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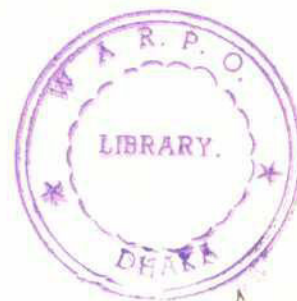
FAP 17

Fisheries Studies
and
Pilot Project (15)

FINAL REPORT

(Draft)

JUNE 1994



Supporting Volume
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VILLAGE STUDY

PABNA IRRIGATION AND RURAL DEVELOPMENT PROJECT

Prepared for the Government of Bangladesh

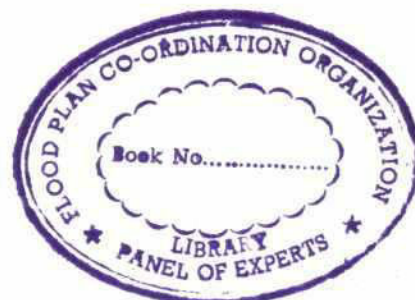
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FAP 17
FINAL REPORT



SUPPORTING VOLUME NO.13

**** Draft ****



VILLAGE STUDY

Pabna Irrigation and Rural Development Project

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FAP 17
FISHERIES STUDIES
AND PILOT PROJECT

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June, 1994

Prepared for the Government of Bangladesh

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SUMMARY OF FINDINGS

1. Impacts of FCD/I on the distribution of fisheries benefits

The most dramatic impact of the PIRDP on fisheries has been in terms of distribution of benefits from the fishery. By transforming perennial waterbodies into seasonal waterbodies, the PIRDP has contributed to driving traditional fishermen off the floodplain and *beel* onto smaller and smaller areas of perennial water, particularly on rivers. This has opened up the same areas of floodplain and *beel* to "open-access" exploitation during the period when they are inundated. This opportunity has been exploited by a growing number of local farmers and agricultural labourers who have moved into fishing on a seasonal but nevertheless professional basis.

The PIRDP has certainly diminished the fishery resource but it has contributed to a **wider** distribution of the benefits of the resource. It is not possible to estimate to what extent this redistribution of the resource has been outweighed by the decrease in its size. In the longer term, more open access and unlimited fishing would be expected to over exploit the fishery and lead to further decline.

2. Fisheries in livelihood strategies

Due to the strong social stigma attached to fishing as an occupation in this area, relatively few people take up fishing as an **important** part of their overall livelihood strategies. Subsistence fishing is widespread and contributes to household consumption though to a lesser extent than purchased fish. However, once a household takes up fishing for income, it becomes an important strand in their livelihood. Fishing offers good returns particularly during the flood season when other agricultural opportunities are limited.

3. Seasonality of fishing activity

The seasonality of fishing activity is very different for different social and occupational groups. As most *beel* within the PIRDP have become seasonal, fishing activity by Muslim non-traditional fishermen is high during the period of the floods, from *ashar* (June/July) to *bhadra* (August/ September). During the flood recession in *ashwin* (September/October) and

✓
kartik (October/November) everyone is involved in intensive fishing activity as fish are more easily caught. During the winter, dry period, fishing is limited to perennial *beel* and rivers, where traditional fishermen dominate, and *kua* (fish-pits) in *beel* and floodplain. The early part of the dry season is also important for children and women who fish out residual waterbodies close to homesteads.

4. Impacts of FCD/I on fishing communities

Traditional fishermen in the area have been the most seriously affected by the decline in fisheries within the PIRDP. High rates of out-migration from both areas studied are at least partially due to impacts of the PIRDP. The pace of out-migration is accelerating in some of the worst hit communities along the Ichhamati River.

The reduction of water area and depth has led to the decline of the area under lease-holding arrangements. Leased *jalmahal* are the only fishing grounds where traditional fishermen can have reasonably secure access. Less area under *jalmahal* means more open-access fishing and, in an open-access fishery, the traditional fishermen are at a disadvantage compared to farmers and landowners.

Traditional fishermen are increasingly limited to rivers and small areas of perennial waterbody. Even in these locations their control of fisheries access is increasingly under pressure from burgeoning numbers of Muslim seasonal or non-traditional fishermen.

Impacts are not evenly spread within the fishing community. Richer gear owners or fishermen involved in marketing are in a better position to adapt to changing circumstances and diversify their activities. Those reliant on fishing with smaller gears and on fishing labour are worst affected.

5. Access regulation

In some waterbodies, fishermen holding leases or sub-leases are unable to enforce any restriction of fishing. Where fishermen have sufficiently strong links with local institutions and centres of political power, they are able to enforce some limitations on fishing activity. However, in the face of increasing competition for access to the declining resource, the Hindu fishermen have greater difficulty in preventing others from fishing on *jalmahal*

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controlled by them, not least because of their status as a minority group with generally poor bureaucratic and political support.

The Ichhamati River at Phechuan is an exception where practically all fisheries involvement by local non-fishermen, except for subsistence fishing with simple gear, has been stopped by traditional fishermen. However, conflicts over fisheries access are increasing and generally are resolved in favour of the majority.

6. Conflicts between agriculture and fisheries

In the operation of flood control structures in the scheme, and in the design of the scheme as a whole, priority has been given to agricultural needs at the expense of fisheries requirements. The period of conflict is particularly focused during the pre-monsoon period when many of the commercially most important species undertake their yearly migration from overwintering sites in the main rivers outside the scheme, through secondary rivers and *khal*, into the *beel*. During this period, sluice gates are not apparently opened, in order to protect crops of *boro* rice standing in the lowest parts of the *beel*.

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INTRODUCTION

The principal aims of the socio-economic component of the FAP 17 Fisheries Studies are to establish how changes in fisheries caused by flood control measures affect the livelihoods of different groups of people living in the floodplains of Bangladesh. It has frequently been stated that fisheries, whether as a full-time occupation, a seasonal stop-gap or an occasional source of food, constitutes an essential part of the livelihood strategies of many rural households living in floodplain areas. There is concern that a rapid expansion of areas protected from flooding by various flood control measures, as envisaged under the Bangladesh Flood Action Plan (FAP), would cause a significant reduction in the fisheries resources available to these people. The possibility that poorer rural households in particular might be highly dependent on seasonal access to open-water fisheries has caused particular concern that the negative impacts to fisheries caused by flood control might actually outweigh the benefits arising through improved agricultural production and protection from flood damage.

The FAP 17 study has therefore analyzed the role of fisheries in the livelihood strategies of different social and occupational groups in floodplain communities and how this has been affected by flood control measures. To do this, communities inside and outside existing flood control schemes, but located in areas with comparable agro-ecological characteristics, have been selected for detailed study in four regions of the country. Near each randomly selected village, one or more specialised fishing communities have been identified which share fisheries resources with the main community. Each of these groupings of main village (usually principally agricultural) and nearby fishing communities has been regarded as a "village cluster". In each of these clusters, a quantitative survey of a stratified sample of households has looked at labour, income and consumption over a one-year period. These quantitative surveys have been supported by village appraisals which have studied the historical and social processes in and around the study villages and their effects on fisheries. Given the complexity of the fisheries environment and the number of factors which influence it, this more qualitative information has provided a vital context for the quantitative data collected during the long-term monitoring of the study villages.

In the North-West Region, the recent completion of the PIRDP, a large full flood control and irrigation scheme, provided an opportunity to study large-scale flood control impacts in some

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detail. However, problems were encountered in identifying suitable areas inside and outside the scheme located on similar agro-ecological zones. The southern and eastern boundaries of the scheme are marked by the Padma and Jamuna Rivers respectively, while to the west, the land is appreciably higher. To the north, the boundary of the scheme lies along the Baral / Hurasnagar River which also marks an important agro-ecological transition between the Ganges floodplain to the south and Atrai Basin, Karatoya and Bangali floodplains to the north. In terms of agro-ecology, the land inside the PIRDP is closer to that located eastwards, on the other side of the Jamuna and Padma Rivers in the North-Central Region around Manikganj.

With this in mind, villages were identified within the scheme which could be compared to villages in the Manikganj area. However, as field research progressed, it became apparent that, whatever the agro-ecological similarities between the two regions, the patterns of exploitation of the fisheries resources are so different that comparison would not be particularly useful. Therefore, this cross-river comparison has been abandoned and the analysis in this report concentrates on two village clusters located within the scheme. The villages studied in the Manikganj area are discussed in a separate report.

The two village clusters inside the PIRDP are located on very different land types and have access to very different types of water resource. While this makes direct comparison between them difficult, it serves to illustrate the range of impacts which have occurred as a result of the construction of the PIRDP. The report describes and assesses the impact which different processes, structures and events have had on the interaction between local people and the fisheries resource. The report combines data collected both during the village appraisals and the various quantitative surveys carried out during the study. It is one of a series of seven Village Study Reports published by FAP 17, as Supporting Volumes of the Final Report. The overall findings are compared and discussed in the Main Volume of the Final Report.

VILLAGE STUDY

Pabna Irrigation and Rural Development Project

1 STUDY LOCATION

1.1 Location

The Pabna Irrigation and Rural Development Project (PIRDP) is located in the south-eastern portion of the North-West Region of Bangladesh. It covers an area of 184,462 hectares. The location of the scheme is shown in Figure 1.

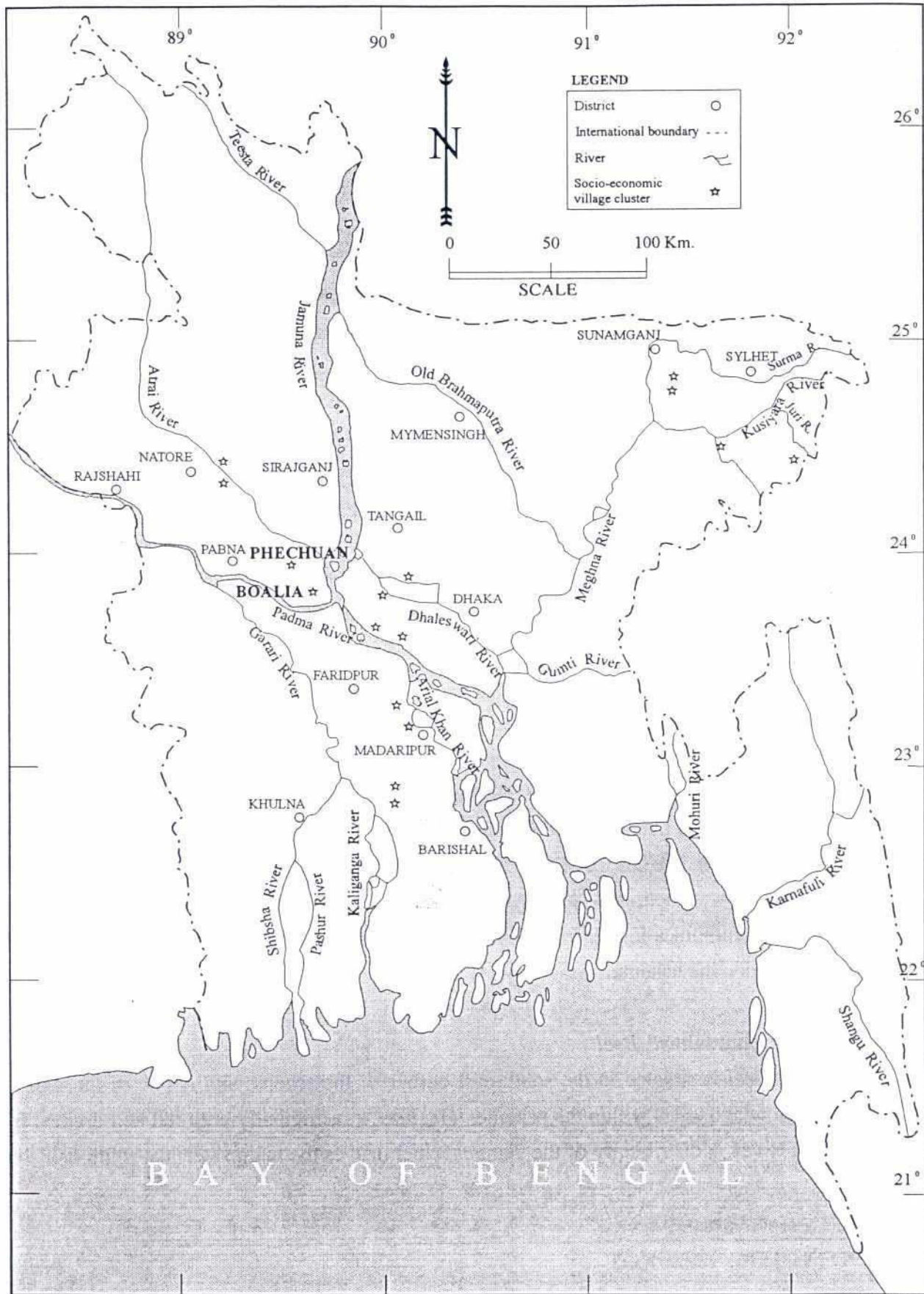
The PIRDP was initiated by the Bangladesh Water Development Board in 1973, with funding from the Asian Development Bank. The principal river embankments along the Jamuna right bank and the Ganges left bank were constructed during the 1970s. The Jamuna embankment is locally referred to as the "*Mujib bandh*", referring to its completion during the time of the then Prime Minister of Bangladesh, Sheikh Mujibur Rahman. Work continued on the project in two phases, the second of which was completed in 1993.

The scheme is a full flood control, drainage and irrigation scheme. Main river embankments enclose the entire area on three sides, along the banks of the Ganges, Padma and Baral Rivers. Water access and drainage is provided by a series of water regulators, the most important of which are located at Charghat, Talimnagar, and Demra. At Bera there are facilities for pumped irrigation and drainage while pumped drainage only is provided on the Kageswari River at Kaitala. Many of the rivers previously flowing through the area of the scheme are now functioning as irrigation channels and additional channels have been excavated. Communications infrastructure and agricultural support services have also been improved under the scheme.

Boalia and Gandahasti Beel

Gandahasti *beel* is situated in the south-east corner of the scheme and is one of the most extensive lowland areas within the scheme. The *beel* was originally both fed and drained by the Badai River, a distributary of the Ganges which leaves the main river just south of Pabna

Figure 1
Location of Boalia and Pechuan
in Bangladesh



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town and then runs through Gandahasti *beel* to its outlet at Talimnagar, at the confluence of the Ganges and the Jamuna Rivers. Two names are widely used to refer to the *beel*, Gandahasti and Gajnar. Among local farmers and fishermen, Gandahasti *beel* usually refers to the deeper portion of the *beel* while Gajnar *beel* is used for the higher floodplain located to the north. There are no major perennial waterbodies in either *beel* although the entire area is dotted with small natural and artificial depressions where some water may stay year round. The Badai River or *khal* which winds through the southern part of the *beel* also retains water perennially. The village of Boalia, in Sujanagar *thana*, was selected for study as a main village. It is located on the northern edge of Gajnar *beel*, about 4 kilometres from the deeper area in Gandahasti *beel*. The community is divided into two distinct sections located on either side of a small seasonal *beel* called Dighar *beel*. Boalia proper lies to the north and east of this *beel* while Char Boalia is located on the west side.

Most of the fishing communities in the area immediately around Boalia are made up of Muslim, non-traditional fishermen although, in the past, there were many traditional Hindu fishing communities scattered among them. The remaining traditional Hindu fishing communities in the area are now mostly located on the eastern and southern sides of Gandahasti *beel* and their fishing activity is almost entirely limited to the Badai River. The nearest group of people locally referred to as "fishermen" is found in Dakhin Char, one *para* of the neighbouring village of Ahmmedpur just south-east of Boalia. These are all Muslim seasonal fishermen.

Pechuan and the Ichhamati River

The second village cluster selected for study lies in an area of higher land in Santhia *thana* along the banks of the Ichhamati River. This river, like the Badai, was originally a distributary of the Ganges running from near Pabna town, through the centre of the PIRD, to Bera, on the Hurasagar River near its confluence with the Jamuna.

Pechuan, the main village, is located on the south bank of the river about 4 kilometres from Santhia. The two satellite fishing communities, Sonatala and Talot are both in the immediate vicinity of Pechuan. Both are predominantly traditional Hindu fishing communities, although there are also Muslim fishermen in both villages. Although both groups of Hindu fishermen are generally called "*halder*", those in Sonatala are from the *malo* fishing caste while those from Talot are *rajbangshi*, another Hindu caste group generally associated with fishing. The locations of the two clusters of villages under study are shown in Figures 2 and 3.

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Figure 2
Boalia & Ahmmmedpur
Location of study villages

