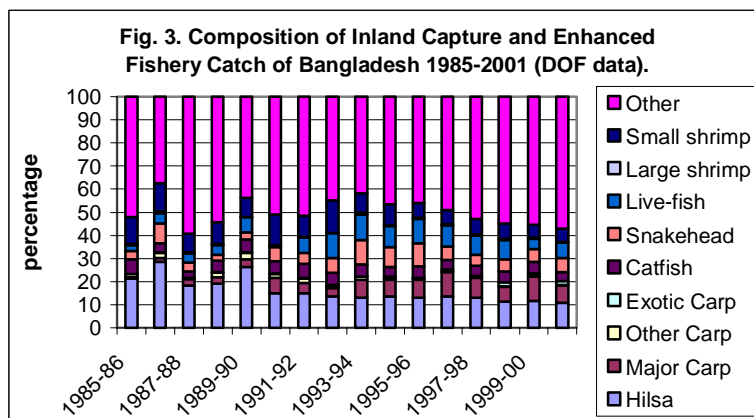
Historically, the major source of fish production was from the inland open waters. But due to natural and man-made causes discussed earlier (including over fishing, FCD/I projects, roads, pesticide, and siltation of river beds and other open waters, the fish population in inland open waters is widely believed by fishers and experts to have declined significantly, resulting in an actual decrease of fish production of the country that is not borne out in the statistics. The livelihoods of the fishing community have been adversely affected (secondary stakeholder discussion). Impacts of different factors (driving forces and pressures) on the resources and livelihoods of different stakeholders and potential responses are discussed in Section 6.

### 3.3 Trends in the Fisheries Sector

#### 3.3.1 Production

During the last fifty years there has been considerable loss and degradation of fish habitat due to man made and natural causes, which coupled with over fishing due to rapid population growth, has caused depletion of inland fisheries resources and loss of biodiversity with potential consequences for the livelihoods of those who depend on inland fisheries.

Over recent decades there have been significant changes and shifts in local fish communities. Some important species like major carps, so called “live fish” (a few small to medium sized fish species that can survive for some time out of water and are highly valued), large catfish, etc. have declined (secondary stakeholders discussion). This is not clear from DOF’s catch data (Fig. 3), which shows a different picture. This needs to be resolved through further study.



**Box 2: Status of Fisheries Resources by Environment**

Environment	Area and Trend	Physical Resource Status (Environment and Ecology)	Biological Resource status	Fishers' Catch/Contribution
Rivers	In rainy season rivers flood over floodplain. In dry season many secondary rivers stop flowing. Ganges has low flow due to abstraction and diversion of water in upper riparian country.	Siltation and riverbank erosion - very narrow and reduced water flow in dry season	Major carp spawn fishery decimated. Some species are either extinct or endangered.	Fisher catch is declining (but according to government (DOF) estimate overall riverine catch is slowly increasing since 1992-93. Access made open since 1995.
River (Estuarine)	Tidally affected. Area fluctuates with tide. Some land reclamation projects planned, but area very dynamic.	Erosion and siltation; intrusion of high salinity in dry months due to reduced flow of river water.	Fish stock declining Hilsa contributes 50% of river and estuary catch, but riverine stock declined.	Fisher catch is declining, high number of small scale fishers, open access.
Sundarban (estuary)	Area stable – controlled by Forest Department and no settlements within forest-	Higher salinity in water due to less water flow from upper riparian zone. Ecosystem changed due to coastal embankment and shrimp farming.	Wild shrimp declining due to fry fishery	Fisher catch declining. Overall catch increasing due to increases in fishing effort.
Haor (NE depression)	Full of water in wet season when they become a large sheet of water. In dry season water is retained in deeper parts only (beels).	Silting up - dry season water area reduced. Submersible dykes affect hydrology and fish habitat. Agro-chemical pollution affects dry season water quality. Aquatic vegetation (water lily, trees, grasses) valuable to poor as food and fuel have declined.	Fish stock and biodiversity declining, but still highly productive and some natural carp stocks remain. Very little swamp forest left.	Fishers' catch has declined. And according to DOF overall production decreased.
Beels/flood plain	Deepest part of floodplains (depression). Some beels are perennial and some are seasonal. Usually owned by Government.	Being silted up and some beels are dyked. Fish migration affected. Floodplains drained and subdivided by embankments. Little water left in dry season for brood fish to survive in.	Fish stock and diversity declining. Some species are threatened and some are locally extinct.	Many people catch fish seasonally, catch per person declining, IN few cases enhanced by stocking or community conservation.
Oxbow lakes (Baors)	Abandoned course of river only located in southeast (Jessore, Kushtia, Faridpur districts). Total 162 oxbow lakes, area 5,488 ha.	Gradual siltation, water area and depth decreasing	Natural fish stock is declining. Since 1960s stocking of carps to replace natural fishery – average 700 kg/ha of carp. Some evidence of lower natural catch with intensive stocking.	Catch in lakes with stocking has increased. Fisher incomes from stocking of Tk 5,000-10,000 pa where fisher groups have secure tenure and support. Other lakes managed privately with fishers hired on share basis.
Reservoir	Kaptai lake area 68,000 ha constructed in 1961 in Chittagong Hilltracts.	Agro-chemical pollution from upper reaches. Water level fluctuates between wet season and dry season.	Stock ed with carp by BFDC, wild carp and catfish declined; small fishes - chapila, kaski and telapia have increased.	BFDC takes license fees. CPUE not increased due to increase of fishing effort



According to IUCN (2000) some 54 species of fish have become threatened with extinction in Bangladesh and 12 of these species are critically endangered or extinct.