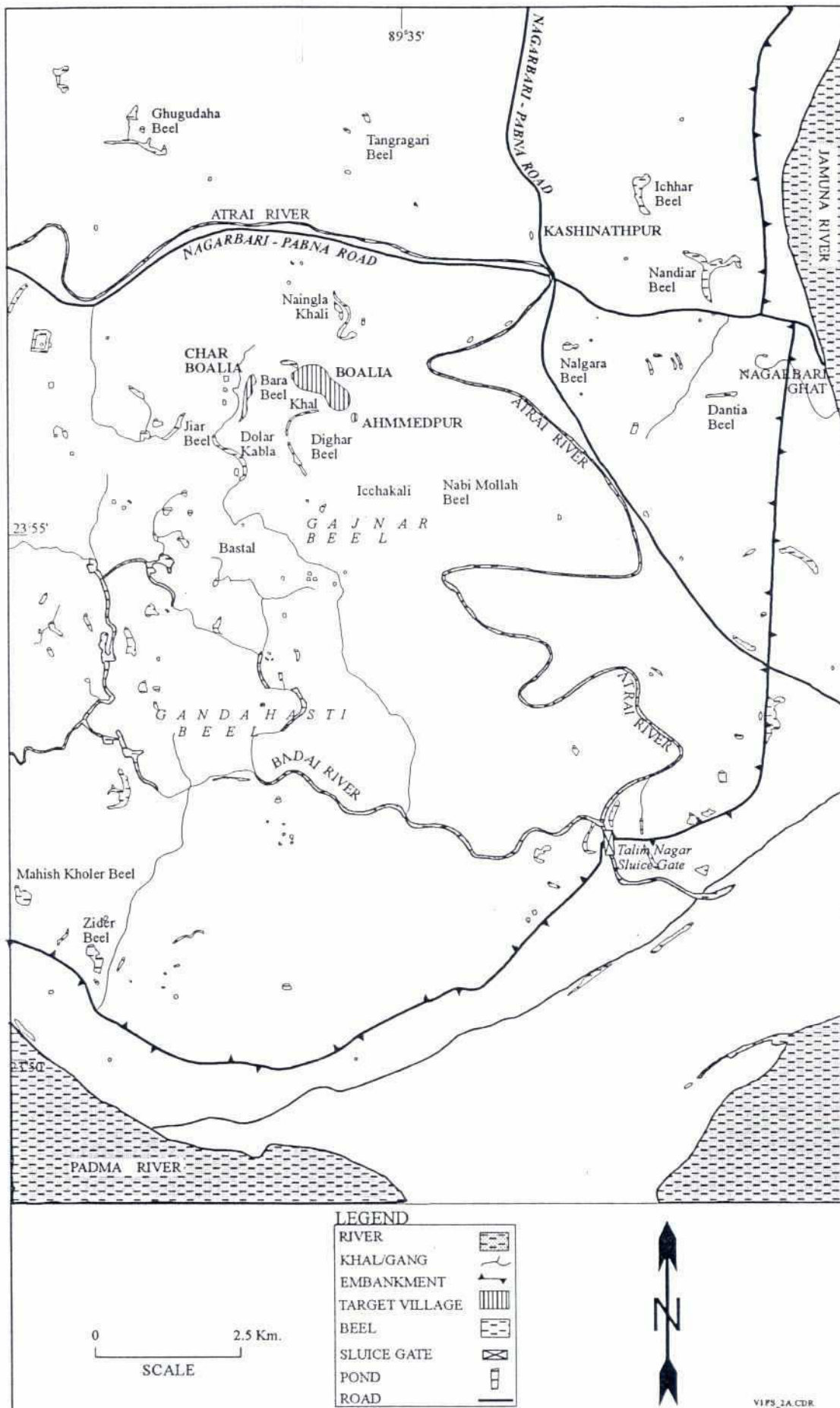
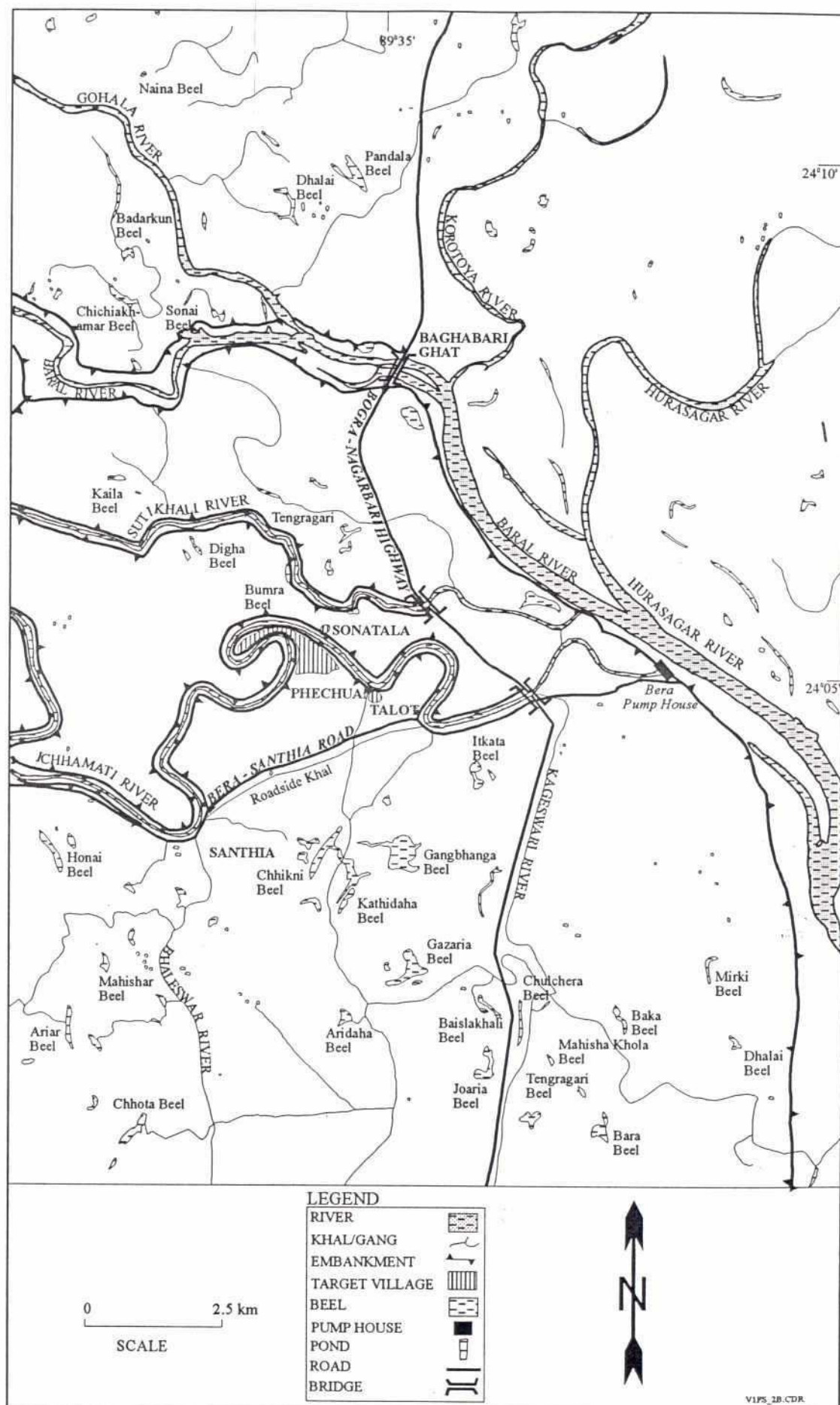


Figure 3
Phechuan, Sonatala & Talot
Location of study villages



1.2 Community profile

Tables 1 and 2 review basic socio-economic data on the population of the main villages and satellite fishing communities. For the main villages this is disaggregated by landholding category, while for the satellite fishing communities it is disaggregated by fishing category. Explanations of these categories are given with the tables.

The landholding structure in Boalia is unusual, with an exceptionally large proportion of medium landowners. The registration and distribution of *khas* land in the *beel* area during the 1970s, or its' simple occupation by nearby farmers, is mainly responsible for this pattern of land ownership. The landholding structure in Pechuan is closer to the norm.

In the cluster of villages around Pechuan, the religious differentiation between predominantly agricultural main villages and satellite fishing communities is very clear. By contrast, Boalia and Ahmmedpur are socially similar communities, in both of which there are groups of seasonal fishing households. The Muslim households engaged in fishing in both communities have very similar patterns of fisheries dependence.

1.3 Agroecology

The two main villages occupy different agro-ecological units (AEUs) within the same agro-ecological region. These agricultural units have been defined by the Bangladesh Land Resource Survey (FAO, 1988) which is based on Soil Reconnaissance Surveys conducted in the 1960s. They therefore are indicative of conditions **prior** to the construction of the principal embankments in the area. The Land Resource Survey uses the distribution of different soil types and areas of different flooding depth and duration to establish the agricultural potential of different land units. These areas are defined as "agro-ecological units" (AEUs). Within a particular AEU, a broadly similar historical distribution of soil types, land height and agricultural capability can be assumed.

These AEUs were used as a basis for the selection of communities for study as they appeared to offer the possibility of identifying areas with similar agricultural potential and similar access to waterbodies as defined by land height. In the case of the communities within the PIRDP, it was originally hoped to find a basis for comparison between communities inside

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Table 1
Boalia and Ahmmedpur
Community Profile

NW1-1 Boalia **Main village** **Inside**

Land Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years' educ. H/H head	H/H Mem-bers	Earn mem-bers	% Muslim	% Hindu	Home-stead	Culti-vable Land	Ponds	Other	Total
Large	14	59.4	9.3	7.5	1.5	100.0	0.0	46	1113	21	20	1200
Medium	73	51.8	4.4	7.8	1.6	100.0	0.0	28	424	9	2	463
Small	76	49.1	4.8	6.2	1.4	100.0	0.0	18	125	3	1	147
Landless	195	37.3	1.5	4.9	1.2	100.0	0.0	6	2	0	0	8

Source: FAP17 Village Census

* Landholding categories are defined in relation to total land owned as follows:

Large >7.5 acres; Medium 2.5-7.49 acres; Small 0.5-2.49 acres; Landless <0.49 acres.

NW1-2 Ahmmedpur **Satellite fishing community** **Inside**

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years' educ. H/H head	H/H mem-bers	Earn. mem-bers	% Muslim	% Hindu	Home-stead	Culti-vable Land	Ponds	Other	Total
F2	17	43.6	0.8	5.8	1.4	100.0	0.0	8	16	2	0	26
F3	37	41.5	0.8	6.5	1.8	100.0	0.0	10	120	4	2	136

Source: FAP17 Village Census

* Fishing categories are defined as follows:

F2 = Fishing as primary source of income but with other subsidiary source of income as well

F3 = Fishing as secondary source of household income.

Table 2
Phechuan, Sonatala and Talot
Community Table

NW2-1 Phechuan**Main village****Inside**

Land Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years' educ. H/H head	H/H Mem- bers	Earn mem- bers	% Muslim	% Hindu	Home- stead	Culti- vable Land	Ponds	Other	Total
Large	5	60.2	3.8	9.6	1.8	100.0	0.0	41	863	11	7	922
Medium	47	55.6	4.3	8.8	2.4	100.0	0.0	24	408	3	10	445
Small	68	47.8	2.3	6.6	1.8	100.0	0.0	11	120	1	2	134
Landless	132	37.0	0.7	4.7	1.3	98.5	1.5	4	4	0	0	8

Source: FAP17 Village Census

* Landholding categories are defined in relation to total land owned as follows:

Large >7.5 acres; Medium 2.5-7.49 acres; Small 0.5-2.49 acres; Landless <0.49 acres.

NW2-2 Sonatala**Satellite fishing village****Inside**

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years' educ. H/H head	H/H mem- bers	Earn. mem- bers	% Muslim	% Hindu	Home- stead	Culti- vable Land	Ponds	Other	Total
F1	35	44.7	0.7	5.7	1.9	0.0	100.0	2	0	0	0	2
F2	32	42.8	0.5	5.3	2.1	0.0	100.0	2	0	0	0	2
F3	8	48.5	2.3	7.3	2.1	0.0	100.0	6	66	2	0	74

Source: FAP17 Village Census

NW2-3 Talot**Satellite fishing village****Inside**

Fish Cat.*	No.	Household Characteristics (Average)				Religious Breakdown		Average Landholdings (decimals)				
		Age H/H head	Years' educ. H/H head	H/H mem- bers	Earn. mem- bers	% Muslim	% Hindu	Home- stead	Culti- vable Land	Ponds	Other	Total
F1	17	41.8	2.0	5.2	1.4	0.0	100.0	5	0	1	1	7
F2	9	51.8	2.3	8.1	2.8	0.0	100.0	12	24	1	1	38
F3	9	42.0	2.4	7.1	2.1	0.0	100.0	10	1	1	0	12

Source: FAP17 Village Census

* Fishing categories are defined as follows: F1 = Fishing as only source of income

F2 = Fishing as primary, but not only, source of income F3 = Fishing as secondary source of household income.

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the scheme and communities across the Jamuna in the North-Central District around Manikganj. This planned comparison was based on similarities between the agro-ecological zoning on both sides.

In practice, using the agro-ecological units as a basis for identifying paired comparisons of communities did not always prove satisfactory given the immense range of variables influencing fisheries activity in different rural communities. The comparison between areas inside the PIRDP and the Manikganj area did not stand up to close scrutiny and was therefore abandoned in this particular case.

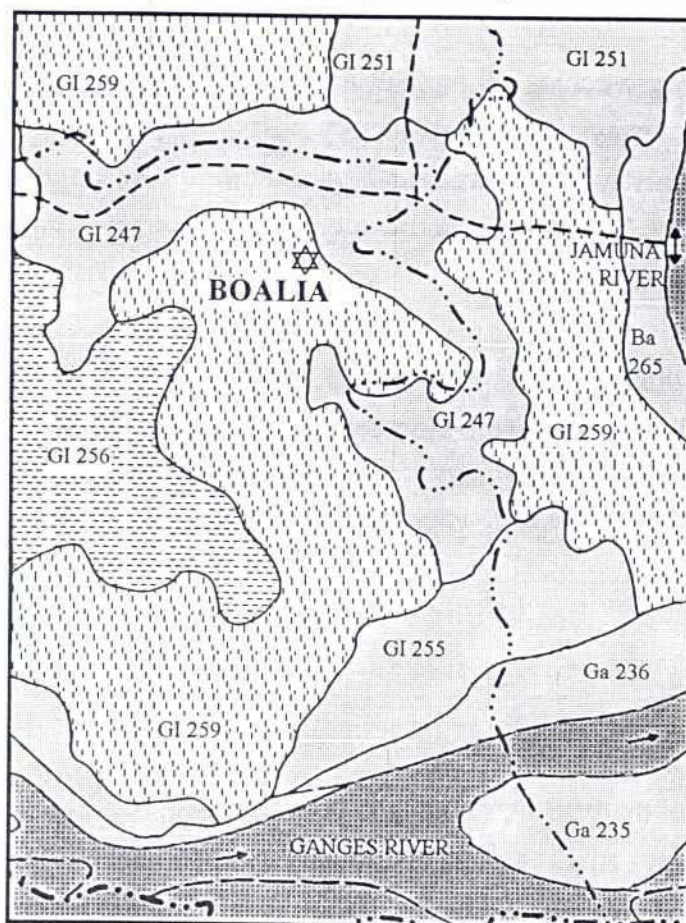
However, the agroecology of areas around study villages does provide a general indication of conditions. In Figures 4 and 5, the agro-ecological units immediately surrounding Boalia and Pechuan are shown. On the maps, AEUs are shaded according to their flood phase while details of the particular AEUs where target villages are located are given in the table below each map.

1.4 Floods

Prior to construction of the PIRDP, flooding in both the village clusters was primarily caused by flows from the Ganges River through distributary streams such as the Baral, the Ichhamati and the Badai. The area now covered by the eastern part of the PIRDP would flood primarily as a result of the congestion of drainage through this system at the point where it combines with the Jamuna (backwater and back-flow effects). Flows in the Ganges and its distributaries peak during late *sraban* or early *bhadra* (early to mid-August). This is generally just **after** the peak flood in the Jamuna system which normally occurs in late *ashar* and early *sraban* (mid to late July). The extent of congestion in the Badai River and Gandahasti *beel* depended on the extent to which flows in the Jamuna allowed water to drain out of the system. Any convergence of the peaks in the two systems could lead to serious flooding which would seriously affect the area of the two target village clusters.

The PIRDP has largely protected the areas inside from the worst effects of this although congestion of **rainfall** drainage behind the embankment is now a problem in some places.

Figure 4
Boalia
Flood phases and agro-ecological units



LEGEND

	>50% F0		District boundary
	>50% F0 and F1		Upazila boundary
	>50% F2, F3, F4		Main road
	>50% F3 and F4		Railway
	>50% F4		River
	Target villages		Tidal river
	Town		

0 1 2 Km
 SCALE

AEU	LANDTYPE DISTRIBUTION (% of land of different flooding depth)					PRINCIPAL LAND CAPABILITIES (%)			
	H	MH	ML	L	VL	Land Capability I		Land Capability II	
GL 259	10	5	15	50	20	IIIWz (75%)	One moderate to poor rice crop per year. Occasional poor dryland crop.	IIIWd (10%)	One moderate to good rice crop & one moderate to poor dry-land crop per year.

Source : FAO Land Resource Survey

Figure 5
Pechuan
Flood phases and agro-ecological units



LEGEND

	>50% F0		District boundary
	>50% F0 and F1		Upazila boundary
	>50% F2, F3, F4		Main road
	>50% F3 and F4		Railway
	>50% F4		River
	Target villages		Tidal river
	Town		

0 1 2 Km
SCALE

AEU	LANDTYPE DISTRIBUTION (% of land of different flooding depth)					PRINCIPAL LAND CAPABILITIES (%)			
	H	MH	ML	L	VL	Land Capability I		Land Capability II	
GL 248	45	20	20	15	0	IIW (40%)	One or two moderate wet-land crops per year, and moderate dry-land crop in the dry season.	IIIWz (20%)	One moderate to poor rice crop per year. Occasional poor dryland crop.

Source : FAO Land Resource Survey

Boalia and Gandahasti *beel*

In Gandahasti *beel*, drainage has always been restricted to the Badai River channel. In-flow through the Badai River from the Ganges at Bharara would gradually fill up the *beel* basin. Back-flow through the Badai used to occur during *joisthya* (May/June) when the Jamuna starts rising. This in-flow from the Jamuna was important for the fish resource in Gandahasti *beel* as it brought fish hatchlings and fingerlings from the main river into the *beel*.

Flows through the Badai River from the Ganges are now significantly reduced and a large proportion of the water feeding Gandahasti *beel* from the west is rainfall run-off from the catchment of the river. Back-flow from the Jamuna is controlled by the Talimnagar sluice gate.

Waterflows in the old course of the Atrai River, which runs down the east side of Gandahasti *beel* and joins with the Badai just upstream from Talimnagar, was already greatly reduced before the construction of the scheme and had limited influence on the *beel* area. During an exceptionally high flood, some overbank flooding from the Jamuna to the east would occur.

Phechuan and the Ichhamati River

The Ichhamati River, and the Sutikhali located just to the north, both flow from offtakes on the Ganges across the area covered by the PIRDP to outlets located on the Baral River. The area through which these rivers flow is dotted with a complex of *beel*, none individually as large as Gandahasti *beel*, but altogether representing a considerable area of lowland. To the north-west, the Chiknai River also runs through an extensive network of *beel*. The Sutikhali connects with the Chiknai just south of the Demra sluiceway on the Baral River.

In this area, flows through the Ganges distributary schemes would be augmented by water coming down the Atrai River and, just downstream from Bera, by the Karatoya and Hurasagar Rivers from the north. The combination of all these flows gave rise to frequent serious congestion.

The PIRDP has largely eliminated these threats. The Ichhamati is sealed off both at the offtake on the Ganges and the outlet on the Baral. Some flow from the outside rivers still enters the area through the Demra sluiceway into the Chiknai and Sutikhali. This carries some fish fingerlings with it during the early monsoon period. However, most flooding in the area is due to rainfall congestion. Runoff from land surrounding the rivers is trapped

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behind the river embankments and lies for considerable periods as water levels inside the rivers are frequently higher than those outside. Flooding from outside of the system has to all intents and purposes been eliminated, though at a cost of increased internal drainage congestion.

1.5 Waterbodies and access

Tables 3 and 4 show the access arrangements, leaseholders and institutions responsible for waterbodies in the area around Boalia and Pechuan respectively.

Boalia and Ahmmedpur

With the exception of the perennial Badai River running through its centre, Gandahasti *beel* and its surrounding floodplain is essentially completely open for fishing during the period when it is inundated. Within the floodplain and *beel*, there are many small depressions where water collects during the flood recession. These can be man-made or natural, and are variously referred to as *kua* (fish-pit) or *maital* (ditch). These are mostly on private land and fisheries on and around these residual waterbodies is restricted from the time of the flood recession on.

The Badai River is divided into a series of *jalmahal*, leased out through the Ministry of Lands by auctioning. The leases for these are normally taken by fisheries co-operatives (or *samity*) located in the traditional Hindu fishing communities along the banks of the Badai River. Almost all these *samity* reportedly have to borrow large sums from local moneylenders and *mohajan* (mostly Muslim) in order to pay for the leases and associated costs. As a result, the degree to which they have real control over these leases is variable.

The man-made *khal* separating Dighar and Jiar *beel* is currently leased out for fisheries by the union *parishad* and other small waterbodies in Gajnar and Gandahasti *beel* are sometimes managed by their respective village or union councils, usually for the maintenance of local mosques.

Pechuan

The Ichhamati River is divided into eight *jalmahal*, each leased out by the ADC Revenue on behalf of the Ministry of Lands. Nominally, most of these *jalmahal* have been leased to



Table 3
Boalia
Access arrangements on local waterbodies

Waterbodies covered (location)	Official leaseholders/ actual controller	Leasing system	Institution responsible	Period
Gandahasti <i>beel</i>	Official - no leasing Actual - landowners exert some control around <i>kua</i>	none	Privately owned / <i>khas</i> land leased or occupied for agriculture	Not applicable
Badai River	Official - fisheries <i>samity</i> Actual - Hindu fisheries leaseholder / Muslim non- fishing <i>mohajan</i>	leasing system (auctioned)	Land Revenue Department / ADC Pabna District	1 year
Seasonal <i>beel</i> - i.e. Bara <i>beel</i> , Dighar <i>beel</i> , Jiar <i>beel</i> , Ichhakhali, Nainglakhali	Official - no leasing Actual - landowners exert some control around <i>kua</i>	none	Privately owned	Not applicable
Floodplain	Official - no leasing Actual - landowners exert some control around <i>kua</i>	none	Privately owned	Not applicable
<i>Khal</i> -	Official - fisheries rights leased to local farmer Actual - controlled by union <i>parishad</i> chairman	leasing system (auctioned)	Union <i>parishad</i>	1 year

Source : FAP17 Village Appraisals

Table 4
Pechuan
Access arrangements on local waterbodies

Waterbodies covered (location)	Official leaseholders/ actual controller	Leasing system	Institution responsible	Period
Ichhamati River	Official - fisheries <i>samity</i> Actual - Hindu fisheries leaseholders / Muslim non- fishermen	leasing system (auctioned)- sub-leases / fixed-fee to fishermen groups/individuals	Land Revenue Department / ADC Pabna District	1 year
Hurasagar / Baral River	Official - fisheries <i>samity</i> Actual - Hindu fisheries leaseholder / Muslim non-fishermen	New Fisheries Management Policy (NFMP) - gear licencing	Department of Fisheries / <i>Thana</i> Fisheries Committee	1 year
Perennial <i>beel</i> - i.e. Gangbhanga <i>beel</i> , Katiyadaha <i>beel</i>	Official - fisheries <i>samity</i> Actual - Hindu fisheries leaseholder / Muslim non-fishermen	leasing system (auctioned)- fixed-fee / catch-share to fishermen groups / individuals	Land Revenue Department / ADC Pabna District	1 year
Seasonal <i>beel</i> & floodplain - i.e. Khodigari, Digha <i>beel</i> , Bumra <i>beel</i> , Tengragari	Official - no leasing Actual - landowners exert some control around <i>kua</i>	not applicable on open floodplain - <i>kua</i> privately leased/rented/ sharecropped out	not applicable	not applicable - <i>kua</i> leased for 1 year or season
<i>Khal</i> i.e. roadside <i>khal</i> (Santhia-Baghabari Road)	Official - local union <i>parishad</i> member Actual - same	leasing system - fixed-fee for gears/ fishermen groups/ individuals	Union <i>parishad</i>	not applicable

Source : FAP17 Village Appraisals

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fisheries *samity* based in neighbouring fishing communities. The actual control varies between traditional influential leaders from the fishing communities to local well-to-do farmers and businessmen who have provided the funds and bureaucratic leverage required. At present, fishermen from both Sonatala and Talot have sections of the river nominally under their control.