Overall national fish production decreased after 1960 mainly due to decline of catch in inland capture fisheries, which continued to decline till 1990. However, there has been an overall increase of fish production since 1975-76 due to technological development and associated production growth in aquaculture and marine fisheries. Since 1990 the overall growth rate of this sector has varied between 6% and 8%.

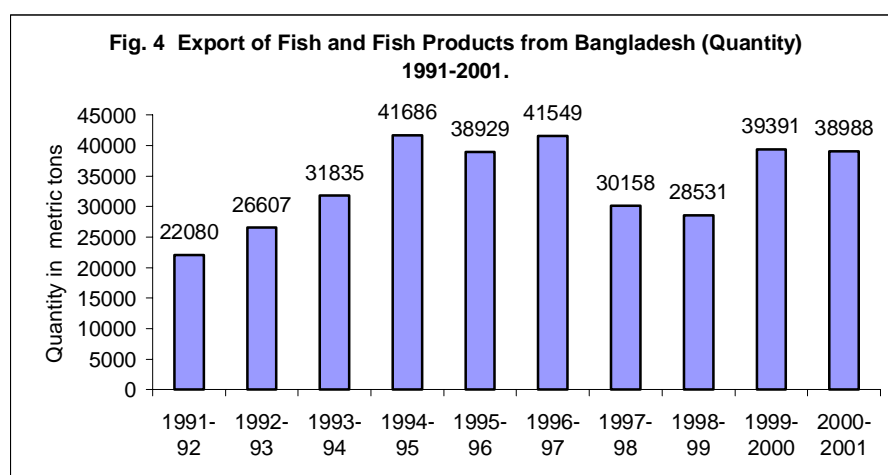
The relative price of fish when compared with other commodities, like rice and meat, has increased (BBS 1992). However, with increase of human population, fishing pressure also increased, with more people – particularly the poor – exploiting aquatic resources. Again with developments in aquaculture, including coastal shrimp culture, and marine fisheries since the mid 1970s, employment opportunities have increasing in this sector.

### 3.3.2 Fish Consumption Trends

With increased over all fish production in the country fish consumption has also increased during the last two decades. Per capita daily fish consumption has increased to 38 gm in 2001 from 22 gm in 1981 (BBS 2001). Field surveys indicate higher consumption for pond owners and richer households, but that for the rural poor including full time fishers consumption in the late 1990s is closer to the 1982 national figure (Thompson et al. 2002).

### 3.3.3 Fish Export Trend

Export of fish and fish products particularly shrimps has increased rapidly during the last two decades to meet demand in foreign markets. Presently the export of fish and fish products contributes about 6% of total export earnings. In the year 2000-2001 a total of 38,988 t of fish were exported, earning about US\$ 383 million. However, since the mid 1990s exports have varied according to world market conditions and reflect importer concerns over quality control in processing (Fig. 4).



## 4. POLICIES AND INSTITUTIONS

### 4.1 National Macro Policies

The key national policies at macro level are: population control, to grow more food through judicious use of natural resources, elimination of poverty, eradication of illiteracy, free market economy/trade liberalization, industrial development for employment generation, and participatory development and management of natural resources. In particular, poverty elimination and sustainable livelihoods are to be achieved through accelerated economic growth so raising incomes and supplying basic needs; generating sufficient employment opportunities; attaining food production beyond self sufficiency level; human resource

development through compulsory primary education and vocational training; lower population growth; protection and preservation of natural resources; closing the gender gap by giving priority to women's education and employment; and establishing better social justice through more equitable distribution of income, resources, and opportunities and by creating effective safety nets for socially and economically disadvantaged sections of the population (fourth and fifth five year plans of Government of Bangladesh).

To achieve the overall national policy objectives, sectoral policies have been adopted since the late 1990s by the government based on the interests of relevant ministries. Relevant national policies cover: water, environment, fisheries, agriculture, education, women and children development, rural development, health, jalmohal management.

## 4.2 Fisheries Policies and Institutions

All water bodies, except seasonally flooded private paddy fields and most of the manmade ponds, are owned by the Government. The Government owned inland water bodies (rivers, canals, beels, oxbow lakes, reservoir) are known as *jalmohals* and since 1950 have been controlled and managed by the Ministry of Land (MOL) with the aim of collecting Government revenue by leasing out fishing rights. While the Ministry of Fisheries and Livestock (MOFL) is responsible for management and development and conservation of the fisheries resources for sustainable yield from the fisheries - both in inland and marine water – it only has authority over some jalmohals on MOL's terms and conditions. Since the 1960s there have been attempts to change policy in order to help fishing communities gain access to fisheries and improve their share of the benefits and to improve the sustainability of management either through limiting fishing in some way or through enhancement, but these have had limited effect.

Jalmohals measuring up to 3 acres and with an annual lease value of up to Tk.5,000 have been open access resources since 1987 for use by the local people for drinking, bathing, fishing, retting jute, etc., they are under the Union Parishads which have to pay Tk.5 per acre per year to the MOL for this. All closed/semi-closed water bodies (pond and closed beel) measuring 3-20 acres were from 1984 to 1997 under the Upazila Parishads for open leasing, but from 1997 the Upazilas were directed by Ministry of Youth and Sports to lease to registered youth cooperatives to create income opportunities for the 15-30 year age group irrespective of their fishing involvement. Water bodies measuring above 20 acre retained with the MOL for revenue oriented management through leasing by tender with a preference for fisher cooperatives. During 1986-1995 some 257 jalmohals above 20 acres area were placed under the New Fisheries Management Policy (NFMP) implemented by MOFL through licensing of "genuine fishers" but retaining the same revenue requirements including annual increases in revenue of 10%. In 1995 open waters (flowing rivers) were declared to be open access with no revenue collection and the NFMP experiment was practically abandoned. But in 1998 some 31 jalmohals have been placed under NPMP and are continuing. Besides selected jalmohals are as and when required transferred to the MOFL for development and management under different development projects of DOF. The water bodies falling within the Sundarbans reserved forest are currently managed by the Department of Forest.

The Ministry of Fisheries and Livestock is the lead agency responsible for formulating fisheries policy and strategies for proper management and development of fisheries resources for sustainable fish production. Under the MOFL, there are four agencies (i) DOF, (ii) BFRI, (iii) BFDC, and (iv) Marine Fisheries Academy. Of these DOF has the relevant functions and responsibilities for development and management of inland fisheries.

Amongst other agencies involved in the fisheries sector, obviously the MOL has the key role as it controls all the public water bodies. The Bangladesh Water Development Board and Local Government Engineering Department are mainly responsible for water management

infrastructure; while the Ministry of Forest and Environment has responsibilities for the Sundarbans mangrove forest and for environmental protection including pollution control and a few critical ecological areas. In the private sector fisher cooperative societies and several NGOs are involved in fisheries sector.

Fish production and harvesting are almost entirely in the hands of the private sector in the form of leaseholders (nominally fisher cooperatives but often powerful middlemen, professional leaseholders, and businessmen). The exception are over 400 jalmohals under DOF administration for sustainable management through various extents of user (fisher) participation – again the actual management is co-management with DOF advising fisher communities and testing of systems such as fish sanctuaries and stock enhancement.

In the past the Government policy for land use, water resource and agriculture was exclusively focused to grow more rice through agricultural development and ignoring other uses of wetlands and floodplains such as fisheries, aquatic plants, forests and grazing, navigation, etc. These policies negatively impacted on these other uses. On realising the consequences the Government has adopted a number of policy changes during recent years. Now the importance of fisheries and environment has been recognized and reflected in the water resource policy, land use policy, and agriculture policy.

The national policies are well formulated but very general; while the actual fisheries policies are scattered and a mix of traditional short-sighted revenue orientation and well intentioned but ad hoc changes. But, the major problem is that the leaseholding interests at various levels are so entrenched in the system that they are able to overcome or manoeuvre around changes that threaten their income and power.

### **4.3 Key Fisheries Policies**

#### **4.3.1 Policy for Fish Habitat (Fishery)**

The Ministry of Environment and Forestry's environment policy includes the following:

- 1) Environment congenial for fish should be ensured through -
  - a) Control of discharge of industrial and domestic untreated effluent/waste into water.
  - b) Prohibition of use of harmful insecticides and pesticides in agriculture, which may be washed away into water bodies and may pollute water and harm aquatic organism.
  - c) Water bodies cannot be dewatered for harvesting fish.
- 2) Arrangement will be made to halt reduction of area of water bodies and for their development/reclamation as source of fish production, under this -
  - a) Water holding capacity of rivers, beels etc. can be increased by excavation/ dredging.
  - b) Water bodies to be reclaimed/developed and declared as national protected area for fish production. Area of such water bodies cannot be reduced.
- 3) FCD/I projects and other development activities which have already had harmful effect on fish resources to be evaluated and their environment be improved for fish production. Appropriate plans and arrangements are to be made so that flow and current of natural water bodies are not affected by development activities like FCD/I projects, roads, and embankments.
- 4) Ensure that fisheries development works do not create any effect on mangrove forest and other ecosystems.