Other small rivers in the area, such as the Kageswari, are subject to similar arrangements, with local fishermen generally paying a fixed fee to leaseholders depending in the type of fishing gear being used. The Hurasagar, from Baghabari down to the confluence with the Jamuna, has been brought under the New Fisheries Management Policy (NFMP), with gear licences being issued on an annual basis to fishermen from nearby fisheries *samity*.

The two major *beel* to the south of Phechuan, Gangbhanga and Katiyadaha *beel*, are both Land Revenue Department *jalmahal* leased to the fisheries *samity* of Talot. These are the traditional fishing grounds of this community. Most of the other *beel* in the immediate area have been converted from perennial waterbodies to seasonal *beel* following the completion of the PIRDp and are not leased.

2. FISHERIES IN BOALIA AND PHECHUAN

2.1 Sources of information

The socio-economic research undertaken by FAP 17 provided four different means of assessing levels of fishing activity and dependence on fisheries in the communities under study :

- During the census survey undertaken in each village, each household reported the principal occupation of the household head and ranked a selection of other sources of income for the household, including fishing.
- During the baseline survey, the sample households listed different income-generating and expenditure-saving activities undertaken at different times of the year by different family members. This included any fishing activities either for income or consumption.
- The one-year monitoring of incomes and activities of sample households recorded the earnings, expenditure and time spent by different household members on all income-generating and expenditure-saving activities including fishing. Special care was taken to check on fishing activities **not** mentioned during the census or baseline surveys.
- Semi-structured appraisals were carried out in all the study communities at different points during the study, focussing on more qualitative issues and historical processes affecting fisheries. These open-ended appraisals allowed available data sets to be cross-checked, distorting factors to be identified and, most importantly, the social, cultural and historical context understood.

The following analysis deals with four basic questions :

- **who** is involved in fishing ?
- **when** and **where** do these different groups fish ?
- **why** do they fish **there**?
- **how important** is fishing for these groups ?

2.2 Patterns of fisheries involvement

Table 5 shows data collected during the census survey from all households in each of these two villages. The proportion of households reporting different first and second ranked sources of household income in each landholding category is shown.

The dramatic difference in reporting of fisheries income between the two villages is exaggerated by under-reporting in Phechuan. Severe tensions surround the issue of fisheries access to the Ichhamati River and this led many households to hide fishing gear and deny any fisheries involvement, at least initially. However, even taking account of this under-reporting, important changes in the patterns of fisheries access and in the enforcement of controls around Phechuan have effectively reduced levels of dependence on fisheries to a very minimal level.

The whole issue of access and the conflicts it has generated around Phechuan are discussed in greater length later in this report.

By contrast, in Boalia, fishing is the major source of income for a considerable group of landless households, mostly concentrated in Char Boalia. A group of small and medium landholders gains secondary income from fishing.

Table 6 uses fishing activity by sample households recorded during the monitoring of households activities to establish a more realistic picture of fishing gear ownership and fishing activity by households from different landholding categories. The table shows the total number and percentage of households in each landholding category estimated to be using different types of fishing gear, and the estimated average annual income earned by households using that gear.

Boalia

The data for Boalia shows two interesting features. Firstly, the reluctance of households to report fishing as a source of income during the initial survey. This highlights the continuing social ostracism to which Muslim households who are involved in fishing are subjected. For at least 20 households in Char Boalia fishing is undoubtedly the principal source of income but this was systematically hidden from researchers during the census survey.

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Table 5
Boalia and Pechuan
Ranking of sources of household income
by landholding category

NW1-1 Boalia

Main village

Inside

Land Cat.	No.	First Rank Occupation *					Second Rank Occupation **				
		Farm	Fish	Lab	Trade	Other	Farm	Fish	Lab	Trade	Other
Large	20	65.0	0.0	0.0	5.0	30.0	35.0	0.0	0.0	10.0	15.0
Medium	61	82.0	0.0	3.3	1.6	9.8	13.1	0.0	1.6	3.3	13.1
Small	56	58.9	0.0	7.1	3.6	28.6	30.4	0.0	14.3	1.8	16.1
Landless	121	28.1	0.0	40.5	2.5	27.3	5.0	0.0	23.1	1.7	9.1

Source: FAP17 Village Census

* % of households in each landholding category ranking different sources of household income as primary

** % of households in each landholding category ranking different sources of household income as secondary

NW2-1 Pechuan

Main village

Inside

Land Cat.	No.	First Rank Occupation *					Second Rank Occupation **				
		Farm	Fish	Lab	Trade	Other	Farm	Fish	Lab	Trade	Other
Large	5	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0
Medium	47	95.7	0.0	0.0	0.0	4.3	4.3	0.0	0.0	10.6	48.9
Small	68	69.1	0.0	11.8	5.9	11.8	20.6	0.0	20.6	2.9	19.1
Landless	132	8.3	0.0	63.6	10.6	17.4	22.7	0.0	6.1	3.8	8.3

Source: FAP17 Village Census

* % of households in each landholding category ranking different sources of household income as primary

** % of households in each landholding category ranking different sources of household income as secondary

The second feature is the apparent predominance of fishing for income over subsistence fishing activity. While it is clear that the line between "subsistence" fishing and fishing for income is somewhat imprecise, there is a tendency for those who do **any** fishing to earn substantial income from it, while subsistence fishing is relatively limited.

Problems inevitably arise regarding the definition of "subsistence" fishing. There is no doubt among the research staff that a considerable amount of fishing activity, particularly by

children, was not picked up during the monitoring. However, as the same problems have been encountered everywhere during the survey work, it is assumed that the figures obtained are representative.

Landless households were the first in Boalia to become involved in fishing as a regular source of income. This is reported to have first started during the early 1960s but only really gathered pace after major out-migration of Hindu traditional fishermen during the 1970s. A combination of communal and political problems and flood control impacts have caused this out-migration. In the wake of this, the involvement of both landless and small farming households in fishing as an important component of their livelihood strategies has steadily

Table 6
Boalia and Phechuan
Gear ownership and average annual
income from gear types by landholding category

NW1-1 Boalia Main village Inside

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill nets	Current jal	9	12.8	1591	23	30.2	1459	12	6.0	3145
	Fashi jal	0	0.0	0	0	0.0	0	18	9.1	3335
Seine	Dora jal	4	4.9	1700	0	0.0	0	0	0.0	0
Lift net	Veshal jal	0	0.0	0	0	0.0	0	6	3.0	1100
Trap	Kadum	0	0.0	0	3	4.4	7935	33	16.9	1389
Hooks	Daun	0	0.0	0	8	10.7	4095	23	12.1	5404
	Nol barsi	4	4.9	7770	3	4.4	10530	21	10.9	360
Cast net	Jhaki jal	0	0.0	0	0	0.0	0	6	3.0	160
Push net	Thella jal	8	10.8	915	16	21.4	1100	0	0.0	0
Other	Dewatering	4	4.9	3020	0	0.0	0	0	0.0	0
	Hand fishing	2	2.1	430	0	0.0	0	15	7.9	163

Source : FAP17 Socio-Economic Monitoring

NW2-1 Phechuan Main village Inside

Gear Type	Bengali Name	Medium Farmers			Small Farmers			Landless		
		No.	%	Tk.	No.	%	Tk.	No.	%	Tk.
Gill net	Koi/Fashi jal	1	2.1	270	9	12.5	570	0	0.0	0

Source : FAP17 Socio-Economic Monitoring

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increased over time.

The trap fishery, using traps locally called *labani* but referred to in the table as *kadum*, is of particular importance for landless fishermen in the village, with about 17% of households using this gear. The two types of gill net used *current* and *fashi jal* are concentrated among the landless households in Char Boalia who have taken up fishing on a more serious basis. More landowners are preventing fishermen from setting traps on their land as the landowners themselves may be fishing there with *current jal*, *nol borsi* or *daun*, or on a *kua* excavated on the plot. This reflects the growing awareness of landowners that the fish resources carried onto their land during the floods have an important value and can generate additional income. This tendency is, however, at the expense of the previously open floodplain fishery exploited by many landless and poor households particularly during the drawdown period from mid-*ashwin* (September/October) to early *augrahayana* (late November).

Phechuan

The lack of fishing activity reported in Phechuan disguises a considerable amount of gear ownership. During a recent conflict over fisheries access to the Ichhamati River, it was reported that several Phechuan villagers had their fishing nets destroyed, indicating that there is probably more gear owned in the village than was reported. From observations in the village, it is apparent that a large number of Phechuan villagers fish with simple *borsi* (hand-line) and *sip* (rod and line) in the Ichhamati, generally catching fish purely for consumption. It would also appear that this activity cuts across all social groups.

The Ichhamati River has recently been stocked with carp fingerlings by the Department of Fisheries as part of the mitigation of negative impacts on fisheries due to the PIRDPA. The knowledge that there are now considerable fisheries resources in the river has made local people understandably interested in gaining fisheries access. For exactly the same reason, local fishermen, who have officially leased the river or work for the lease, are equally concerned to **prevent** fishing by other groups.

In the context of this conflict, it proved very difficult to establish the real historical trends in levels of fishing activity in Phechuan. Subsistence fishing in the river has always been widespread and some fishing for income by poorer households during slack agricultural periods probably took place, though on a limited scale.

2.3 Women and fisheries

In both villages, the restriction on women's direct involvement in fishing activities is generally strict. In contrast to villages studied by FAP 17 in the North-Central Region, the practice of *purdah* has a stronger hold on people of all social levels in these communities. Relatively few women, even among poor households, are involved in income-generation of any kind outside the home. Many male respondents voiced their opposition to the idea of women working outside of the home and there is strong male suspicion of NGO activities in the area targeting women. This is illustrated by the short case study given in Box 1.

Monawar Begum is the 32 year-old wife of a landless agricultural labourer and seasonal fisherman in Ahmmedpur village, next to Boalia. They have 5 children between the ages of one and eight years. At the time of the interview, Monawar's husband was working weeding *rabi* crops (onion) on piece-work basis (one-and-a-half *bigha* for Tk.60). Even though the *rabi* season in the area is generally marked by a healthy demand for agricultural labour, Monawar and her husband are hard put to it to provide for the family and in the month of February were having to cut out one meal a day in order to make ends meet. In spite of this situation, Monawar's husband is adamant that she should not work. She is occasionally able to carry out jobs for wealthier neighbours when these can be performed inside their homestead compounds, but the idea of going out to work, as a few women in the village are now doing, seems to be out of the question for her husband who says : "You will die without food but never work out of the house. You will eat what I bring to you or not at all".

Box 1 : Women and work in Boalia

While there is extensive drying of fish caught during the flood drawdown in Gandahasti and Gajnar *beel*, this is mostly carried out by men on large drying racks positioned out near the *beel* just south of Char Boalia. At most, women process fish in the home for home consumption. The fishing gears most commonly used in both villages are *current jal*, *daun* and some traps, all of which are purchased ready-made, leaving little scope for involvement of women in gear-making.

An important exception to the above limitations on women's involvement outside the home is seen in Pechuan and is directly related to fisheries. During 1992/93, a savings group of 35 women from poor households in Pechuan, organised by BRAC and with support from BRDB, rented a *maital* or borrow-pit in the village, which they stocked and harvested themselves. The presence of the NGO is a key factor in mobilising women to overcome social strictures which limit their economic contribution to the household. However, this case is still exceptional in this area.

2.4 Children's involvement in fisheries

Boalia

The levels of children's involvement in fishing is reported to have followed a similar pattern in Boalia to that of the community in general. Before the 1970s, children were primarily engaged in fishing for consumption and "play". The Hindu *rajbangshi* fishermen were left to exploit the resource for their livelihoods. However, as Muslim landless labourers began fishing, children have played an important part from the start.

Around 10% of children in the village were estimated to be regularly catching **and selling** fish in Boalia, undoubtedly encouraged by the presence of the seasonal fish market at Char Boalia. Figure 6 shows the proportion of overall fishing time by households which is accounted for by children.

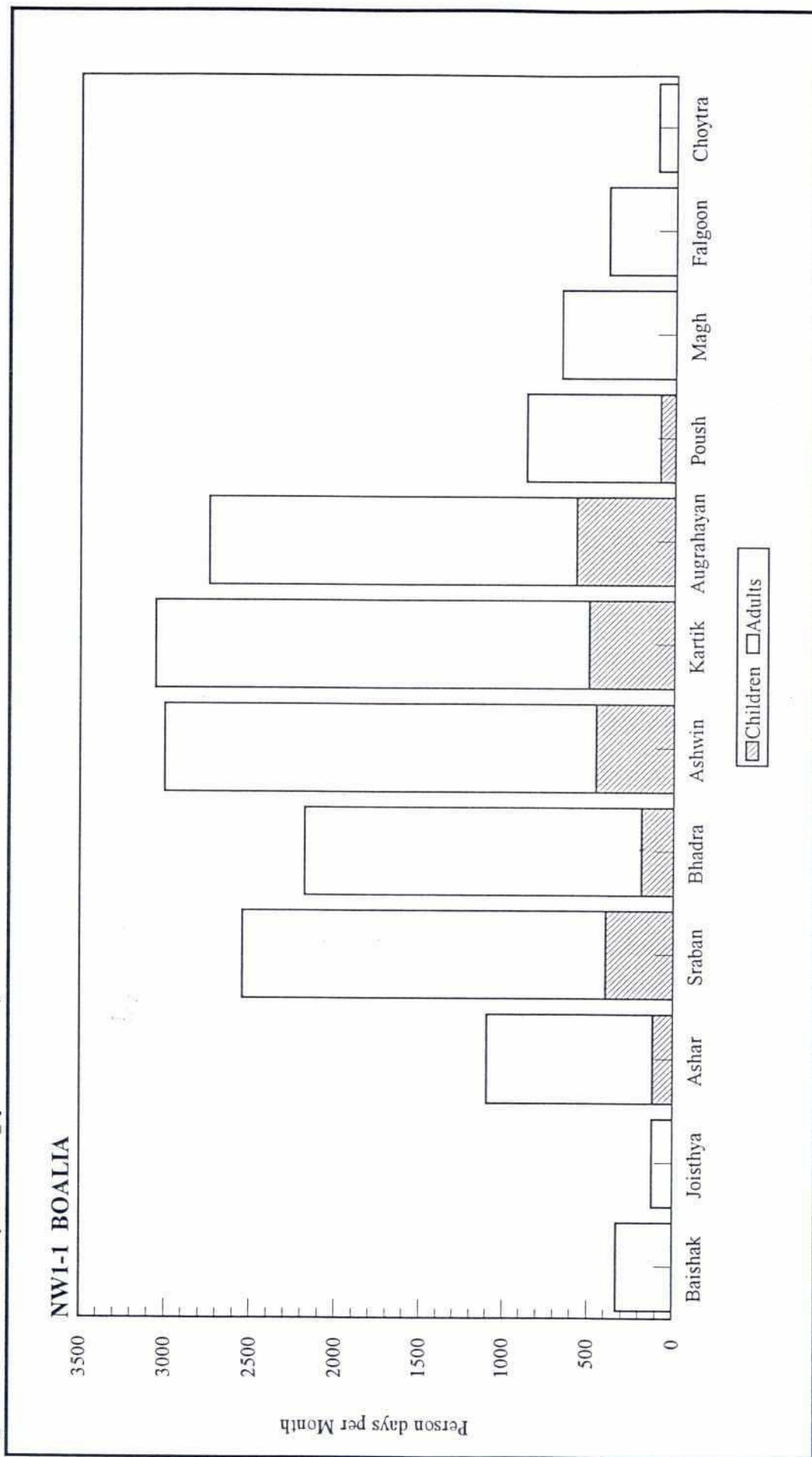
Children's involvement is often limited to assisting a father or elder brother by holding the container for the catch while the older person actually fishes. However children play an important primary role in the operation of some gears. The age-group from 11 to 15 is particularly active.

Fishing by children is most concentrated during the drawdown period, when large numbers are engaged in the dewatering of natural and man-made ditches (*maital*) left on the floodplain and around the homestead areas. This activity continues with decreasing intensity, around Boalia, well into the dry season. Children are often seen assisting with the harvesting of *kua*. In particular, after harvesting, children are able to "glean" any remaining fish left in the muddy bottom of the fish-pits. However, where *kua* are being harvested using pumps, the role of children is more limited, and the catch left to them is almost certainly reduced.

Children are also active during the full-flood period as many of the gears commonly used by seasonal and subsistence fishermen of all classes are easily handled by children. The job of checking and collecting catches from *current jal* and *daun* is commonly carried out by children.

The reported increase in children's involvement in income-generation coincides with the implementation of the PIRDP. The control of flooding, the reduced depth and, in some areas,

Figure 6 Person Days Fishing per Month, Adults and Children



Source: FAP 17 Socio-Economic Monitoring

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the extension of the flooding period due to drainage congestion may actually encourage children's involvement as it provides a better environment for the types of fishing gear which they commonly use. On the other hand, where the **area** of flooding is extensively reduced, floodwater, and the fish which they carry, may never reach the high floodplain and homestead areas which children most commonly exploit.

Submersible naturally-stocked *maital* or ditches are a key resource commonly exploited by children. Fishing of these small waterbodies is often either open to all or loosely limited to the surrounding households and neighbourhood.

Pechuan

In the Ichhamati River, traditionally fished by Pechuan villagers, strict controls are now applied to fishing by the lessees. To a large extent, children are exempted from this, and many are engaged in line fishing in the river almost all year round. Some were observed to also be using small lengths of *current jal* and *daun*, suggesting that many access limitations applied to adults are not necessarily applied to children.

As in Boalia, children in Pechuan were observed fishing in ditches and *maital* around the village and in the flooded paddy fields during the drawdown period. However, such activity is more limited than in many of the other areas studied.

2.5 Fisheries access

Fisheries access is frequently modified by the tenurial status of waterbodies or the land located beneath waterbodies or flood waters. In the long term, it is the pattern of use rights and their historical and cultural context, which have the most influence over the ways in which people fish and the extent of their reliance on fisheries. In the case of the village cluster consisting of Boalia and Ahmmedpur, the division of the discussion of fisheries access between the main villages and the satellite fishing communities is rather arbitrary. The access issues affecting Boalia are more or less identical with those affecting Ahmmedpur and both communities include very similar groups of fishermen.

The following discussion concentrates on subsistence fishing in Pechuan and Boalia.