### **4.3.2 Water Policy for Fish Habitat**

Realizing the harmful effect of FCD/I projects, which caused significant loss and degradation of fish habitats including obstacles to the migration routes of fishes, Government in its national water resource policy (1999) gave due consideration to fisheries and environment. The following provisions are relevant:

- 1) Fisheries and wildlife will receive due emphasis in water resource planning in areas where their social impact is high.
- 2) Measures will be taken to minimize disruption to the natural aquatic habitat and water channels.
- 3) Drainage schemes, to the extent possible, will avoid state-owned swamps and marshes that have primary value for waterfowl or other wildlife.
- 4) Water bodies like baors, haors, beels, roadside borrow pits, etc. will, as far as possible, be reserved for fish production and development. Perennial links of the water bodies to the rivers will also be properly maintained.
- 5) Water development plans will not interrupt fish movement and will make adequate provision in control structures to allow fish migration and breeding.
- 6) Brackish water aquaculture will be confined to specific zones designated by the Government for this purpose.

### **4.3.3 Land Use Policy for Fish Habitat**

The main relevant provisions of this policy are that the usual area for fish production such as ponds, rivers, canals and marsh lands should not come across adverse situation; and the conversion of water land into agriculture land be discouraged.

### **4.3.4 Legal Provisions for Fish Conservation**

Based on the concept of resource conservation so that fish may reproduce, in 1950 the East Bengal Fish Protection and Conservation Act was enacted in what is now Bangladesh. The main features of the Act 1950 including amendments and rules framed under it are (i) restrictions on size at catch of some species of fish at specific periods of year, (ii) restrictions on catch of any particular species at certain season/time (during spawning) (iii) restrictions on the placing of fixed engine (any fishing devices fixed to the ground) which may hamper movement of fish, (iv) closure of fishing in any water body at any time, (v) restrictions on fishing by dewatering and any other destructive methods, and (vi) restrictions on the use of particular kinds of gear and on mesh size of net.

## **4.4 Policies for Inland Fisheries - Jalmohals**

### **4.4.1 Jalmohal Management Policy of Ministry of Land**

After abolishing the *Zamindari* system in 1950 the ownership and management of water bodies (*Sairat mohal/jalmohal/fishery*) was vested with Government (Ministry of Land) which followed the previous policy of administering those *jalmohals* with the aim of earning revenue through leasing the fishing rights through auction.

The present *jalmohal* management policy of MOL is to lease out the *jalmohals* primarily to the Fisher Cooperative Societies (FCS) registered with the Department of Cooperatives through sealed tenders submitted by FCSs to the district administration. If no FCS bids or if the bid value is less than the minimum lease value fixed by MOL, then the *jalmohal* is leased through open auction where anybody can participate. The terms and conditions of leases are as follows:

1. The lease value of *jalmohals* leased to a fisher cooperative society through negotiation are fixed at 10% above the average of the last three years or the highest of the last three years revenue received whichever is higher.
2. The lessee must abide by regulations of the Fish Protection and Conservation Act 1950.
3. The lessee must not do such activity that would hinder/affect navigation, agriculture, public health, environment or cause the water of the *jalmohal* to be polluted.
4. The lessee is bound to provide any information regarding the *jalmohal* and fish and fish production to authorized fishery officers of the DOF.
5. The *jalmohal* cannot be subleased to any other person.

The present system of fixing the minimum lease value is to add 25% to the last three terms' average lease value and then increase the lease value by 10% every year in addition Value Added Tax and income tax are levied on the lease value. For *jalmohals* under DOF administration for sustainable management the 10% increase every year was ended in 2003.

#### **4.4.2 New Fisheries Management Policy (NFMP)**

In order to augment fish production through sustainable management and establish the fishing right of genuine fishers the leasing system was abolished and replaced by fisher licensing in selected *jalmohals* under NFMP from 1986. Along with MOFL/DOF, a fisher association the *Jatio Matshajibi Shamiti* was co-opted to list fishers and manage their lease payment. Under the NFMP provision for collateral free credit up to Tk.6,000 was made to help the poor fishers pay the government revenue and procure boats and nets. Initially 10 *Jalmohals* were brought under the NFMP and were managed jointly by MOFL and MOL, later 257 were brought under the pilot policy.

Compared with competitive leasing the NFMP helped fishers in some locations to establish their rights to fisheries and reduced exploitation by middlemen (leaseholders) to some extent. The extra tolls due to leaseholders did not have to formally be paid. But because of the cumbersome, time consuming and lengthy process of getting bank credit under NFMP, most fishers did not take bank loans. Some fishers remained dependent on informal private credit from moneylenders and in some cases lessees retained actual control. Fisher incomes increased in some waterbodies, but investments for sustainability were rare. The NFMP was practically abandon following the decision of the government to abolish revenue collection from flowing rivers in 1995 and to allow open access to all free of cost, except for licensing mechanized fishing boats. However, in 1998 the *Jatiya Matshyajibi Samity* arranged to have a project with DOF in 31 *jalmohals* where it has continued leasing in the name of NFMP.

#### **4.4.3 National Fisheries Policy of Bangladesh (NFP)**

The NFP was adopted by the Government in 1998, but an implementation strategy is yet to be formulated, it has the following goals and objectives:

- 1) Development of fisheries resources and increase of fish production.
- 2) Poverty alleviation through creation of employment opportunities and improvement of socio-economic condition of fisher community.
- 3) Meet the national demand for animal protein.
- 4) Increase foreign exchange earnings and economic growth through export of fish products.
- 5) Maintain environmental balance, protect biodiversity, and improve public health.

#### 4.5 Governance and Decentralization of Power and Authority

Decentralization of power and authority to local level together with people's participation at all levels are the general policy strategies of government. Accordingly some powers and authorities have been delegated to the districts and upazilas (sub-districts). However the major decision making powers remain at the central level. The proposed Upazila Parishad (sub-district elected local government) has been talked about for some time and would devolve considerable administrative and decision making power to create local government, but has yet to take place. The local councils (union parishad) remain the only locally elected form of government.

At macro-level jalmohals larger than 20 acres are administered by MOL for the collection of revenue through leasing. MOL is responsible for policy, planning and monitoring. Lease management, including fixing the lease and collection of revenue is administered at meso-level (district) by the Deputy Commissioner assisted by the Assistant Deputy Commissioner (ADC)(Revenue) who chairs the jalmohal committee. At micro-level the jalmohals are managed by lessees (Fisher Cooperative Society or other individual who gets the lease).

Jalmohals up to 20 acre are administered by the Ministry of Youth and Sports through the Department of Youth. These jalmohals are leased to registered cooperative societies of youths (men and women) through the tender system by an Upazila-level Committee with Upazila Nirbahi Officer (UNO) as Chairman and Upazila Youth Development Officer as Member-Secretary. Jalmohals falling within metropolitan areas are leased through the tender system by a Committee headed by ADC (Revenue) and District Youth Development Officer as Member-Secretary.

Overall development and management of fisheries is the responsibility of the DOF. For inland capture fisheries the major responsibilities of DOF are:

- 1) Enforcement of the Fish Protection and Conservation Act 1950, its subsequent amendment and rules framed under the act.
- 2) Undertake different management strategies like establishing fish sanctuary.
- 3) Stocking open waters/flood plain with fish fingerlings.
- 4) Developing and conserving fish habitat.
- 5) Creating awareness among the people including fishers about fisheries management and conservation need and of their laws.

In addition several NGOs are involved in assisting the community in managing fisheries through organizing them and capacity building. The current distribution of responsibilities of the different organizations and agencies in fisheries resource and habitat management at different levels is shown in Table 4.

#### 5. LIVELIHOOD ANALYSIS

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 (see Box 3). In each case separate meetings were held with people

<b>Box 3 PRA coverage in Bangladesh</b>	
<b>Fisheries stakeholders (* in all sites)</b>	
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
<b>Fisheries environment and sites covered</b>	
1.	Main River (Jamuna confluence)
2.	Estuary (Bhola)
3.	Haor (Derai, Sunamganj)
4.	Enhanced (stocked) Beel (Hilna Beel)
5.	Seasonal floodplain (Siltar)

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.

**Table 4 Fisheries Management Responsibilities at Different Levels.**

Levels		Actors	Responsibilities
Macro	National	MOFL	Formulate policy and planning for fisheries management, resource conservation and development
		DOF	Assist MOFL in policy formulation and planning in technical aspects, plan for execution of the activities, guide supervise monitor and evaluation.
		MOL	Policy and planning of lease management of Jalmohals above 20 acres.
		MOYS	Policy and planning for management of closed type of Jalmohals below 20 acres.
		MOEF	Policy and planning for forest resources management and conservation; and protection and conservation of environment management
Meso	Division	Divisional Deputy Director (DOF)	Supervision, Monitoring, Advising enforcement of law
	District	District Fishery Officer	Supervision, Monitoring, Advising enforcement of law
		Deputy Commissioner	Leasing jalmohal and collection
		Divisional Forest Officer	Supervise and monitor management of fisheries resources in the Sundarban forest
Micro	Upazila	Upazila Fishery Officer Assist Fishery Officer	Enforce Fish Act and Laws and extension activities
		Upazila (sub-district) – administrator or council chairman	Coordinating lease of small Jalmahols placed under the Ministry of Youth and Sport and Jalmohal manage under NFMP
		Forest Ranger	Issue permits for fishing in Sundarban forest area and collect revenue.
	Local	Fisher organizations NGO	Motivate and organize the fisher for capacity building to establishing fishers right, and bargain for the interest of fishers community
		Chairman, Union Parishad	Management of Khas water body up to 3 acres as common property resource.

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 5). 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.

**Table 5 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

Stakeholder Type	Wealth Category with percentage	Criteria/wealth
	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.

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 6 (and also make use of other aquatic resources for own use).