Subsistence fishermen

As more and more Muslim agriculturists in and around Gandahasti *beel* have become involved in fishing, it is clear that the division between those who fish primarily for income and those who fish for consumption has become progressively more and more uncertain. For the many Muslim fishermen using relatively cheap gear such as lines or traps, the proportions of catch being eaten and sold depend purely on the amount caught. Any excess catch is sold and the proportions of catch which a "subsistence" fishermen might end up selling will differ radically according to the water area fished, the season and the flooding patterns in any particular year.

The definition of subsistence has become one of convenience. When non-traditional fishermen want to minimise the amount of fishing which they do (because they are using illegal gear or think there may be some kind of access restriction) they describe it as "just for consumption" although they may well be using sizeable units of *daun borsi* (longline) and *current jal* (monofilament gillnet). Children's fishing activity is almost **all** described as "just for consumption" although over 50% of the people selling fish in local *hat* on any day during the flood season and drawdown may well be children selling fish which **they** have caught.

The impacts of changes in the *beel* are similar to those felt by people fishing for income. As more land in the *beel* comes under cultivation, the first signs of a tendency to extend **land** tenure to water covering that land are clearly visible. *Kua*, which are increasing in number, represent a means for landowners to lay claim to the fisheries resource on their land. During the drawdown, landowners are more and more inclined to set traps on their land to catch fish carried in water draining out of their plots, whether or not they own a *kua*. This displaces the widespread practice of landless fishermen who appear to have always been free to place their traps wherever they wished.

In the past, some of the leased waterbodies in the *beel* were opened up to *community fishing* as the water level fell. These events traditionally served to both complete the exploitation of residual fisheries resources as fully as possible and satisfy the social obligations of waterbody owners or lessees to distribute at least some fish among the community in a relatively equitable fashion. It is not entirely clear which of these reasons was dominant. Certainly, now, many leaseholders and owners of waterbodies exact for themselves a proportion of the catch even after they have opened the waterbody for "community fishing".

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In leased waterbodies, these group fishing activities, in which children usually play a very important role, can be compared to gleaning in the field after the crop harvest. However, as water and fisheries resources increase in value and become the subject of ever greater competition, fish gleaning seems to be suffering the same fate as crop gleaning: owners retain more and more of the residual harvest. This process has been accelerated by the spread of low-lift pumps, which allow an almost complete harvest.

The type of tensions and conflicts which can be expected to arise in relation to control of fisheries resources in the floodplain are well-illustrated by the controversy surrounding the one-kilometre stretch of artificially-excavated *khal* in the floodplain between Jiar Baal and Dighar *beel*, about 2 kilometres south of Boalia. This *khal* was excavated under a Food-For-Work programme in 1963 as a reservoir to provide dry season irrigation and a cattle-watering hole. Fishing on this *khal* was always open and apparently quite rich, the *khal* forming a sort of extended *kua* in the middle of the floodplain, concentrating the fish resources and providing local people with an easily accessible fishery during the drawdown period and dry season. At some point in the late 1980s the Union *parishad* office realised just how much fish local people were extracting from the *khal* and instituted a leasing arrangement for the fishery. This was entirely in line with government leasing policy, which awards control of *khas* waterbodies of less than 3 acres to the union-level authorities. Since then, the union chairman is said to treat access rights to this *khal* fishery as a reward for political support among local influentials.

This development illustrates well the complex patterns of interlocking claims and counter-claims regarding rights to resources which are common in rural areas. Use rights on the floodplain are perhaps particularly subject to conflicting claims as the dividing line between water and land rights is often obscure. In this case, an individual (the union chairman) has apparently expropriated a fisheries resource (the *khal* fishery), using a public works project (a new canal) in which it is located as an excuse. Many of the people on whose land the canal was originally excavated feel that they were not properly compensated for their land in the first place and thus have their own rights to fish in the water it now contains. Great concern, and much suspicion, is expressed in the community over work already underway to extend this *khal*. Farmers whose land is likely to be expropriated for the scheme feel that it is very unlikely that they will receive proper compensation. The scheme is interpreted more as a means for the chairman and his "followers" to take further control of a considerable water resource and use both the water (for irrigation) and the fishery resources

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for their material and political gain. The extent to which any of this is actually true was difficult to establish but it certainly illustrates well the growing competition for water and fisheries resources taking place in one area within a large flood control scheme.

The other area of key importance for the "subsistence" fishery, is the marginal waterbodies found near to homestead areas. These *maital* and *pagar*, an assortment of natural and man-made ditches, borrow-pits and depressions form a complex series of easily accessible, naturally-stocked waterbodies which are generally very fully exploited, especially by labourers and children. The expansion of aquaculture in the area will inevitably lead to more and more of these "minor" waterbodies being converted to more intensive and controlled culture practices and their subsequent closure to subsistence fisheries.

Phechuan

Since the construction of the PIRDP, the Ichhamati River has become an extended irrigation ditch. It is fully embanked, has no current and is being artificially stocked. It is therefore rather ironic that the situation on that river is perhaps illustrative of conditions on most waterbodies in the area 20-30 years ago.

Following recent disputes and court cases regarding fishing by local non-fishermen in the river, there is practically no "serious" fishing in the river by anyone except the Hindu fishermen from Talot and Sonatala who are authorised to fish there. In the pre-Liberation period, there would probably have been very few Muslims willing to accept the social stigma associated with fishing for income and the river was effectively left to the professional fishermen. However, at the same time, subsistence fishing is regarded as so normal that local fishermen do not even attempt to restrict it.

The difference now is that there are **many** local Muslim non-fishermen who are impatient to fish as much as possible, whatever the social implications, because, after Department of Fisheries stocking, everyone **knows** that there is a valuable resource to be exploited. Pressures on other employment opportunities and the increase in landlessness have also undoubtedly played their part.

However, it is clear from this case that subsistence fishing of this kind in local waterways is an integral part of life in the communities along the banks. The normality of the activity is assisted by the fact that, unlike on *beel*, it is very simple for **anyone**, no matter what their

age or status, to perch on the bank of the river and hang a line into the water. By contrast, to fish in a *beel* either requires a boat or wading out into progressively deeper water for considerable distances. In an area where fishing is considered a low status activity, fishing on a *beel* is considerably harder to disguise and far more obviously "dirty" than fishing in a neatly embanked river.

2.6 Seasonality and fisheries

The fishing activity of the various groups identified above is dictated by the annual patterns of fish movement dictated by the expansion and retraction of water areas due to the seasonal floods. Flood control measures are aimed above all at changing the extent and duration of these floods. Such changes inevitably impact on the seasonal patterns of fisheries.

Figure 7 shows the time spent fishing by households in the two villages on different types of waterbodies through the year. This highlights the way in which seasonal patterns of fishing involvement are dictated by the patterns of inundation and accompanying changes in access arrangements. Time spent fishing in Phechuan is minimal. Table 7 shows the seasonal intensity of gear use for the principal gear/waterbody combinations and the movement of particular gears across different types of waterbody in response to the stage of the flood cycle.

Pre-monsoon

The pre-monsoon period in this area generally lasts from early or mid-*baishak* (mid-April to the beginning of May) until the onset of the flood from the main rivers in early *ashar* (mid-June). This period is marked by heavy rain storms which may cause temporary rises in the levels of *beel* stimulating movement out onto the floodplain by *beel*-resident species which have been overwintering in residual areas of perennial water.

These first storms are the trigger mechanism for the major migratory species to commence their spawning runs up the Padma, the Jamuna and the Ganges. After the upstream spawning, the fish eggs drift downstream hatching as they go. The hatchlings and fingerlings then drift up the smaller rivers and *khal* which connect the main channels with *beel* and floodplain areas. The Badai River, which normally drains Gandahasti *beel* at Talimnagar, experiences back-flow from the Jamuna River during this time, carrying hatchlings into the *beel*.

Figure 7 Distribution of Fishing Effort by Waterbody Through the Year

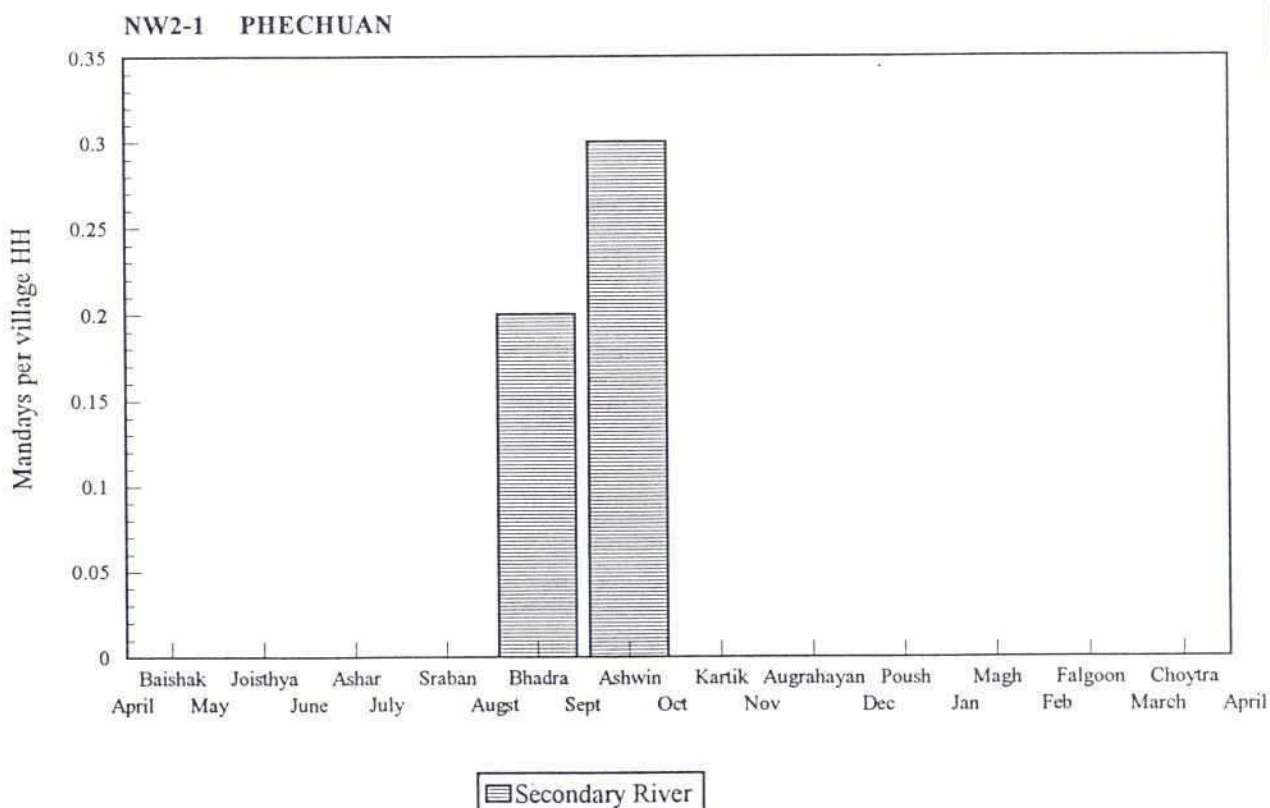
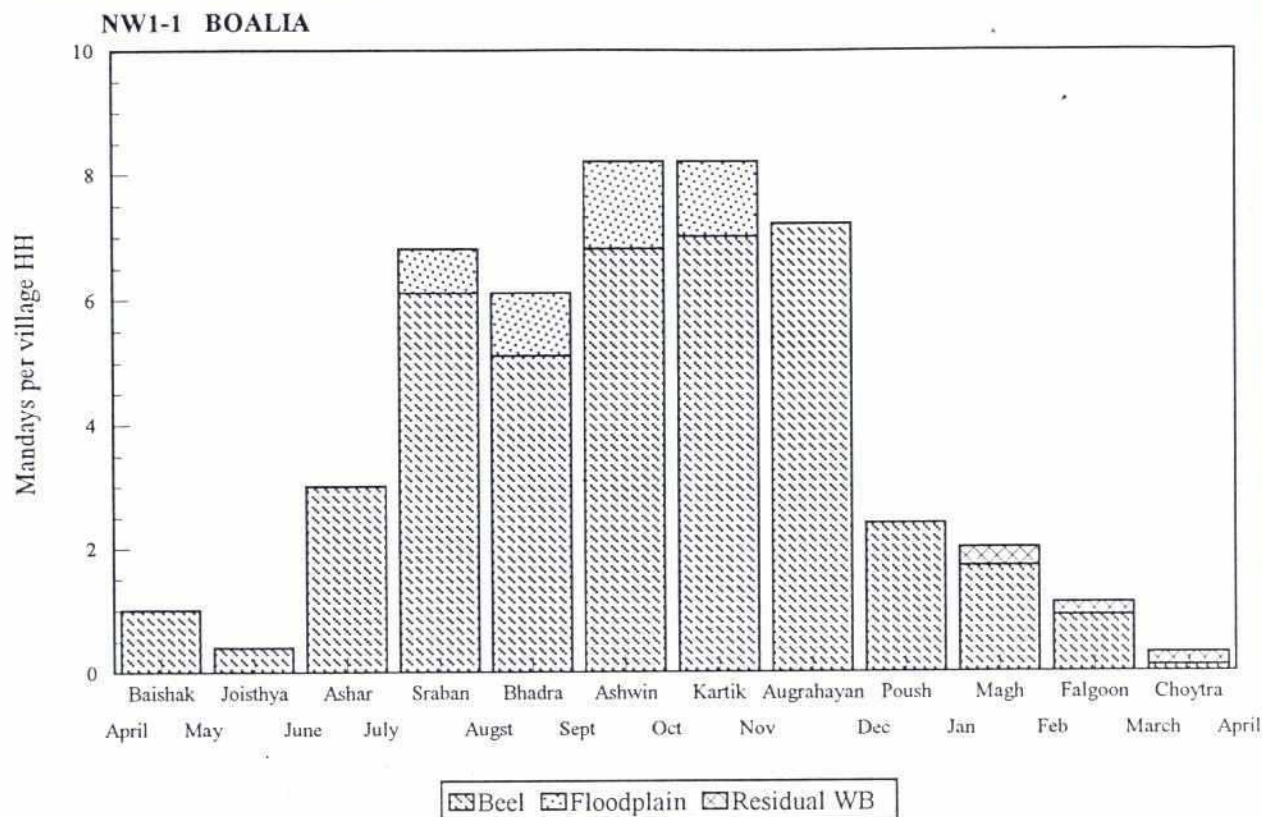


Table 7
Principal Gears, Use by Month and Waterbody

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Units: Man Days per Village Household			
												Falgun	Choytra	Md/V/Hh Eff %	
NW1 – 1 Boalia															
Current jal	Beel			1.0	0.6	0.3	2.0	1.8	1.6	0.2	0.1			7.6	16.4
Koi/Fashijal	Beel			0.4	0.3	0.8	1.2	0.7	0.4		0.4			4.2	9.1
Thella jal	Beel				0.3	0.3	1.0	0.9	1.0	0.5				3.9	8.4
Daun	Beel	0.1		0.6	2.4	1.5	2.4	2.3	1.8	0.3	0.5	0.5		12.4	26.8
	Floodplain				0.5	0.5	0.5	0.5						2.0	4.3
Nol barsi	Beel				1.8	1.6	0.3	0.7	0.8	0.2	0.6	0.4		6.4	13.8
Kadum	Beel	0.4	0.4	1.0	0.8	0.6		0.5	1.3	1.1				6.0	13.0

NW2-1 Phechuan												Units: Man Days per Village Household			
Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgun	Choytra	Md/V/Hh	Eff %
Koi/Fashi jal	Secondary River					0.2	0.3							0.6	100.0

Note : Depth of shading indicates relative intensity of use of that gear within the year

Note : Depth of shading indicates relative intensity of use of that gear within the year

Fishing activity among non-traditional fishermen during the pre-monsoon period is limited. The flow of fingerlings through the Badai River is restricted by the Talimnagar sluice gate which generally remains closed during this period to prevent waters from the early rise of the Jamuna from damaging standing *boro* crops.

Traps start being used, particularly in the *beel*, from *baishak* but remain the only gear making a significant contribution to fishing income until *ashar*, when gill nets (*current jal* and *koi jal*) come in to use (see Table 7).

The pre-monsoon fishery was probably more important for non-traditional fishermen before the construction of the PIRDP. Movement of fish into the *beel* area from rivers would have been unrestricted and, with less land under *boro*, there would have been less agricultural labour demand during this time. However, the main focus of the pre-monsoon fisheries is on *khal* and secondary rivers as fish move from one habitat to another, and this fishery has always been dominated by traditional fishermen.

Peak flood

During the peak flood period, from *ashar* (June/July) to early *ashwin* (September/November) the rains set in on a more regular basis, the *beel* fill up and expand over the surrounding floodplain. The rise in the levels of the main rivers first stops outflows from the *beel* through the connecting *khal* and then causes back-up, increasing *beel* levels. Depending on the level of flood in that particular year, there might also be overbank flooding uniting *beel*, floodplain, *khal* and the main rivers into one sheet of water.

During this period, landless people, and any other groups involved in fishing, have relatively easy access to fisheries resources over a large area. *Kadum* (traps) are used around Gandahasti *beel* to catch fish around the rising margins of the *beel* and as fish move out onto the floodplain. Gears such as *current jal* (monofilament gillnet), *daun* (longline) and *nol borsi* (hook and line) can be easily used over large areas of the floodplain and *beel*.

The peak of the floodplain fishery is in *sraban* (July/August) when intrusion of water right up to homestead areas encourages fishing by children using *thella jal* (pushnets) and *sip borsi* (rod and line). Catch per unit effort and income from fishing during these periods are relatively low due to the dispersal of fisheries resources over a wide flooded area although the numbers of people involved are quite high because agricultural labour demand is limited

and water covers such a wide area. In the areas around both Boalia and Phechuan, this period is particularly important for very poor groups, notably female heads-of-household and old people who can **only** fish when water resources are close to homestead areas and can be exploited without excessive infringement on social norms restricting women's movement to the homestead area.

The construction of the embankment has probably contributed to an increase in the amount of fishing carried out during this period. To some extent, it has encouraged the changes in agricultural patterns which leave people with more time to fish during the summer floods. More importantly, it has opened up greater areas to fishing by reducing crop coverage during the floods as more land is devoted to winter *boro* rice crops. As explained below, it has led to important changes in access arrangements which have encouraged more people to fish.

Balancing these changes which are leading to more fishing and a greater distribution of fisheries benefits, the total area inundated has probably been reduced, concentrating fishing effort on a smaller overall area and possibly reducing overall production.

Drawdown

Between early and late *ashwin* (late September to early October), the floods start to recede, a process which continues right through to the end of *augrahasan* (mid-December). Water drains off floodplains, such as Gajnar *beel*, into the deeper areas, such as Gandahasti *beel*, and the many other depressions scattered over the floodplain. As the drawdown proceeds, more and more of these peripheral waterbodies become isolated, together with the fish resources in them. Most fish retreat into the deeper *beel* areas where they become steadily more and more concentrated.

Water also moves out of the *beel* areas into the rivers. In the case of Gandahasti *beel*, water drains out into the Jamuna through the Badai River until the water level in the *beel* becomes so low that this flow effectively stops.

For the floodplain fishery engaged in by non-traditional and subsistence fishermen in Boalia, where the areas of perennial water are limited, this period is the most important in terms of both fisheries income and fishing effort as the recession of water offers opportunities for more efficient catching. The movement of fish back into a more restricted area creates opportunities for channelling fish movement. At points where fish movement is restricted



using artificial channels or dykes, fish can be more easily caught using *kadum* (traps) and *thella jal* (pushnets) see Table 7. The use of practically all gears increases during this period although the relative earnings (income per man-day of fishing) peak for gears which entrap fish following the water off the floodplain, such as *current jal* and *koi jal*. Once the small peripheral waterbodies are isolated, dewatering starts and this carries on through the dry season.