**Table 6 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%

The endowments of assets currently held by the various stakeholder categories are generally low irrespective of environment. A summary example is given in Table 7 for full time fishers, who 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.



**Table 7 Assets of Full-time fishers**

	Reservoir	Floodplain	Haor	River
<b>Human Capital</b>				
Health	Poor	ill	Ill	Ill
Literacy	10% (children)	40%	30%	10%
Skill training			No	Fish cultivation
Access to information			Radio, neighbours	Radio, television
<b>Physical Capital</b>				
Housing	Mixed	Tin roofs	mixed	90%- Kuccha
Road	None, use lake	Yes	No	Kuccha
Sanitation		Poor	poor	Open latrine
Gear/Boat		100% have smaller gear	100% have boat and gear	50% own gear, 20% have boat
<b>Social Capital</b>				
Cooperatives		Some NGO	No	Yes
Association		No	no	
Conflict resolution	Among themselves	Village court	Village court	
Cooperation	High within themselves and with Govt.	Low trust	Conflicts with non-fishers	Good
<b>Financial Capital</b>				
Credit	NGO, moneylender	Some NGO		Informal credit from Arotidar at high interest
Savings		No	no	None
<b>Natural Capital</b>				
Land Ownership	Homestead	None	none	25% have agric land
Fishing access	If pay license. Govt prevents fishing in some months	Open but landowners limit	Leaseholder limits	Open access
High Water level	Aug-Sept	Jul-Oct	Jul-Aug	July-August
High Fish catch	Jul-Sept	Nov-Dec	May-Jul	September-October

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. Box 4 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.

**Box 4 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/ Chailla 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)

## 6. TREND AND CHANGES

Based on past studies, the PRAs, and consultations with secondary stakeholders, a “Driving force, Pressure, Status, Impact and Response” (DPSIR) matrix has been developed for inland fisheries (Table 7). Five key forces identified are population pressure, floodplain infrastructure, land use changes, pollution, and fishery access and leasing policies. Measures are already being tried at least on a pilot basis to reverse some of these pressures. However, there are considerable gaps between national policy statements which recognise and seek to limit these forces where they are negative for fisheries and the poor, and the reality of inertia at various levels in a system where individuals with power and resources have a greater interest in maintaining the status quo.

## **6.1 Environment and Human Use**

Environment and the natural resources have been affected by human interventions/activities and natural processes. Fish habitats have been lost or degraded due to siltation, pollution (industrial domestic and agro-chemicals), withdrawal or abstraction of water, flood control, drainage and irrigation projects etc, which coupled with over fishing and destructive fishing due to rapid human population growth has affected the fish production and biodiversity seriously in absence of proper management practices, and thereby the livelihood of the poor dependent on fisheries (inland fisheries) have consequently affected.

Fisheries enhancement - stocking of floodplain and culture based fisheries in oxbow lakes and beels - taken up under different development projects has increased catches and improved fisher livelihoods where they have access, but the impacts on subsistence fishers are unclear and only in smaller beels and baors have communities been able to manage the financial investment and guarding necessary. There are concerns that larger wetlands may be partitioned by the private sector (leaseholders) for aquaculture development. This is likely to increase production but of larger high value fish species destined for urban markets to the detriment of access for poor people to subsistence fishing and other aquatic resources that are common property. For example, in Noakhali it has recently been estimated that 40,000 ha of seasonal floodplains are suitable for freshwater prawn (golda) cultivation by smallholders, this would increase farmer's incomes over current crop production, but the poorest 28% of households (landless) would lose about 15% of their incomes which are derived from seasonal fisheries in these floodplains.

## **6.2 Trends, Threats, Opportunities and Constraints**

Literature review and secondary stakeholders indicate that the physical resource (water bodies) are in gradual decline, both qualitatively and quantitatively, due to man made and natural causes (siltation, pollution, FCD/I, over exploitation) so affecting aquatic resources. Some species of fishes are already locally extinct and others are threatened. Fish catches and production in inland waters have declined with population pressure and accordingly fishers' incomes have decreased. Many fishers have either adopted other occupations as a secondary source of income, or fishing has become their secondary source of income. DOF's estimates show an upward trend in fish production in the inland open waters, but the methods involved are widely regarded as in need of revision and updating, recent estimates from the sector review indicate declining production.

In spite of the threats there exist opportunities for maintenance and restoration of fisheries resources and improvement of the lives of those dependent on inland fisheries. The major opportunity is recent changes in government policies to maintain remaining wetlands and recognise their value as fisheries. The high productivity of the water bodies is nature's gift to the poor people of Bangladesh. This can continue if strategies are developed to implement policies and coordination can be achieved between sectors impacting the floodplains.

In spite of these opportunities, there are problems and constraints in implementation of government policies and strategies. There are gaps in coordination among different agencies involved in the fisheries sector, and shortage of manpower and financial support in the Department of Fisheries for sustainable management of fisheries resources and improving the livelihoods of the fishing communities. Besides this, the lack of initiatives and pursuit of sustainability and continuity of any successful programme after the development phase is over have been major constraints in the public sector.