The drawdown period is probably the period of the year when fisheries involvement is most evenly spread across different social groups. Agricultural labour demand picks up with the *amon* harvest in *kartik* (October/November) and *augrahayana* (November/ December) and, immediately afterwards, the commencement of work on *rabi* crops. Since the construction of the embankment, the preparation of seedbeds for *boro* rice has become increasingly important at this time. However, the harvesting of fish from areas of floodplain is an integral part of their preparation for the winter cropping season. Labourers and landowners are all involved. Children appear to play an especially active role during this period and are probably responsible for most of the catch from the dewatering of agricultural plots and small ditches and depressions.

As the land reappears from under the water, property rights come back into force. In the past, around Gandahasti *beel* these rights were not generally applied to the fisheries resources. Anyone was able to fish anywhere until practically all water had receded and owners started preparing their fields for crops. Now, more and more landowners are reserving for themselves the right of "fishing out" their flooded plots or at least prevent others from fishing. This is particularly true where *kua* (fish-pits) have been excavated and *kua*-owners have placed *katha* (brush-piles) in their fish-pits to further aggregate fish.

Floods generally recede earlier since the construction of the PIRDIP as the area under water has been reduced. However, in some sections of the floodplain and *beel*, drainage congestion due to the embankment can cause the drawdown to occur relatively later. The longer period under water may enhance fisheries to some extent although it can create serious problems for farmers. Congestion is a severe problem around Phechuan, where the embankment along the Ichhamati River severely hampers the drainage of rainfall flooding and has frequently damaged standing crops of transplanted *amon* in a broad strip of land along the river's edge.

Dry season

By late *augrahayana* (mid-December), the bulk of the flood water has receded off the floodplain and is confined to the *khal* and a plethora of small *maital*, *pagar* and other depressions in the *beel*, floodplain and around village homestead areas. All the fish which have been feeding and growing on the floodplain and have not been caught or have not escaped back out to the main rivers are concentrated in these residual waterbodies.

Prior to the construction of the embankment, Gandahasti *beel* retained a large area of perennial water which was harvested during this period. Much of the production of the floodplain would have been concentrated during a few months at the end of the year. Since completion of the PIRDP, however, this fishery has effectively disappeared and the *beel* has become a seasonal floodplain dotted with small residual waterbodies which steadily dry up (or are dried up by pumping) through the winter. Instead of large harvests from leased waterbodies by traditional fishermen, the winter is now a period of steadily declining catches by non-traditional fishermen and farmers dewatering small waterbodies and *kua* on their own land.

This fishery on residual waterbodies, while it lasts, is highly concentrated. The nature of the fishery lends itself to more rigid controls and, during this period landowners restrict fishing activity on their *kua*. For the agricultural community at large, the many *maital* and submersible ponds around the homesteads constitute a similar, and important, resource. Fish naturally-stocked in these ponds are caught as required, usually for consumption, during the course of the dry season. Towards the end of the winter, in *falgoon* (February/March) and *choytra* (March/April), these waterbodies are generally completely dewatered, with children and even women playing an important role in this process. Excess catches are sold.

The fishing activity among traditional fishermen is now limited to their leased areas in the rivers, particularly the Badai River, which receives the drawdown from the whole catchment around Gandahasti *beel*. But on these leased areas, fishermen are not able to effectively prevent local Muslims from fishing during this key period. Use of *current jal* and *nol borsi* (hook and line) by Muslim fishermen in the river is apparently frequent.

These dry season fisheries are impacted to different degrees by flood control. The expansion in the *beel* of irrigated *boro* has encouraged the excavation of *kua*, as these serve both as a water reserve and a means of aggregating fish resources. They also increase the overall

effort being applied to fisheries and, where dewatering by mechanical means is used, result in a far more complete harvest than normal fishing activity. Though this leaves a smaller breeding stock, the resilience of many of the floodplain resident species to these apparently indiscriminate methods of harvesting is extraordinary.

The fishery in *maital* and ditches near the homesteads is reduced where flooding no longer reaches these areas. This has an impact on the contribution which children are able to make to household livelihood by fishing. The tendency, already visible in Boalia, to convert these ditches to cultured ponds, which becomes possible after flood control removes the flooding risk, results in their "closure" to the common fishery and the concentration of benefits in the hands of owners and operators. Concentration of control of the fisheries resource increases after flood control as remaining areas of water are increasingly sought after, both for irrigation and for fisheries. This is most noticeable during the dry season when water is in demand for irrigation and fisheries activities in residual waterbodies reach their peak .

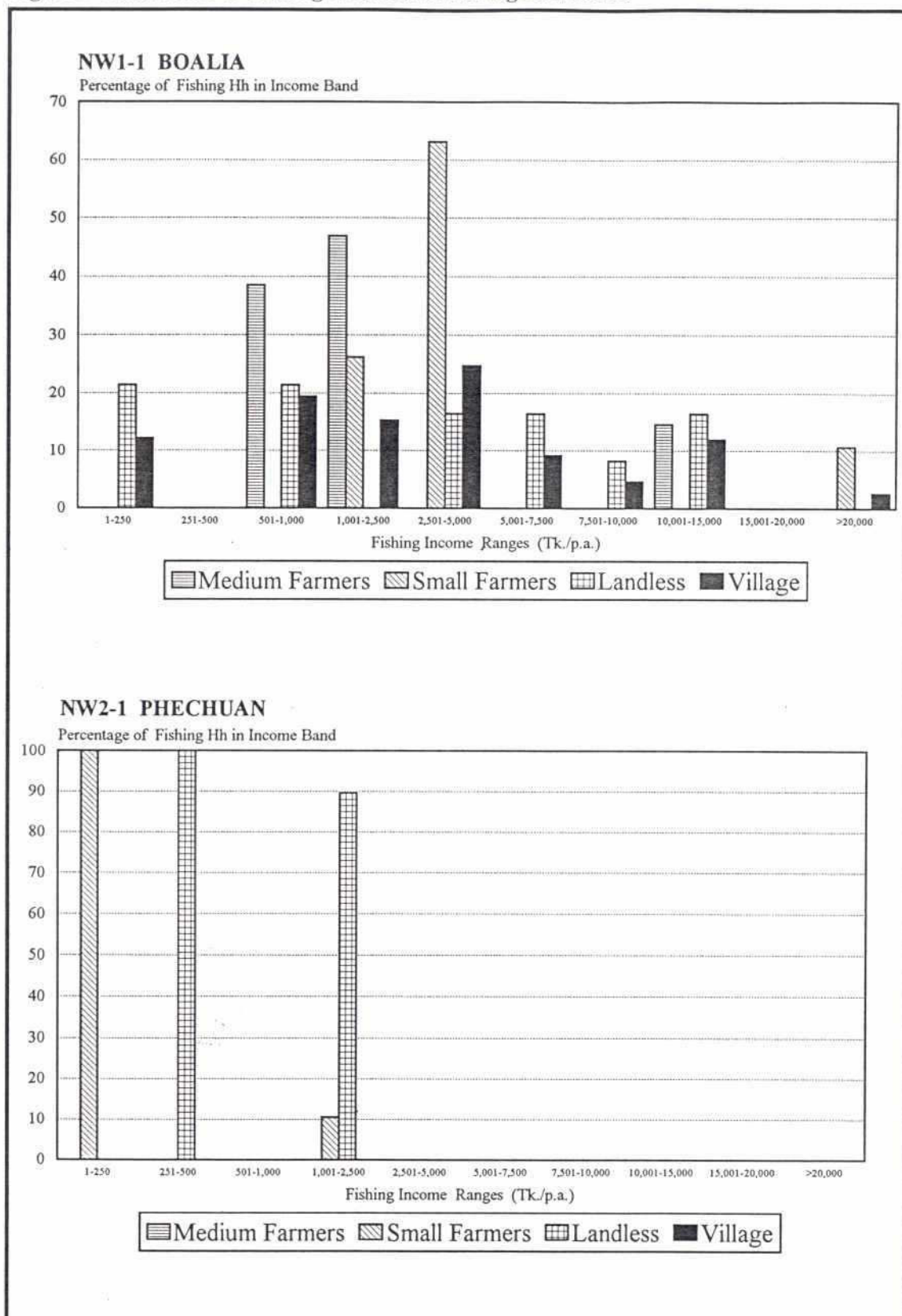
2.7 Fisheries income

Boalia

The levels of fishing income obtained by households from different groups need to be seen in the context of the access arrangements described above. On the one hand, a continuing sense of social proscription surrounds fishing for income and limits the extent to which many people in this area are willing to get involved. On the other, the conditions in Gandahasti *beel* encourage new entrants to move into fishing : a large seasonal *beel*, no leased areas and limited competition with traditional fishermen.

As shown in Figure 8, the result is that, in Boalia, those that fish, fish seriously and fisheries constitutes an important, or even the main source of income for them. However, among the rest of the village, activity is limited considering the extent of the resources at their disposal. Figure 8 shows the distribution of households between different fisheries incomes ranges. In Boalia, the proportion of households falling in the ranges Tk.1,000 to Tk.5,000 is particularly high while there are relatively fewer households in the lower ranges. Fishing income is **relatively** less important for landholding households but, for both medium and small landholders, income is also earned from *kua* and *maital* harvesting later in the year while, for the landless, dependence on fisheries is more sharply confined to the flood season

Figure 8 Distribution of Fishing Incomes for Fishing Households



Source: FAP17 Socio-Economic Survey

and drawdown. From *bhadra* (August/September) through to *augrahayana* (November/December) fishing constitutes the most important single source of income for landless households. In fact, it is practically the **only source** for about 40 households in the village with relatively few other households fishing for more than household consumption. Fishing fills in an important gap in agricultural opportunities (both in labouring and share-cropping) that follows the *boro* harvest. With average annual household income at just below Tk.10,000 for this group, the seasonal importance of fishing cannot be overstated.

For small and medium farmers, *nol borsi* (hook and line) contributes a disproportionate share of their fishing earnings. For both small and medium farmers, who share broadly similar levels of household income near Tk.29,000 and Tk.34,000 respectively, fishing represents a significant but perhaps not critical seasonal supplement to income.

Tables 8 and 9 and Figures 9 and 10 show the balance between household income from different sources in the two villages throughout the year. The data in the tables are disaggregated by landholding category.

Several important changes have taken place in income structure in the two communities over the last 20 years. In Boalia, the extensive *beel* area to the south used to be an important dry season grazing area for cattle. The expansion of *boro* cultivation has greatly reduced this activity and the livestock population is reported to be 50% less than 20 years ago. Loss of income from this source from all socio-economic strata has almost certainly been made up for by increased rice production and labour-demand.

While the shift to HYV *boro* rice has brought great increases in production, rising costs for HYV *boro* cultivation have, over the last few years, made it unpopular with share-croppers and farmers with small landholdings. The benefits from the shift to HYV are said to have gone disproportionately to larger and wealthier landholders who have been able to invest in irrigation technology and enjoy economies of scale in purchasing inputs such as fertilizer and pesticide.

From the 1993/94 season, a considerable number of farmers in Gandahasti *beel* are reported to be shifting back to the older cropping pattern of deep-water, broadcast *amon* followed by *rabi* crops, particularly onion, as the returns are better. The scale of this is not yet clear but if it were to take place on a large scale, it would lead to a further (and generally positive)

Table 8 Income Sources Through the Year, by Landholding Category, NW1-1 Boalia UNIT: TK.

LAND CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABA	BHAD	ASHWI	KARTI	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
Medium	Fishing	—	—	28	102	104	152	164	97	41	107	63	60	919	2.6
	Fish culture	(2)	—	—	(5)	(6)	—	(3)	—	—	377	19	346	726	2.1
	Non-agric. labour	484	484	484	484	484	484	484	484	511	484	484	592	5,947	16.9
	Small stock	6	9	5	9	22	14	4	7	5	1	14	7	104	0.3
	Large stock	183	184	161	114	1,156	69	60	32	32	75	95	208	2,368	6.7
	Agriculture	2,077	3,936	2,585	2,705	1,489	2,371	982	394	1,191	208	442	2,155	20,534	58.3
	Self employment	369	257	353	41	26	951	46	43	44	226	9	2,246	4,611	13.1
	Total	3,117	4,870	3,616	3,450	3,275	4,041	1,737	1,057	1,824	1,478	1,126	5,614	35,209	100
Small	Fishing	124	57	10	167	97	362	428	383	87	144	65	—	1,923	6.6
	Fish trading	—	—	26	26	29	15	13	—	—	22	18	—	149	0.5
	Fish culture	—	—	—	—	—	—	(16)	37	75	—	—	—	96	0.3
	Agricultural labour	39	—	—	—	—	—	—	—	—	21	22	—	83	0.3
	Non-agric. labour	404	404	404	3,227	404	404	404	404	404	1,794	404	411	9,070	31.3
	Small stock	28	7	11	13	118	104	39	32	37	55	17	63	524	1.8
	Large stock	348	21	32	10	10	853	23	81	71	53	53	43	1,598	5.5
	Agriculture	1,215	1,634	1,649	1,278	1,230	1,379	966	510	164	270	368	1,860	12,524	43.2
	Self employment	496	235	173	243	230	186	155	127	133	823	53	138	2,992	10.3
	Total	2,654	2,358	2,305	4,964	2,118	3,303	2,012	1,574	971	3,182	1,000	2,515	28,959	100
Landless	Fishing	24	—	118	183	211	244	269	230	96	64	19	15	1,473	14.3
	Agricultural labour	241	236	102	57	57	68	226	172	251	238	190	374	2,212	21.5
	Non-agric. labour	142	97	81	81	81	67	67	67	77	82	102	187	1,130	11.0
	Small stock	16	17	21	84	39	85	59	56	59	30	42	26	534	5.2
	Large stock	—	—	—	—	—	—	—	35	24	—	741	—	801	7.8
	Agriculture	228	265	248	162	127	108	60	67	—	15	189	47	1,516	14.7
	Self employment	329	194	159	422	140	267	171	158	162	154	162	303	2,621	25.5
	Total	980	809	729	989	655	839	852	785	669	583	1,445	952	10,287	100
Village	Fishing	41	13	75	162	163	251	282	236	82	91	39	21	1,456	7.4
	Fish culture	(1)	—	—	(1)	(1)	—	(4)	8	17	79	4	73	174	0.9
	Agricultural labour	146	134	58	33	33	38	128	98	143	140	113	212	1,273	6.5
	Non-agric. labour	272	247	238	865	238	230	230	230	241	547	250	322	3,908	19.9
	Small stock	17	13	15	52	53	74	43	40	43	30	30	30	442	2.2
	Large stock	116	43	41	26	246	204	18	45	36	28	452	53	1,308	6.7
	Agriculture	836	1,342	1,051	946	659	867	455	234	287	112	282	894	7,966	40.5
	Self employment	375	217	203	302	136	393	141	127	130	318	106	675	3,122	15.9
	Total	1,802	2,009	1,681	2,385	1,527	2,057	1,293	1,018	979	1,345	1,276	2,280	19,649	100

Figure 9 Income Sources Through the Year, NW1-1 Boalia

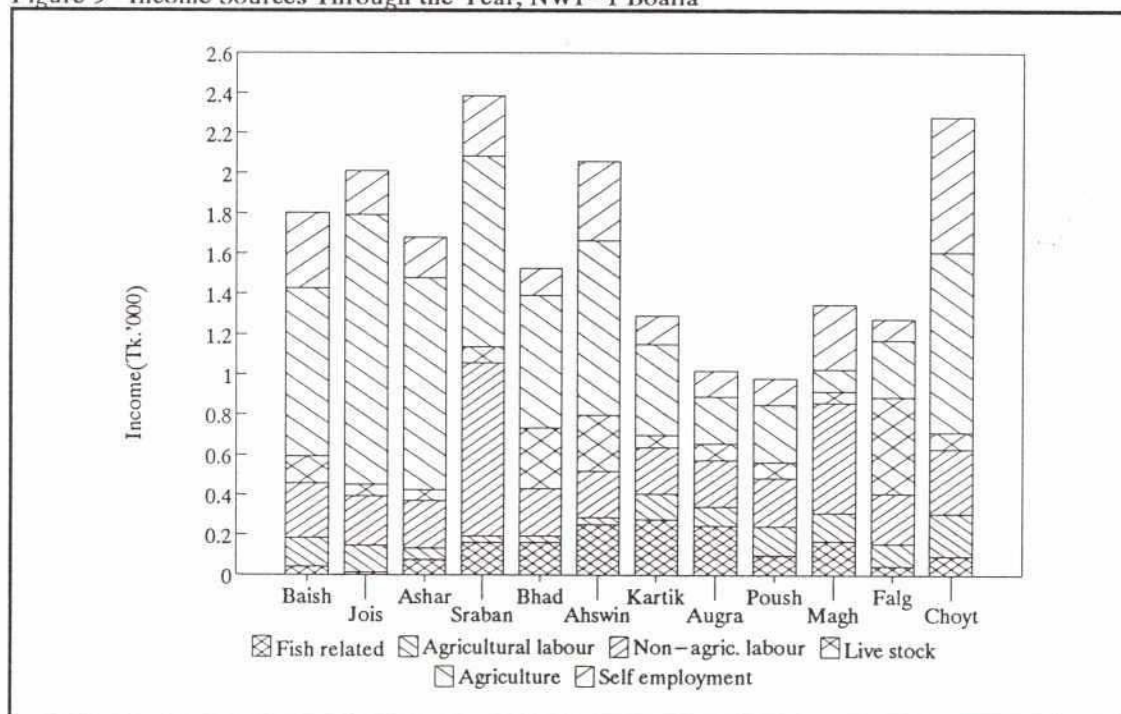
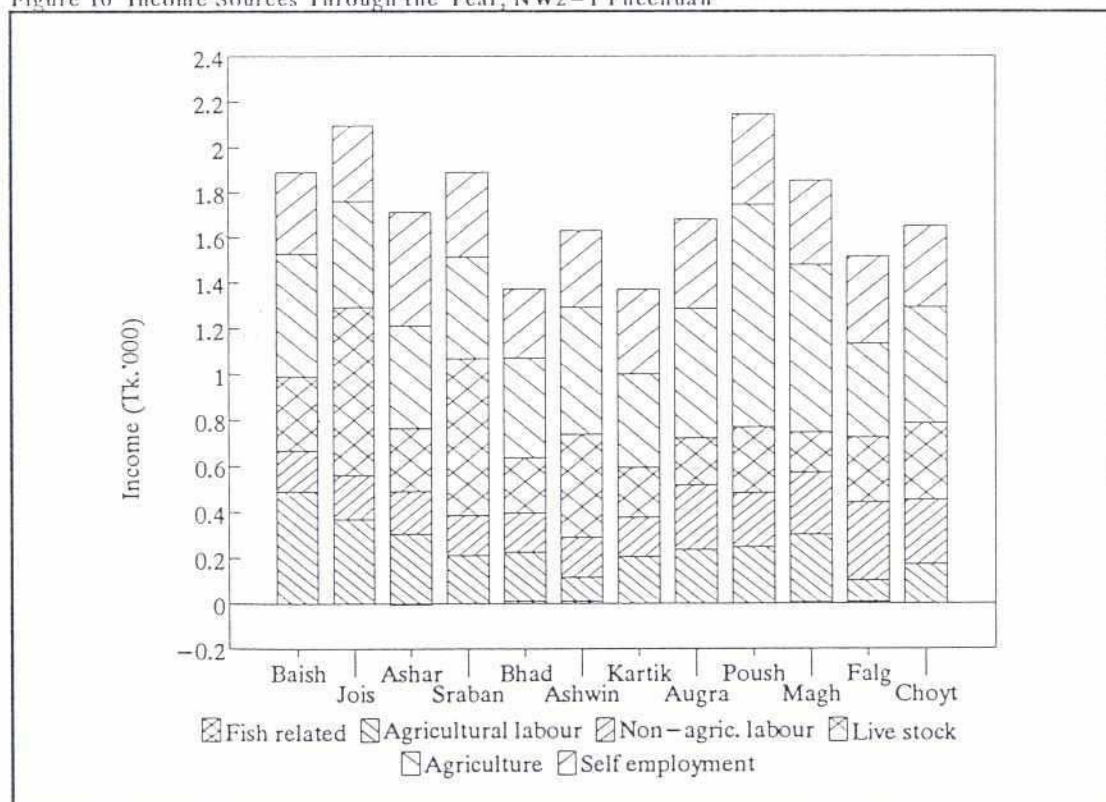


Table 9 Income Sources Through the Year, by Landholding Category, NW2-1 Phechuan UNIT: TK.

LAND CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABA	BHAD	ASIPWI	KARTIK	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
Medium	Fishing	-	-	-	-	6	-	-	-	-	-	-	-	6	0.0
	Agricultural labour	112	115	138	61	84	-	80	169	172	69	38	86	1,125	3.8
	Non-agric. labour	-	-	-	23	-	-	-	80	132	29	34	-	299	1.0
	Small stock	22	10	10	9	14	17	13	22	18	7	12	2	156	0.5
	Large stock	551	2,705	384	238	202	195	179	179	690	582	693	718	7,316	24.5
	Agriculture	1,723	1,701	1,422	1,028	1,287	1,811	1,707	1,122	2,432	2,646	993	868	18,738	62.7
	Self employment	111	112	1,062	101	99	107	109	130	100	111	104	102	2,248	7.5
	Total	2,519	4,643	3,016	1,460	1,692	2,130	2,088	1,702	3,544	3,444	1,874	1,776	29,888	100
Small	Fishing	-	-	-	6	28	38	-	-	-	-	-	-	71	0.2
	Fish culture	-	-	(16)	(3)	9	9	8	-	-	20	28	-	53	0.2
	Agricultural labour	906	406	149	158	174	88	195	251	247	676	61	204	3,514	10.9
	Non-agric. labour	643	698	683	625	625	625	625	700	768	777	949	776	8,494	26.4
	Small stock	91	66	66	563	38	27	45	44	66	83	68	53	1,208	3.8
	Large stock	439	514	476	1,454	519	478	544	486	467	15	430	393	6,215	19.3
	Agriculture	604	304	497	837	561	768	221	831	1,215	738	685	858	8,119	25.3
	Self employment	350	350	350	600	350	350	350	350	350	350	350	350	4,450	13.9
	Total	3,033	2,338	2,205	4,240	2,304	2,383	1,988	2,662	3,113	2,659	2,571	2,634	32,124	100
Landless	Agricultural labour	412	440	441	289	283	152	253	252	276	180	128	185	3,290	28.0
	Non-agric. labour	-	-	-	-	-	-	-	136	-	97	135	126	493	4.2
	Small stock	25	21	18	85	34	48	11	27	2	69	21	138	498	4.2
	Large stock	97	79	71	56	50	454	21	8	-	-	-	-	836	7.1
	Agriculture	87	121	78	43	62	-	35	229	344	52	58	194	1,300	11.1
	Self employment	462	407	383	359	352	417	475	516	531	477	503	459	5,341	45.4
	Total	1,083	1,068	991	832	781	1,071	795	1,168	1,153	875	845	1,102	11,758	100
Village	Fishing	-	-	-	2	9	10	-	-	-	-	-	-	21	0.1
	Fish culture	-	-	(4)	(1)	2	2	2	-	-	5	8	-	15	0.1
	Agricultural labour	491	369	303	210	215	105	204	236	248	295	93	172	2,940	14.1
	Non-agric. labour	177	192	188	176	172	172	172	281	236	271	340	281	2,658	12.8
	Small stock	42	31	29	202	31	37	21	31	23	61	32	88	628	3.0
	Large stock	277	698	242	476	208	411	195	172	260	115	250	245	3,550	17.1
	Agriculture	540	472	449	449	433	556	404	565	981	734	408	505	6,496	31.2
	Self employment	364	335	503	376	303	339	371	397	399	372	385	361	4,507	21.7
	Total	1,891	2,097	1,710	1,890	1,373	1,632	1,369	1,682	2,147	1,853	1,516	1,652	20,815	100

Figure 10 Income Sources Through the Year, NW2-1 Phechuan



change in the floodplain habitat during the wet season, with more vegetation cover from *amon*, reduced area where fishing could be carried out, better productivity and perhaps, in the long term, better catch per unit effort.

The effects of such a return to traditional cropping patterns on labour demand is less clear. From Table 8 showing the distribution of incomes among different landholding groups, it is clear that with the newer cropping systems, agricultural labour demand is sustained right through what is effectively an extended *rabi* season from *kartik*, when *boro* seed-beds and *rabi* crops are being prepared to the end of the *boro* harvest in *joisthya* (May/June). This peak might diminish earlier in the year if there was less land under *boro*, but some additional labour demand would be created during the *kharif 1* season harvesting *aus*. This would diminish the amount of fishing effort being applied during the peak floods.

However, the flooding season has **always** been a slack period for agricultural labour and, with increasing population pressure, the numbers of agricultural workers and small farmers involved in fishing can be expected to rise no matter what is happening agriculturally.

Phechuan

Low levels of fishing reported in Phechuan result in correspondingly low fishing incomes. Taking all sampled strata together, fishing contributes on average Tk. 21 per household, by far the lowest of any of the villages covered in the FAP 17 surveys. Total income in each landholding category is however similar.

Table 9 gives details of the breakdown of incomes by month and income category. Several features of incomes in Phechuan stand out : agricultural incomes are lower than those in Boalia, despite its seemingly more favourable agroecological environment; the higher levels of income from self-employment and employment in agricultural labour; the higher incomes from livestock; and the much greater consistency of incomes through the year.

The lower agricultural incomes in Phechuan are partly explained by the greater amount of land available for share-cropping by the landless - Boalia had 14 large landowners with an average of 12 acres, Phechuan only 5, with a holding of 9.2 acres; as noted, it also had a much higher proportion of medium landowners. This explains why agricultural incomes of the landless in Boalia are twice that of Phechuan. The higher agricultural incomes of small farms remain unexplained.

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In Pechuan, though there is the expected dip during the flood, agricultural labour incomes are both higher and more evenly spread than in Boalia. This is perhaps explained by the more diversified cropping environment in Pechuan. In Boalia the widespread cultivation of *boro* creates a sharp peak in labour demand for land preparation that is harder to meet in a village where many of the landless labourers are share-cropping; labour opportunities therefore may go to outsiders.

The higher incomes from livestock in Pechuan (Tk. 3550 as against Tk. 1217) are consistent with reported dependence on this activity.

Most notable however is the much greater degree of consistency in income sources in Pechuan. This is so particularly for the landless who rely on self-employment for a relatively steady 50% of their income through the year. This reflects the presence of local weaving industries, fairly intensive NGO activity and the relative proximity of both Santhia and Bera *bazar*.

In Boalia, self-employment for the landless is less significant (just over 25%) and as with their other income sources, it declines significantly during the flooding season. The two agricultural villages are similar in total incomes earned by each land holding class, but have achieved this through alternative livelihood strategies.

In Boalia fishing incomes are important for all landholding classes, but particularly for the landless during the flood season, when other sources of income are strictly limited. In Pechuan the leasing of the adjacent Ichhamati river and the attendant conflicts together with more limited flooding constrain the opportunity for fishing. But it is not clear how much the households in Pechuan would have wished to fish for income even if they had easy access to suitable waterbodies, as their greater opportunities for self-employment sustain income levels through the flood-season. The social stigma attached to fishing in the North-West is also higher than in all other regions, except perhaps the North-East.

2.8 Conclusions

The fisheries resources in both Gandahasti *beel* and the Ichhamati River have evidently been seriously impacted by the construction of the Pabna Irrigation Project. Reports of a 75%

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decline in catches are widespread though so high a figure would not seem to be supported by the FAP17 fish catch assessment studies. The direct impacts of the scheme are on migratory species whose routes are blocked or restricted. The shifts in agricultural patterns, towards winter *boro* cultivation, have accentuated these negative impacts by expanding the cultivated area over the entire *beel* and floodplain and disrupting the aquatic habitat. The introduction of mechanical irrigation technology has transformed methods of harvesting residual waterbodies during the drawdown and dry seasons, impacting non-migratory *beel*-resident species by eliminating most perennial waterbodies.

In both areas, the general reduction in fish production and in water area has resulted in greater competition for the reduced resources and conflicts over the management of water for agriculture and fisheries. Fisheries access on the Ichhamati is particularly restricted. Artificial restocking, while certainly improving the production levels, has apparently increased the bitterness of the competition for a share of the resource. The distribution of the resource is probably more concentrated now in the hands of leaseholders.

3. FISHING COMMUNITIES AND FLOOD CONTROL

3.1 Means of comparison

The difficulties in identifying fishing communities between which valid socio-economic comparisons can be made are even more marked than with primarily agricultural communities. The strategies employed by different fishing communities for maintaining their livelihood is highly dependent on historical, social and cultural factors which are rarely replicated from one community to the next.

The complexity of the social inter-actions affecting traditional fishing communities means that, in most cases, direct quantitative comparisons are less informative than more qualitative means of assessment. This is particularly true when dealing with traditional Hindu fishing communities which have obviously been strongly influenced by political and social changes in Bangladesh as a whole. These have often been far more important in terms of their livelihood strategies than changes in the fisheries resource due to flood control.


In spite of these problems, some basic indicators can be studied and assessed in order to achieve a better understanding of how flood control measures might have affected the livelihood of "professional" fishing communities. The indicators taken into consideration when looking at fishing communities are reviewed below.

Social and religious structure of fishing communities

Up to the Partition of India and Pakistan in 1947, fishing as a livelihood was limited to specific social and religious groups. Since then, many of the lines dividing fishing and non-fishing communities have steadily broken down. Changes in resources and hydrology due to flood control constitute one of these pressures affecting **who** is fishing.

Migration

Patterns of migration can be indicative of changes in the fisheries resource or in access to that resource. These changes, in turn, may have been affected by flood control measures. In some cases, traditional fishing communities have migrated directly due to changes in the fisheries resource, but some general points need to be made regarding migration of traditional fishing communities as an indicator of flood control impacts.

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- By far the most important cause of migration by traditional Hindu fishing communities in Bangladesh is communal pressure. Most migration has taken place in clear waves, usually following significant political changes (the Partition of India and Pakistan in 1947, the Independence of Bangladesh in 1971) or episodes of communal tension (anti-Hindu riots in 1965, the backlash after the Babri Mosque incident in 1992). All these events have led to fluxes of migration by Hindu households in general to India.
 - The trend has been for Hindu fishing communities to remain in Bangladesh for longer as the capture fisheries resources in the country are far more abundant than in West Bengal and therefore, even in conditions of increased competition and decline, offer greater opportunities for fishing communities to continue their traditional occupation.
 - Changes in patterns of seasonal migration for fishing are better indicators of changes in the resource than wholesale out-migration by entire fishing communities. Although these changes are seldom the result of the introduction of flood control *per se*, flood control is often one of a range of factors influencing changes in the areas exploited by fishermen.

Access issues

Traditional fishing communities have been affected more than any others by the major changes in fisheries access arrangements which have taken place over the last 40 years all over the country. Flood control impacts on waterbodies have often contributed to important changes in the social structure of access but many other factors are also at work and need to be identified.

Seasonality and fishing

Study of the seasonal patterns of gear use, and the changes in gears and fishing techniques can also serve as a useful comparative indicator when considering fishing communities. Different types and sizes of fishing gear are designed for use on waterbodies with specific characteristics in terms of depth, flood duration and species composition. As the waterbodies change, the gears used on them must change also. In the floodplain, any change in waterbodies and hydrology also implies changes in seasonal patterns of gear use and waterbody exploitation. Comparison of gear use and waterbody exploitation through the year thus becomes a very important indicator of the condition of the fishery.

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While fishing communities adapt, like any other community, to changing circumstances and change their technology accordingly, the gears used by specific groups of fishermen also reflect long-standing traditions of exploitation, and management, of fisheries resources. These indicators are not so readily observed among seasonal fishermen or agriculturalists engaged in fishing part-time.

Patterns of waterbody exploitation

Changes in the types and locations of waterbodies exploited by traditional fishing communities have to be carefully placed in their historical context, requiring an understanding of conditions 40 years ago or more. This obviously presents problems in terms of finding reliable sources but such research is essential for understanding the real significance of flood control measures on fisheries resources and the communities dependent on them. Often patterns of waterbody exploitation now and in the past are due to long-term changes in the waterbodies themselves, the communities around them and the social and political context of Bangladesh as a whole.

Incomes and occupational patterns

In spite of social, cultural and religious barriers, traditional fishing communities do diversify out of fishing into other activities in response to changes in the fisheries on which they depend. The extent to which individual communities are able to do this varies greatly from area to area and community to community, but this can also provide an important indicator regarding the ways in which local resources and fishing communities' access to them has altered over time.

3.2 Social and religious composition of fishing communities

Ahmmedpur

In Gandahasti *beel*, there has been an important shift in the overall composition of the fishing community as a result of the major changes in the *beel* after the construction of the PIRDP embankment. As the area of permanent *beel* has retracted, the level of fishing activity by traditional Hindu fishermen from around the *beel* has also shrunk steadily. The types of larger gear, such as *berjal* (seine net), used by these fishermen are less adapted to fishing in shallow waters. In addition, the removal of leasing arrangements on the *beel* has opened them up to increasing levels of fishing by local farmers and agricultural labourers moving into

fishing. Communities like the Muslim fishing community in Ahmmedpur now account for the bulk of fishing effort on Gandahasti *beel*.

A core of Hindu traditional fishing communities remain around Gandahasti *beel*, particularly at its southern end along the Badai River. These *halder* in Kadamtali, Pukurnia and Talimnagar are now entirely concentrated on fishing in the Badai River, as this is the only area for which they can obtain some controlled and stable access through the leasing system.

Sonatala and Talot

Sonatala and Talot are just two of a series of traditional fishing communities located along the Ichhamati River. Like Sonatala and Talot, the other communities are either *malo* (as in Dakhin Boalmari) or *rajbangshi* (as in Sanjaypur and Gopalpur). As in Gandahasti *beel*, these Hindu communities have all come under pressure as a result of changes in local waterbodies and competition from Muslim farmers and labourers who have taken to seasonal fishing for income, often competing directly for resources exploited by the traditional Hindu communities. None of these Muslim communities have direct control of any of the major leaseholdings in the area but exploit *jalmahal* areas regardless of formal restrictions.

3.3 Migration

Ahmmedpur

Table 10 shows the numbers of households migrating from both Boalia and Ahmmedpur over the last 40 years, with the timing and causes ascribed by respondents in the communities. The factors primarily instigating the **out-migration** of Hindu fishing households from the area are communal and political and largely pre-date the construction of the flood control structures now found in the area. However, remaining Hindu fishing communities on the south side of Gandahasti *beel* have shifted the focus of their fishing activity **off of the beel** and onto the Badai River as the formal control mechanisms on their fishing grounds in the *beel* have been removed or disregarded.

Sonatala and Talot

Table 11 shows the migration data for Sonatala and Talot. In the case of these two villages, the data on out-migration reveals a more interesting story. Sonatala was previously a far larger community than Talot. Prior to partition it is said to have been a thriving fishing

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Table 10
Boalia and Ahmmmedpur
out-migration of households - 1950s to present

VILLAGE	BOALIA		AHMMEDPUR	
Timing	H/H nos.	Reasons for migration	H/H nos.	Reasons for migration
before 1950	0	-	0	-
1950-1970	0		0	-
1970-1980	10	• Independence of Bangladesh (all Hindu H/H moving to India)	30	• Independence of Bangladesh (all Hindu H/H moving to India)
1980-1990	0	-	0	-
1990-present	0	-	5	• Muslim households (motive unclear)

Source : FAPI7 Village Appraisals

community of more than 200 households. These fishermen, like most *malo*, have mainly specialised in riverine fisheries and exploited the Ichhamati, the Baral and Hurasagar, as well as seasonally fishing on the Padma, Jamuna and Meghna Rivers. The period immediately after Partition in 1947 and after the Liberation of Bangladesh in 1971 mark the principal waves of migration to India.

Some households in Sonatala left at this time but by far the biggest wave of migration was some years after Liberation, in the period 1976-77. While the primary reason given for this move is, again, communal tension and political instability, the decline in fisheries was already making itself felt and may have been a contributing factor.

The closure of most of the river connections between the area inside the PIRDP and the major rivers outside would have significantly reduced the scope of operation for Sonatala fishermen who would have normally used their own craft to move seasonally from the village to distant fishing grounds on the Meghna, Jamuna and Padma. The blocking of the Ichhamati

River at its inlet from the Ganges near Pabna had already caused the river to dry up during the winter even before its outlet into the Baral River at Bera was also blocked off by the PIRDP embankment.

In Talot, the pattern of migration has been somewhat different. A significant group left immediately after Partition, but since then, the flow of out-migrants has been relatively slow and steady until recent years. It is clear that the decline in the *beel* fisheries which Talot fishermen traditionally depended on has gathered pace over the last decade as the full impact of the Pabna Irrigation Project has taken effect.

Table 11
Sonatala and Talot
out-migration of households - 1950s to present

VILLAGE	SONATALA		TALOT	
Timing	H/H nos	Reasons for migration	H/H nos.	Reasons for migration
before 1950	30	<ul style="list-style-type: none"> • communal conflict (all Hindu <i>malo</i> H/H migrating to India : 1948-49) 	15	<ul style="list-style-type: none"> • communal conflict (all Hindu <i>rajbangshi</i> H/H migrating to India)
1950-1970	22	<ul style="list-style-type: none"> • communal conflict (all Hindu <i>malo</i> H/H migrating to India) 	5	<ul style="list-style-type: none"> • communal conflict (all Hindu <i>rajbangshi</i> H/H migrating to India)
1970-1980	100	<ul style="list-style-type: none"> • communal conflict (all Hindu <i>malo</i> H/H migrating to India) • joining relatives in India • decline in fisheries 	0	
1980-1990	50	<ul style="list-style-type: none"> • decline in fisheries • reduction of waterbodies 	5	<ul style="list-style-type: none"> • communal conflict (all Hindu <i>rajbangshi</i> H/H migrating to India) • competition with non-traditional fishermen
1990-present	10	<ul style="list-style-type: none"> • decline in fisheries • reduction of waterbodies 	12	<ul style="list-style-type: none"> • decline in fisheries • competition with non-traditional fishermen • joining relatives

Source : FAP17 Village Appraisals

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Respondents in Talot also mentioned the "pull" factor, encouraging young members of the fishing community to join relatives in West Bengal either to go to school or find work, is becoming increasingly important as the Indian economy grows and job opportunities there improve. However, the political and social vulnerability of the Hindu minority in Bangladesh remains the principal factor affecting out-migration by Hindu fishermen in Sonatala and Talot.

For the *rajbangshi* of Talot, who have always been more *beel*-dependent in their fishing patterns, the PIRDP development has influenced fewer of them to migrate, at least in the period immediately after construction of the first sections of the embankment. Much of the northern embankment of the project, along the south bank of the Baral River was only completed during the later phases of the PIRDP and the fisheries impacts may have been felt by Talot fishermen on their local waterbodies more recently. This, together with increasing competition from Muslim fishermen, explains the increase in the rate of migration from Talot over the past years.

3.4 Access for fishermen

The access issues affecting the non-traditional, Muslim fishermen in Ahmmedpur and the traditional, Hindu fishermen fishing on Gandahasti *beel* as well as those in Sonatala and Talot, are quite different and are therefore dealt with in separate sections below.

Non-traditional fishermen in Ahmmedpur - access issues

Conditions of access to fisheries for the **non**-traditional Muslim fishermen in the satellite fishing community of Ahmmedpur (and for those in Char Boalia) need to be seen in historical context. Muslims from either of these communities have only been engaged in year-round fishing on any scale since the early 1970s. Muslim communities around Gandahasti *beel* are reported to have fiercely resisted the adoption of fishing as a means of livelihood by "their people". It is clear that fishing has **always** played some role in the livelihoods of people living in lowland areas such as Gandahasti *beel*, but it is equally clear that, historically, there were strict limitations imposed around such activities. The very low social status associated with fishing, and the sense that fishing by one member of the community might in some way "pollute" other members of the community clearly has connotations which go back to deeply-ingrained patterns of social interaction.