**Table 7 Analysis of Driving forces, Pressures, Status, Impacts and Responses (DPSIR) for Inland Fisheries in Bangladesh.**

SI No	Driving Forces	Pressures	Status of resource	Livelihood impacts			Responses (addressing)		
				F/t fisher	P/t fisher	Fish seller	Driving forces	Pressure	State
1	Increasing population and landless/ poverty / unemployment	Over fishing in inland water	Fish stock and biodiversity declining.	Low catch and income, changing occupation	Some changing occupation	Selling cultured fish/change occupation	Population control/create new employment opportunities	Alternate income generating activities	Enforcement of law (partly), fish conservation and stocking
2	Agriculture intensification, flood control, drainage and irrigation  Unplanned construction of road network.	Loss of fish habitat and interruption in migration routes of fish  Interruption of migration routes	Fish stock and biodiversity declining	Low catch and income, changing occupation	Some changing occupation	Selling cultured fish/change occupation	Participatory planning, Integrated Floodplain Management	Re-excavate linking canals, fish pass under project at very small scale, diversify away from crops with high dry season water demand	Enforcement of law (partly), fish conservation and stocking
3	Agricultural intensification and deforestation	Siltation of water bodies/ loss of wetland habitat	Fish stock and biodiversity declining.	Low catch and income, changing occupation	Some changing occupation	Selling cultured fish/change occupation	Afforestation	Re-excavate linking canals,	
4	Indiscriminate use of insecticide/ chemical fertilizers  Industrialization	Degradation water quality/ water pollution	Increasing diseases/ natural mortality	Low catch and low price	Some changing occupation	Selling culture fish/change occupation	Introduce Integrated Pest Management and use of organic fertilizer		Enforce existing laws regarding EIA and pollution
5	Short term leasing of Jalmohal and increase of lease value  Open access to flowing river fisheries	Over fishing and destructive fishing	Fish stock and biodiversity declining	Low share of fishery benefits, changing occupation	Some changing occupation		Policy changes, structural reform of MOL	Awareness raising and alternative livelihood activities	Enforcement of law (partly), fish conservation and stocking

### **6.3 Exogenous Factors and their Impact on the Fishers**

Non-fisheries changes can have both positive and negative impacts on fisher livelihoods, for example improvement of the road network has resulted in quick movement of fish from fishing ground to market and thereby the fishers get better prices, but construction of roads has hampered fish migration in many places and is associated with loss and conversion of use of wetlands.

The free market economy has promoted the export and import of fish. Export of fresh water fish like hilsa, catfish, etc. has benefited the fishers and fish traders as they are getting better prices. Many cultured carps are imported from India. It is not clear if this affects the price of local carp, but in any case this has little effect on wild caught fish prices as local fishes are preferred. Unlike the shrimp sub-sector only a small amount of higher valued freshwater fish are exported so any change in export demand is unlikely to have significant livelihood impacts on fishers.

Urbanization is likely to affect the fishers. As the proportion of the population which is urbanised grows and the rural economy diversifies into non-farm strategies, there are likely to be different demands on the fisheries sector. As urban incomes rise so too will their demand for food (including such a preferred food as fish). Urbanization is seen by many policy-makers as offering opportunities to rural dwellers to supply a growing urban population's needs and thus to become more market oriented. However, such demand-led development is likely to lead to further pressure on wild fish stocks. It may stimulate aquaculture production, but this tends to benefit mostly better off households owning land and therefore ponds. Fishers and other poor households are likely to have their fishing grounds squeezed by land use changes. Some floodplain areas may be drained, but recent policies will hopefully limit this. However, floodplain wetlands may well be converted from open access and traditional seasonal common property fisheries into fenced or dyked off privately operated culture based fisheries managed by the landowners.

## **7. PROBLEMS AND RECOMMENDATIONS**

### **7.1 Problem Analysis of Primary Stakeholders**

The major problems of different types of stakeholders identified through PRA in the different environments (rivers floodplain, beels, haors, oxbow lake, reservoir, etc.) are summarised in Table 8 (up to ten problems were prioritised by the resource users and then their causes and effects and potential solutions were identified by them, for reasons of space the 3-4 top problems are shown here). Declining fish catches are reported to be a major problem by most categories of people using these resources in all environments except the reservoir. However, root problems underlying this were only highlighted in a relatively few cases. This points to a need for research to understand in detail the actual significance of floodplain fisheries and of other aquatic resources for livelihoods, the alternative opportunities and constraints for traditional/full time fishers, the impacts of environmental changes on fisheries (such as pesticide levels and the impacts of integrated pest management, the trade offs between aquaculture and fisheries in floodplains), and the impacts of the access policies on fisher livelihoods – how to limit exploitation while maintaining benefits for poorer households.