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In traditional rural Bengal society, fishing as an occupation is a tightly circumscribed activity associated with distinct caste groups and generally carried out only by them. Fishing is a hunting activity which in turn carries a series of associations with low-caste or even non-caste (i.e. tribal) activities which contribute to the overwhelmingly negative correlation between fishing activity and social status. There is a differentiation between fishing with gear **in the water** and fishing from the bank. Anyone can apparently drop a line or throw a *jhaki jal* (castnet) from a river bank (keeping dry in the process) without risk of compromising their social standing. Actually getting **into** the water with a pushnet or a seine net is an entirely different matter and implies risks of pollution. Such attitudes, though generally associated with Hindu culture, are still strong in Muslim communities in rural Bengal and are reflected in the opposition among higher status Muslim farmers to the involvement of any of their co-religionists in fishing.

The negative social connotations of fishing also appear to be strictly limited to fishing **as a source of livelihood**. Fishing as "recreation" or simply for household consumption is largely exempt from the general disapproval of fishing activity by anyone except a fisherman.

In Boalia and Ahmmedpur, until the political and communal upheavals surrounding the Partition of India and Pakistan in 1947 and the Independence of Bangladesh in 1971 led to the departure of many of the traditional Hindu fishermen in the area, the issue of Muslims fishing had not arisen. Fish was widely available and cheap. However, the traditional supply of fish decreased as Hindu fishermen migrated out to India. As pressure on other resources increased with population growth, poorer community members, inevitably, looked at the gap left by departing Hindu fishermen and sought to fill it, in spite of the strong social ostracism they faced. Once some Muslim households had established themselves as fishermen and "broken the taboo", others followed. The numbers of these non-traditional fishermen now far exceeds the previous numbers of traditional fishermen whose place they have taken.

The big move of landless and small landowning Muslim agriculturists into fishing as an occupation more or less coincided with the construction of the embankment around Gandahasti *beel*. By turning the extensive areas of perennial *beel* into a seasonal floodplain, the embankment almost certainly encouraged Muslim fishermen at the expense of those traditional fishermen left in the area. As the sections of *beel* which constituted the traditional fishing grounds of some of the Hindu fishing communities in the area became seasonal and less productive, Hindu fishermen either migrated or concentrated on fishing in the remaining

perennial water in the Badai River leaving most of Gandahasti *beel* to the new entrants.

From this, the reduction of *beel* and floodplain area as a result of the construction of the PIRDP may actually have created a more open fishery in Gandahasti *beel*, at least in the short-term. There is almost no doubt that more people are currently benefitting directly from the fishery than was the case before.

The story of fisheries involvement in Ahmmedpur is related in Box 2.

In the 1960s, even before the *rajbangshi* fishing community in Ahmmedpur moved out, one landless labourer in the Muslim community, a certain Aru Sarder, started **secretly** catching fish in the *beel* and selling them at one of the local markets. When it was discovered, this person was so violently ostracised by the local *panchayat* that he ended up leaving the village to live elsewhere. Not long after his departure, however, other landless households began to follow his example, starting a trend which has steadily gathered pace. The numbers of fishermen seem to have taken off with the departure of the *rajbangshi* community in the early 1970s.

Box 2 : Muslims and fishing in Ahmmedpur

In the longer term, the proliferation of *kua* in the *beel* will probably give rise to complications in the structure of access. *Kua*-owners recognise the benefits to **their** returns from limiting fishing activity on the surrounding flooded land. In Digbar *beel*, just south-west of Boalia, landowners are already controlling fishing activity on their land during the peak fishing months of *poush* (December/ January) and *magh* (January/February). While no *kua* have yet been dug in this particular section of the floodplain, the extension of property rights from the underlying land to the fisheries resource in waters above has already commenced. The extent of the Gandahasti floodplain may prevent this having a noticeable effect for some time, but increased efforts to exert ownership claims over the "open-access" floodplain resource are practically inevitable and will affect, above all, Muslim non-traditional fishermen.

Table 12 shows the pattern of change in fishing by different groups, including non-traditional Muslim fishermen, in relation to changes in land-use in the *beel* and floodplain in Gandahasti *beel*. The steady movement of agriculture into the lower areas of the *beel* has been accompanied by the development of a new occupational group of Muslim fishermen who work, either as labourers or share-croppers, on the *boro* rice areas opened up in the *beel* during the winter and, during the flooding season, take advantage of the lack of restrictions on fishing in the *beel* to earn a living from fishing with *current jal* and *borsi*.

Table 12

Gandahasti *beel*

Fisheries access for different social groups and changes in floodplain agriculture - 1960s to present

Time	Non-traditional Muslim fishermen	Traditional Hindu fishermen	Land- owners	Landless labourers	ACTIVITIES & CHANGES
1960s	practically none: one or two Muslim landless try fishing but prevented by social ostracism	Flood season - open fishing on <i>beel</i> & floodplain: open fishing in rivers; Dry season - fishing on leased <i>beel</i> ; <i>katha</i> & <i>kua</i> harvesting on rivers	Flood season - subsistence fishing on floodplain & <i>mailal</i> Dry season - community fishing in some <i>beel</i> after harvest: <i>mailal</i> & <i>kua</i> harvest	Flood season - subsistence fishing in floodplain & <i>mailal</i> Dry season - community fishing on some <i>beel</i> after harvest	Flood season - DWR/jute Dry season - <i>rabi</i> crops, some <i>boro</i> & cattle grazing in <i>beel</i> and floodplain
1970s	↓ Flood season - few Muslims start occasional fishing on floodplain: Hindu fishermen migrate out: lease restrictions on <i>beel</i> lifted: Dry season - <i>boro</i> & <i>rabi</i> crops	↓ Flood season - open fishing in floodplain: leases on Badai River Dry season - more competition on <i>beel</i> & floodplain: no more leases on <i>beel</i> ; <i>katha</i> on rivers	↓ Flood season - subsistence fishing in floodplain: Dry season - community fishing on some <i>beel</i> after harvest: lowland in <i>beel</i> occupied & cultivated	↓ Flood season - increasing subsistence fishing in floodplain: Dry season - community fishing on some <i>beel</i> after harvest: more labour on <i>boro</i> during winter	↓ Lower land cultivated: increase in <i>boro</i> area: main river embank- ment constructed: <i>beel</i> become seasonal:
1980s	↓ Flood season - more landless & small farmers fishing on <i>beel</i> & floodplain: Dry season - <i>boro</i> & <i>rabi</i> crops	↓ Flood season - competition for open fishing on floodplain & <i>beel</i> : fishing on leased area of river Dry season - fishing on leased areas of Badai River: pond & fishing & fish trading for others	↓ Flood season - subsistence fishing & fishing for income in floodplain Dry season - most of <i>beel</i> converted to <i>boro</i>	↓ Flood season - increasing subsistence fishing & fishing for income in <i>beel</i> : Dry season - more labour during winter:	↓ Most of <i>beel</i> & lowland cultivated: HYV <i>boro</i> introduced: flood control completed: reduced area of DWR: LLP introduced
1990s	↓ Flood season - most of fishing on <i>beel</i> by Muslims: some conflicts with fish-pit owners Dry season - <i>kua</i> & <i>mailal</i> harvesting: <i>boro</i> & <i>rabi</i> crops	↓ Flood season - fishing in <i>beel</i> restricted: Dry season - competition on leased areas of Badai River: pond & river fishing & fish trading for others	↓ Flood season - fishing for income in <i>beel</i> : excavation of fish-pits on land Dry season - HYV <i>boro</i> cultivation in <i>beel</i> & floodplain: fishpits & <i>mailal</i> harvesting	↓ Flood season - much fishing for income in <i>beel</i> : restrictions & conflicts with landowners Dry season - <i>boro</i> & <i>rabi</i> crops	↓ widespread HYV <i>boro</i> cultivation: widespread LLP use: less DWR

Source : FAP17 Village Appraisals

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Patterns of fishing effort on waterbodies under different access arrangements are shown, for Ahmmedpur, in Figure 11.

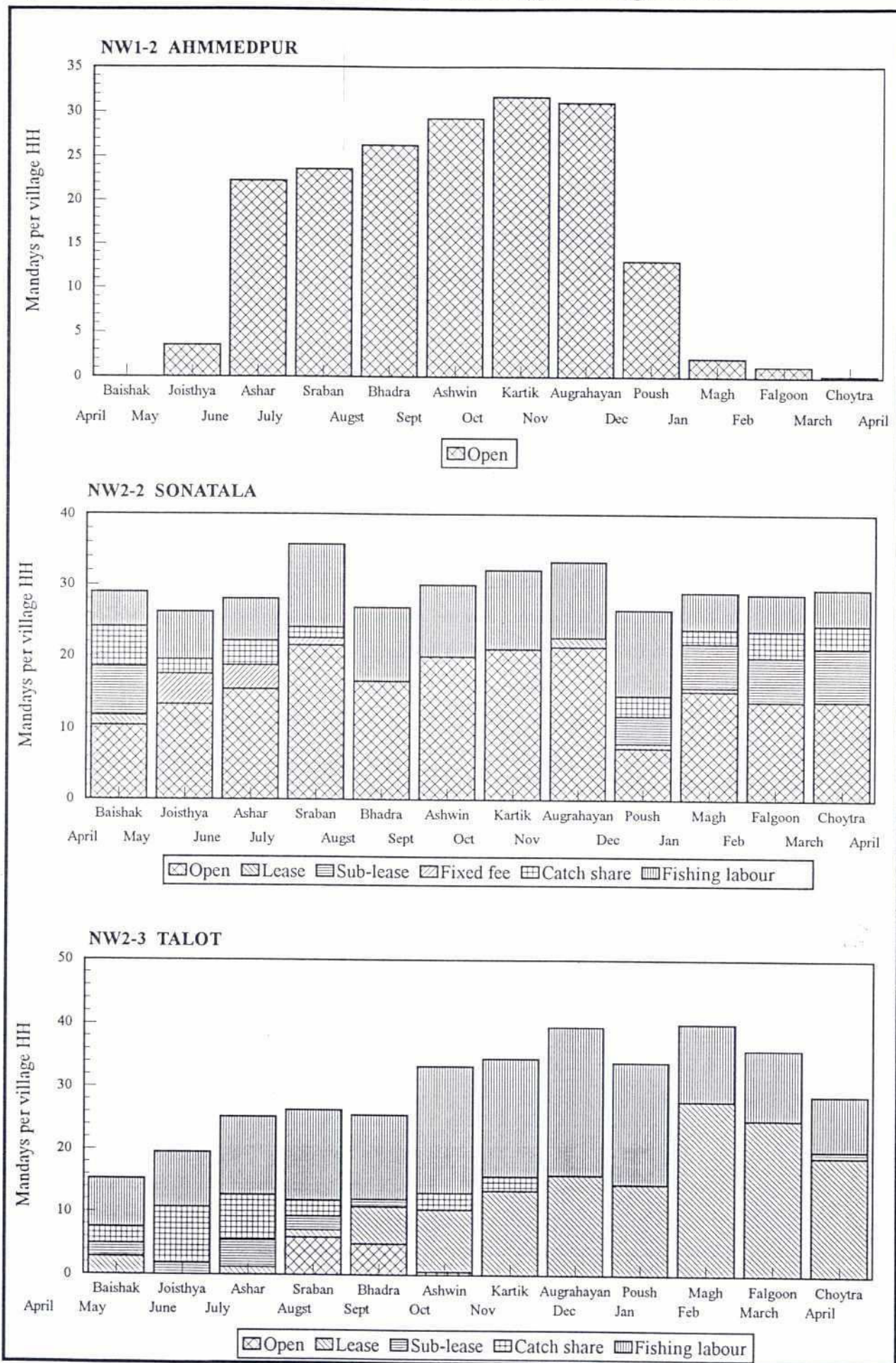
Traditional fishermen in Gandahasti *beel* - access issues

The position of traditional Hindu fishermen with regard to control of fishing grounds in Gandahasti *beel* has been the mirror image of that of the non-traditional Muslim fishermen. The change of their traditional fishing grounds in the *beel* from perennial to seasonal has been accompanied by the removal of any formal leasing arrangement. This has meant that, in the face of competition from Muslim fishermen, the traditional fishermen have had no legal basis on which to enforce their long-standing right to the fishery. In any case, the physical changes in the waterbody have made it unsuitable for their traditional fishing methods. The Hindu fishermen have therefore moved off the *beel* almost completely and concentrated on the only remaining leased area, the Badai River. The various sections of this river constitute different *jalmahal* leased by the Land Revenue Office to fisheries cooperatives based on the various fishing communities along the river.

According to the terms of these leasing arrangements, fishermen should be able to control fishing on the stretch of the river covered by their *jalmahal* and close it to non-fishermen. In reality, it is apparent that the Hindu fishermen are unable to do this. The *halder* set their *veshal* (liftnets) and *katha* (brushpiles) and harvest sections of the river using *berjal* (seine nets) during the dry season, but all around these activities, local farmers and labourers are freely using *daun borsi* (longline) and *current jal* (monofilament gillnet) to catch significant amounts of fish with very little interference from the leaseholders.

When asked about this, both Hindu and Muslim fishermen say that the traditional fishermen are not in a position, as a minority, to force anyone to stay off the waterbody which they "control". It is significant that the traditional fishing communities on the Badai are all dependent on loans from Muslim *mohajan* from the local community in order to raise the lease fee. Many *samity* members in this area are also Muslim non-traditional fishermen. According to the Hindu *halder*, if they did not have these Muslim farmers in the *samity* they would not be able to get hold of the leases even for the Badai River, nor would they have any chance of enforcing even the limited restrictions on fishing which they do at present.

Figure 11 Distribution of Fishing Effort by Access Type Through the Year



Traditional fishermen in Sonatala and Talot - access issues

On the Ichhamati River, the recent case of fishermen effectively defending their rights to control of the fishery is in marked contrast to the situation in Gandahasti *beel*. In the face of an apparently determined effort to establish more general community right to the resource (described in Box 3), the Sonatala fishermen were able to defend their exclusive rights to access to the fishery. Several factors have contributed to this success.

Firstly, and probably most importantly, the Sonatala fishermen have the support of an influential local politician who has, in the past, been directly involved in leaseholding

on the river. This individual may also be financing, at least partially, the Sonatala fisheries *samity*'s current control of the section of the Ichhamati running past the village. At the time of the conflict last year with local farmers over fisheries access, this person was actually holding the lease, albeit unofficially, and was able to mobilise the bureaucratic and legal support to ensure that the issue was taken through the courts. The Sonatala fishermen's rights to control the waterbody have been considerably strengthened as a result, although the action was probably dictated above all by the personal interest of the individual in question.

The active involvement of the Department of Fisheries in the management of the river, as a result of their involvement in stocking the Ichhamati with carp fingerlings, has also enhanced the position of the *malo* fishermen who officially hold lease title to the river. Sonatala fishermen participated in the stocking activities and this certainly will have improved their standing as "official" leaseholders.

Ironically, this stocking programme was also behind the conflict in the first place. While, before stocking, traditional fishermen have had to deal primarily with small-scale subsistence fishing in "their" river, it is clear that the restocking programme has led to an enormous jump in interest in exploiting the river more intensively. This has complicated the position

In November, 1992, a group of villagers from Pechuan (who had reported practically no fishing gear ownership during the course of the FAP 17 Census Survey) decided to assert their right to fish in the Ichamati River by simply going there *en masse* and starting fishing. The *malo* fishermen from Sonatala, working for the then-leaseholder, fiercely resisted this intrusion. It seems there was violence and eventually the villagers withdrew, reportedly as they realised that legally they in fact had no right to fish the river. They had apparently been relying on intimidating the fishermen into compliance. The following day, the lease-holder for the river instituted a case against 12 of the Pechuan villagers, accusing them of beating up the fishermen and destroying nets and boats. One villager was arrested and subsequently released on bail. The case is still pending in court.

Box 3 : Fighting for fish on the Ichhamati

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of the Sonatala, and other, Hindu fishermen as they are now at least **nominal** controllers of a resource which everyone **knows** is valuable.

Another important aspect is the physical nature of the Ichhamati River. Being narrow with clearly defined boundaries, it obviously lends itself to better control of fishing effort, especially in comparison with an ill-defined and seasonally variable *beel*.

In Talot, the fishermen's cooperative has been able to maintain a considerable level of control over the community's traditional waterbodies, both on the Ichhamati River and in neighbouring *beel*. This may also be partly due to the strong connections of the community with the previous *zamindar* of the area, who maintains some influence in local affairs. The secretary of the Talot cooperative is also particularly active and has been successful in maintaining the *samity*'s influence.

As in Sonatala, association with the stocking programme undertaken in the Ichhamati by the Fisheries Department as part of the Pabna Irrigation Project has undoubtedly strengthened the hand of this leaseholder, as there is local institutional support for tightly controlling the fishery on the river. However, the character and connections of the individual play a key role. A few kilometres further west on the same river, in Gopalpur, another traditional Hindu fishing community lacking such political backing is reportedly unable to regulate fishing effort on its leased portion of the river.

Talot fishermen are also highly dependent on the fisheries in Gangbhanga and Katadiha baal. These two waterbodies are their traditional main fishing grounds and were previously part of the *zamindari* of Shohodor and Varanger Roy. Access rights for the fishermen were previously allocated by a combination of a tradition of exploitation of that waterbody and the payment of a yearly revenue (*khajna*). The Talot *Matshashibi Samabaya Samity* (Fishermen's Cooperative Society), formed in 1960, has taken on the lease of the waterbodies and has been able to maintain control. However, increasing competition with local Muslim farmers and labourers fishing on the leased areas or on the surrounding floodplain is increasingly threatening the degree to which Talot fishermen can depend on these *beel* for a living. Gangbhanga *beel* is still a perennial waterbody while Katiyadaha has become seasonal since the construction of the embankment.

Most of the other *beel* and floodplain areas around Pechuan are not governed by any formal

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leasing arrangements. Sonatala fishermen, in addition to riverine fisheries, have apparently always fished these *beel*, notably the Khodigari and Bumra *beel* in addition to the local rivers. However, the FCD/I scheme which has reduced their access to riverine fisheries has also severely impacted the local *beel*. All the *beel* which Sonatala fishermen fish are now seasonal. This combination of impacts on practically all their fishing grounds is probably largely responsible for the large scale out-migration which has taken place from Sonatala.

Traditional fishermen are in a double-bind. On the one hand, to gain access to productive *jalmahal* they need to mobilise both credit, usually from informal sources, and political patronage to influence the distributive apparatus. This is almost always done at the cost of surrendering both a proportion of earnings and a degree of independence to the *mohajan* or other influential figures who act on their behalf. This relationship of dependence/indebtedness has, however, the advantage of securing sufficient political support to enforce some kind of restriction on fishing. On the other hand, where fishermen are able to maintain more independence, either obtaining *jalmahal* leases themselves or limiting their indebtedness to the purely financial, they have considerable difficulty in exerting control over the fishery.

Their position as a low-status minority group makes it very difficult for Hindu traditional fishermen to impose any real restrictions on *jalmahal* controlled by them **unless** they are supported by more influential figures who have a direct interest in protecting, or monopolising, the resource. Given the degree of competition and the influx of new entrants into the fishery, strict management of the key fisheries areas, such as important *beel*, *khal* and rivers, may be necessary for the sustainability of the fishery as a whole.

3.5 Fisheries access and water management

Waterbodies located inside the PIRDP are obviously crucially affected by the management of water through the system. The reduction in the total inundated area which has resulted from flood control has focused attention, and fishing effort, on a few key stretches of water which are vital for the access and movement of water and fish.

The stretch of the Badai River running from the sluice gate at Talimnagar into Gandahasti *beel* is of critical importance for the fisheries in the whole *beel*. Especially since the construction of the PIRDP, the flow of water through this channel has become even more



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vital to the state of fisheries in the *beel*. Before the embankment there were probably secondary channels and some overbank flooding which augmented the supply of water and fish from the rivers into the *beel*. Now, at least for the migratory species, the Badai River and the Talimnagar sluice gate represent the only access channel for the whole area of lowland running from Sujanagar in the west to the Kashinathpur-Talimnagar road in the east.