**Table 8 Main problems identified by stakeholders and environments.**

Stakeholder	Reservoir	Oxbow lake	Enhance beel	Floodplain	Haor	Main river	Estuary	Sundarban	
FT Fish	1	Hill erosion	Homestead	Education	Less fish	Road	Capital	Capital	Lack of gear
	2	Crime e.g. kidnapping	Roads	Drink water	Fish recruitment	Fuel&feed	Fish decline	Fish decrease	River bank erosion
	3	Capital	Fish decline	Beel dries up	Roads	Dewatering	homestead	Drink water	Robbery
	4	Hygiene	Fish disease		Canal silted	Fishery access	Robbery	No ice plant	Fish decline
PT Fish		Road	Drink water		Fish decline	Fish decline	Lack of gear	Fish decline	
	2	Electricity	Silted beel		Trees decline	Lack capital for gear	Lack homestead	Crop yields fell	
	3	Health care	Unemployment		Flood	homestead land	Fish decline	River erosion	
	4	Cattle disease			Transport	drink water	Extortion	Trees decreased	
Subst Fish		Fish decline	Flood	Fish decrease	Flood			Fish decline	
	2	Roads	Fish decline	Communication	Fish decrease			Can't fish in beel all year	
	3	Electricity	Other natural resources decline	Livestock	Drink water			Livestock	
	4			Drink water	Medical problem			Trees decreased	
Fish worker	Low pay Long hours Aratdars		Funds Fish access			No emp opp			
Fish trader		homestead	Capital	Lack of capital		Fish decline	Capital	Fish decline	
	2	Low income	Roads	Drink water		institutional credit	Homestead	Trees decreased	
	3	Lack fuel	Health care	Lack of fuelwood		Poor house & homestead transportation	Fish decline	Low sale prices	
	4	Terrorism/ kidnapping	Drinking water						
Women			Drink water	Less fish	Road			Dowry	
	2		Fish access	Drink water	Less fish			Low wage	
	3		fuel	No land	Drink water			No emp opp.	
Other		Capital	Lack funds	Input cost	Road	Flood			
	2	Security	Poor fry	Less fish	Flooding	Lack fund			
	3	Defaulters	disease	waterlogging	Graveyard				

Note: numbers in lefthand column indicate the priority of the problem, the first line for each stakeholder category is the most important problem in their ranking.

## **7.2 Issues and Recommendations of Secondary Stakeholders**

In the national workshop to disseminate findings of this study, held in Dhaka on 13 March 2003, two working groups considered on the basis of the study opportunities for improving livelihoods and potential research issues, the findings are summarized here.

Opportunities for improving livelihoods dependent on aquatic resources:

1. The leasing system - now jalmohals are handed over to DoF for 10 years but this needs extending further with handed over waterbodies. There is no change in revenue rates yet.
2. Coordination between government agencies should be better
3. Survey of waterbodies - problem of areas, what are the real and legal areas?
4. How to manage open access rivers - need to develop a regulatory system.
5. Rivers are drying up.
6. Seasonal rice fields give opportunity for aquaculture.
7. Non-fish aquatic resources are important.
8. Future investments – given the shrinking floodplain and growing urban area, we should aim now at diversification and high value products e.g. fish.
9. Provide a comparative analysis of alternative scenarios for floodplain development, e.g. flood control and rice versus open water fisheries in monsoon – overall what is the total value?
10. DoF needs a communications unit and to decide how to portray fisheries/wetlands.

Proposed priorities for research relating to inland fisheries and livelihoods:

1. Adopt a holistic approach needed in research (livelihoods).
2. Legal and institutional gaps for CBFM.
3. Areas of fisheries and wetland resources, their status, access, security of use, and legal versus actual status.
4. Valuation of wetland use and of improved wetland management (benefits and costs of habitat restoration, etc.) and how much benefits go to poor people.
5. Security issues of resources and users – resource, access, musclemen, security etc. lack of incentives to invest.
6. Traditional fishers giving up profession – patterns and recent trends.
7. Impacts of trans-boundary (e.g. in upstream nation) changes on livelihoods of poor fishery dependent people.
8. Indigenous knowledge and good practices in fishery management and conservation
9. What messages are being conveyed, how best to inform policy makers, and how to harmonise policies affecting wetlands/fisheries.
10. PRAs are widely used they should incorporate solution analysis by communities.
11. Is openwater fisheries decline due to extraction or environmental changes? Research to determine which is the main factor in their decline. To what can we attribute losses e.g. threatened species, etc.
12. What objective should we adopt for fishery management e.g. maximise poverty reduction, maximise catch in long term, maximum economic value of catch.
13. If we adopt the integrated natural resource management objective rather than poverty reduction objective, then which system gives more revenue, fair/equitable distribution benefits, maximum catch etc? Compare and assess alternative systems including: open access, leasing, CBFM, etc. Who benefits, in which way?
14. Private enclosure of floodplains for stocking fish is a rapid change through local private initiatives, need to understand the impacts on poor people, and the differences between this and other floodplains.

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