Local people's concern over the decline in fisheries resources in Gandahasti *beel* as a whole is therefore focused on the management of this river and the sluice gate which controls it. At present there is a general consensus that it is poor control of the water regulator which is causing the most damage to fish stocks in Gandahasti *beel*. Longer-term changes in agriculture and the increase in complete dewatering of residual waterbodies are also recognised as playing a role, but the failure of regulator management procedures to accommodate the requirements of migrating fish fry and fingerlings during the early rise of flood waters is a more concrete failure which can be easily recognised and for which blame can be apportioned.

There is also a fairly wide-based consensus that proper control of the water regulator could sustain fisheries resources in the *beel* without seriously jeopardising agriculture. The closure of the sluices during the period from late *baishak* (early May) to late *joisthya* (early July) is reportedly aimed at protecting a relatively small amount of *boro* crops standing in the lowest parts of the *beel*. According to local people, the current operating schedules are dictated by the fact that most of this very low-lying *boro* land is owned (or occupied) by large and influential landowners who are able to influence sluice gate operation.

Even if the Talimnagar sluice gate were to be managed more equitably, seasonal fishermen in Boalia and Ahmmedpur point out that the fishing activities along the Badai River constitute a further serious threat to sustainable fisheries in the *beel*. At present, the river is intensively exploited using *berjal* (seine net), *veshal* (liftnet) and *katha*, mostly by traditional Hindu fishermen. As soon as the sluice gate is opened, usually in *joisthya* (May/June) the fishery for fish fry and fingerlings is very active along this river and, as one Boalia fisherman put it : "There's not much point in opening the sluice gate to let fish in if they're all going to get caught in the first 100 metres of river inside the gate."

3.6 Seasonality and fishing

Patterns of fisheries activity through the year are dictated by a range of factors : the physical configuration of waterbodies, hydrology, target species, resources available for investment in fishing gear, traditions of gear use and institutional access arrangements. The comparison of existing gear, waterbody use and effort provides a starting point for explaining patterns of fishing activity among these communities.

Ahmmedpur

Table 13 shows the numbers of households in different fishing categories in Ahmmedpur owning different kinds of fishing gears and the average household income earned from those gears.

Even in the relatively short time in which Ahmmedpur fishermen have been active, some changes in gear use are reported. One or two of the early Muslim fishermen in both Ahmmedpur and Boalia reportedly operated *veshal* (liftnets) in the *khal* within Gajnar *beel*. In the early 1970s, some fishing households even invested in a *berjal* (seine net). However, from the 1970s on, the suitability of these larger gears declined as the depth of water in the *beel*

reduced following the completion of flood control works. Many of the newer Muslim entrants to the fishery were also not in a position to mobilise the sort of credit required to purchase larger gears and have preferred to invest in smaller gears such as *current jal* (monofilament gillnet), which are owned by 85% of the community, *daun* (longline) and traps (*kadum* or *labani*), owned by 36% of households. These are better suited to their needs and the seasonal waterbodies accessible to them.

The seasonality of waterbodies for Ahmmedpur fishermen is reflected in the seasonality of

Table 13 Distribution of Gears, Ahmmedpur

Gear Type	Bengali Name	No.	%	Tk.
Gill nets	Current jal	46	85.3	7038
	Koi/Fashi jal	5	9.8	1065
Seine nets	Ber jal	3	4.9	3755
	Moi jal	3	4.9	3005
Trap	Kadum	20	36.4	1670
Hooks	Sip	3	4.9	210
	Daun	8	14.7	2260
Cast net	Jhaki jal	5	9.8	992
Other	Dewatering	3	4.9	281
	Hand fishing	3	4.9	450

Source : FAP17 Socio-Economic Monitoring

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gear ownership. *Current jal*, *daun* and traps all have short life-spans, generally lasting for no more than one fishing season. This showed up in very low reported gear ownership when a census of gear in Boalia and Ahmmedpur was conducted in January, 1993.

Fishing activity in Ahmmedpur has generally increased as water level in the *beel* decreased, access controls were removed and traditional fishermen either migrated out or concentrated their fishing activity on the Badai River. As the increase in acreage under cultivation and the reduction in flooded area reduced the sites where larger gears could be operated, Muslim fishermen have moved in using smaller gears.

Figure 12 shows the effort applied by Ahmmedpur fishermen on different waterbody types through the year and Table 14 the average effort per household for the principal gear/waterbody combinations. The concentration of fishing effort using *current jal* on the *beel* and floodplain, with peak effort applied during the drawdown period reflects the reliance of the community on the open access fishery in Gandahasti *beel*. The movement of Muslim fishermen from the deeper parts of Gandahasti *beel* in *ashar* (June/July), as they fill up with the first flood waters, on to the floodplain as the peak flood arrives, and then back into the *beel* as the flood recedes, is clearly illustrated in the figure.

Unlike surrounding Hindu fishing communities who continue fishing on the leased and perennial Badai River, fishing activity for the Muslim fishermen drops off very sharply once the bulk of floodwater has drained out of the *beel*. Most of these fishermen then take up agricultural labouring during the winter months.

Table 14 Distribution of Gears, Sonatala

Gear Type	Bengali Name	No.	%	Tk.
Seine nets	Ber jal	45	60.1	7411
	Moi jal	14	19.7	3841
	Hat panch	22	29.2	6446
Lift net	Veshal jal	10	14.4	953
Cast net	Jhaki jal	19	25.5	4702
Push net	Thella jal	4	5.8	340

Source : FAP17 : Socio-Economic Monitoring

Sonatala and Talot

Tables 15 and 16 show the distribution of fishing gear ownership in Sonatala and Talot.

The reduction in seasonal migration out onto the main rivers, particularly from Sonatala, has reduced their use of drifting gillnets for *ilish* and other species typically caught in the Padma

and Jamuna. The gears used in the two communities are still quite different, reflecting their contrasting backgrounds and traditions. Sonatala fishermen use a variety of gears suitable primarily for riverine fisheries, in particular the *hat panch* (medium seine net), *moi jal* (small seine net with pockets) and *veshal* or *khora* (liftnet). The various types of

Table 15 Distribution of Gears, Talot

Gear Type	Bengali Name	No.	%	Tk.
Seine nets	Ber jal	17	45.8	7870
	Deol	2	6.9	2680
	Kathi jal	14	38.8	3259
Lift net	Veshal jal	9	24.9	2824
Katha	Katha	4	12.1	1970
Cast net	Jhaki jal	10	26.7	1460

Source : FAP17 Socio-Economic Monitoring

berjal used in both communities are more or less similar, although Talot fishermen are currently more concentrated on *katha berjal* for harvesting the *katha* in the stretch of the Ichhamati River controlled (at least nominally) by their fisheries *samity*. The numbers of different types of gear used in the villages are show in Table 13.

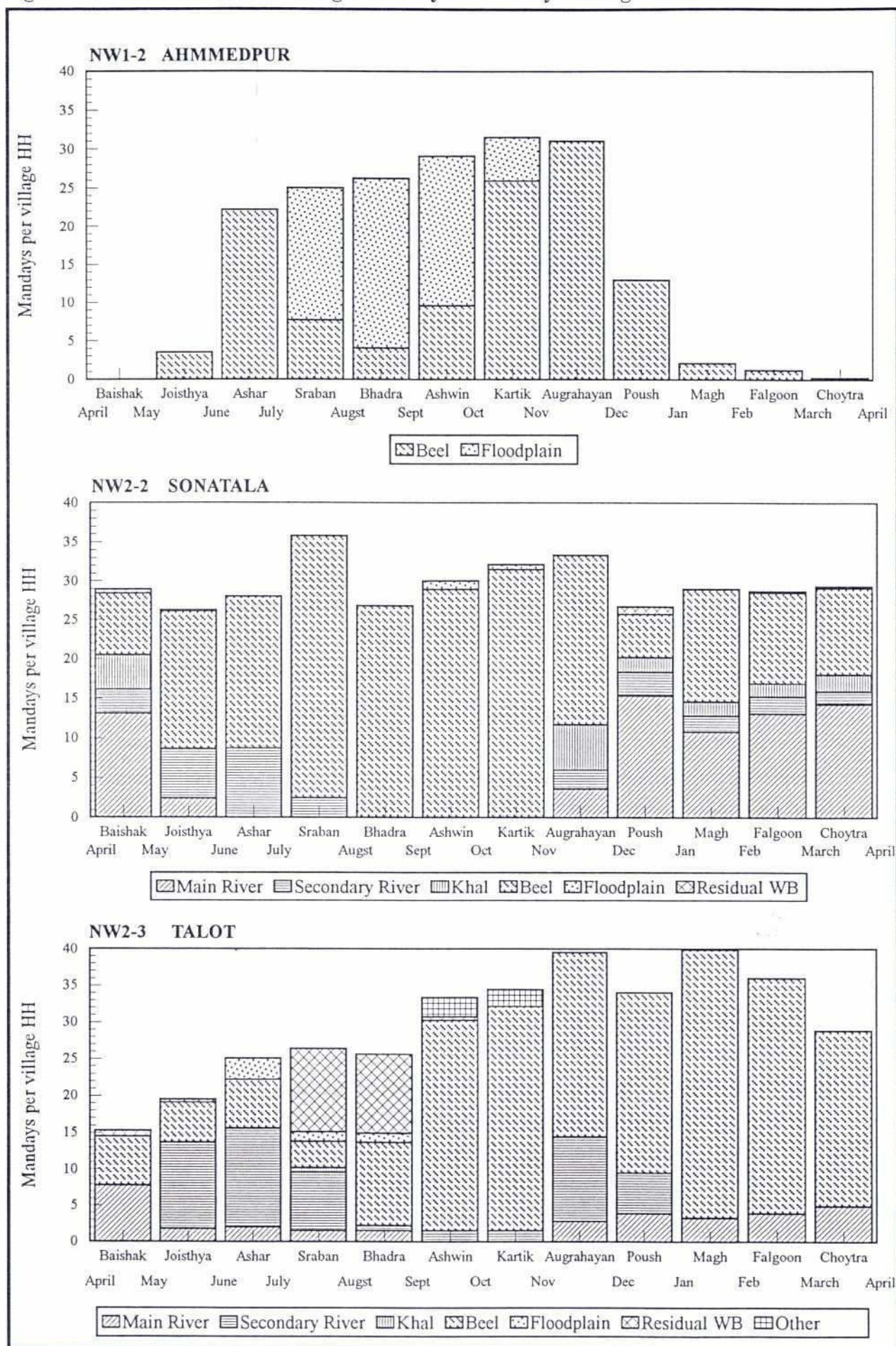
In Figure 12 and Table 14, the different patterns of fishing effort, gear use and waterbody exploitation by the *malo* and *rajbangshi* fishermen in the two villages are indicated.

In the case of the *malo* fishermen of Sonatala, their relatively greater level of dependence on fisheries on the main river, generally the Padma, during the winter months is highlighted. This is probably a left-over from their original patterns of fishing. However, due to major changes in surrounding waterbodies, discussed below, much of their fishing effort is now concentrated on a range of local *beel*. While some fishing continues on these *beel* through the winter months, it is noticeable that, unlike the *rajbangshi* fishermen of Talot, the peak effort on the *beel* is during the flood season. The *beel* fished by the Sonatala fishermen have few perennial water areas left during the winter and much of their *beel* fishery during the winter months is on *kua* owned by local farmers.

In Talot, the *rajbangshi* fishermen have always focused their fishing on Gangbhang *beel* and their pattern of seasonal fishing effort is far more typical of a controlled (i.e. leased) *beel* fishery. Fishing on the *beel* only starts seriously from the month of *ashwin* (September/October) when the flood recession begins. Some fishing on the main river constitutes a

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Figure 12 Distribution of Fishing Effort by Waterbody Through the Year



Source: FAP 17 Socio-Economic Monitoring

Table 16
Principal Gears, Use by Month and Waterbody

NW1-2 Ahmedpur															
Gear	Habitat	Baishak	Jois	Ashar	Shaban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falagoon	Choytra	Md/VHh	Eff %
Current jal	Beel		2.4	20.5	7.3	3.7	5.2	19.0	22.5	12.1				92.7	50.1
	Floodplain				15.9	17.3	17.3	5.6						56.1	30.3
Kadum	Beel			0.4				2.7	6.9					10.0	5.4

NW2-2 Sonatala

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgon	Choytra	Md/VHh	Eff %
Ber jal	Main River	6.2								3.8	6.1	6.1	6.9	29.2	8.2
Ber jal labour	Main River	4.7	2.4						3.6	11.5	2.6	4.9	4.8	34.5	9.7
Ber jal	Beel	1.5	7.2	7.2	28.7	21.5	14.5	12.7	9.6	2.3	2.8	2.6	2.5	113.1	31.9
Ber jal labour	Beel		4.2	7.2			10.1	11.1	6.1		2.6			41.2	11.6
Hat panch	Beel	5.2	5.3	4.0	3.0	3.1	3.1	4.9	5.2	3.2	7.2	7.7	7.0	58.8	16.6

NW2-3 Talot

Gear	Habitat	Baishak	Jois	Ashar	Sraban	Bhadra	Ashwin	Kartik	Augra	Poush	Magh	Falgon	Choytra	Md/VHh	Eff %
Ber jal labour	Main River	5.9	1.8	2.0	1.5	1.5			2.8	3.9	3.3	3.9	4.9	31.6	8.8
Ber jal	Secondary River		7.9	8.2	3.4				3.2	1.4				24.1	6.7
Ber jal labour	Secondary River		4.0	5.4	4.7	0.7	1.5	1.5	8.4	4.2				30.4	8.5
Ber jal	Beel	2.8	2.4	1.2	0.4	5.1	6.0	6.0	4.0	5.1	9.4	9.1	4.1	55.5	15.5
Ber jal labour	Beel	3.9	3.0	5.1	2.4	5.5	17.7	17.2	10.6	7.5	9.3	8.4	4.8	95.5	26.7
Kathijal	Beel								8.7	8.0	7.0	5.3	7.7	36.9	10.3

Note : Depth of shading indicates relative intensity of use of that gear within the year

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relatively minor element during the winter months. The *kathi jal* (a type of berjal) used by some *rajbangshi* is specifically suited to the harvesting of areas of *beel* or brush-piles and could be considered typical of professional *beel* fishermen.

3.7 Patterns of waterbody exploitation

Ahmmedpur

Figure 13 shows the waterbodies currently exploited by fishermen from Ahmmedpur. As the fishermen in this village are relatively recent entrants to the sector, there has been little opportunity for major changes in their patterns of waterbody exploitation. The focus of Ahmmedpur fishermen's activity has always been on local *beel* and floodplain areas: Bara *beel*, Dighar *beel* and Gandahasti *beel* proper. While Bara and Dighar *beel* have maintained a fairly consistent level of importance, the deeper areas of Gandahasti *beel* are increasing in importance for them as some of the other minor waterbodies close to the village have diminished in size and production as a result of the construction of the PIRDP.

Sonatala and Talot

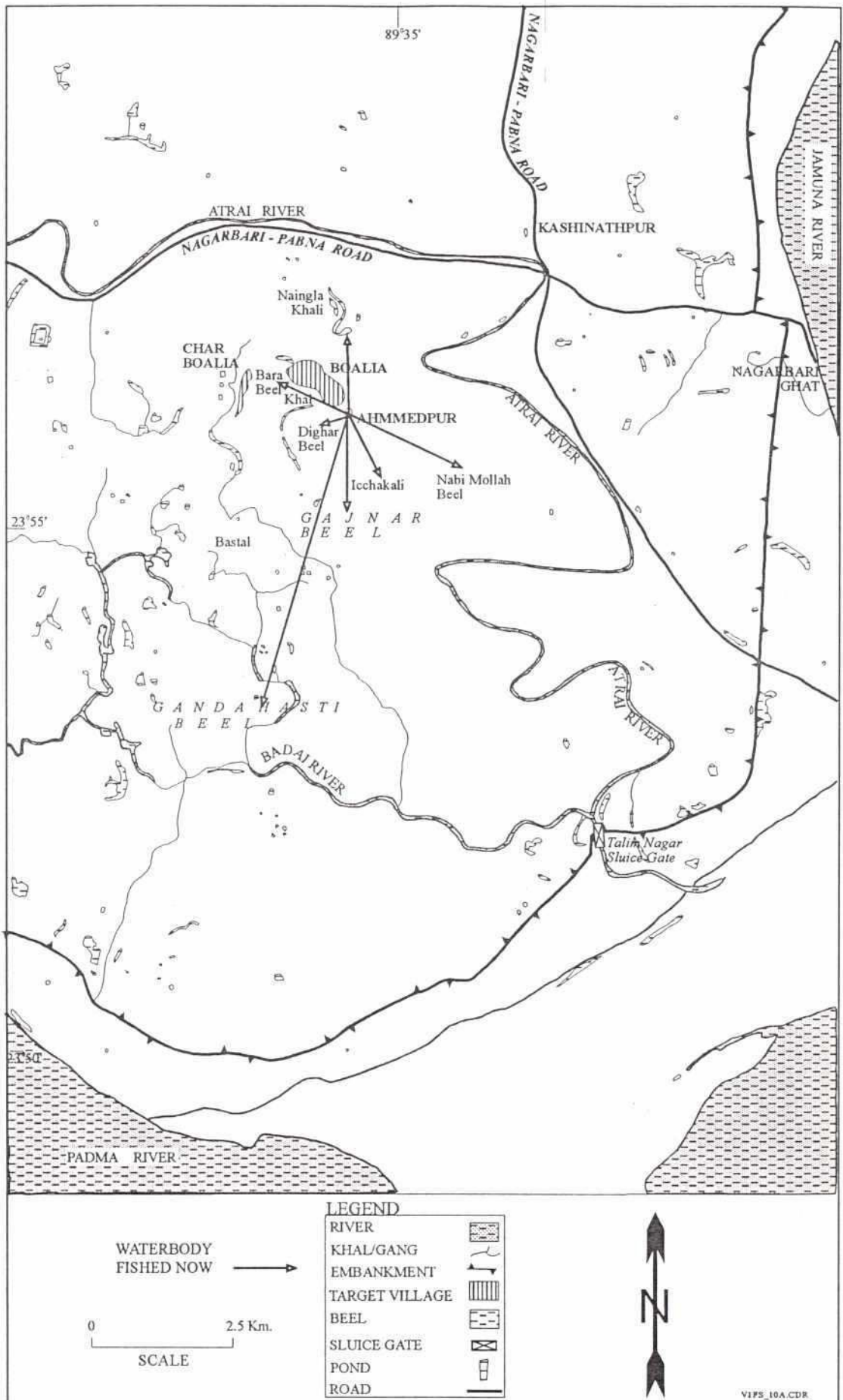
Figures 14 and 15 show the waterbodies fished at present and in the past by the fishermen in Sonatala and Talot. The principal change in fishing patterns for both these communities has been the reduction in seasonal migration out into the Jamuna, Padma and Meghna Rivers due to the blocking of direct water access through the Ichhamati River.

This has particularly affected the *malo* fishermen of Sonatala who, in the past, were much more reliant on their access to the main river. This seems to be a distinguishing feature of many *malo* communities. Along with the *barman* caste fishermen, the *malo* originally seem to have dominated fisheries on the Padma, Jamuna and Ganges. Other caste fishing groups, such as the *rajbangshi* in Talot, have probably only become involved on the main rivers relatively recently. So for Sonatala fishermen, the shift in waterbodies has been a shift in emphasis. The *beel* in the immediate vicinity of the village were always stop-gap fishing grounds exploited during the gaps in the main river fishing seasons. These minor fishing grounds have now become the one of the mainstays of their fishing strategies. Relatively few fishermen from Sonatala now fish on the main rivers and then primarily as fishing labour.

The cutting off of access routes for the *malo*'s own fishing craft by the blocking of the

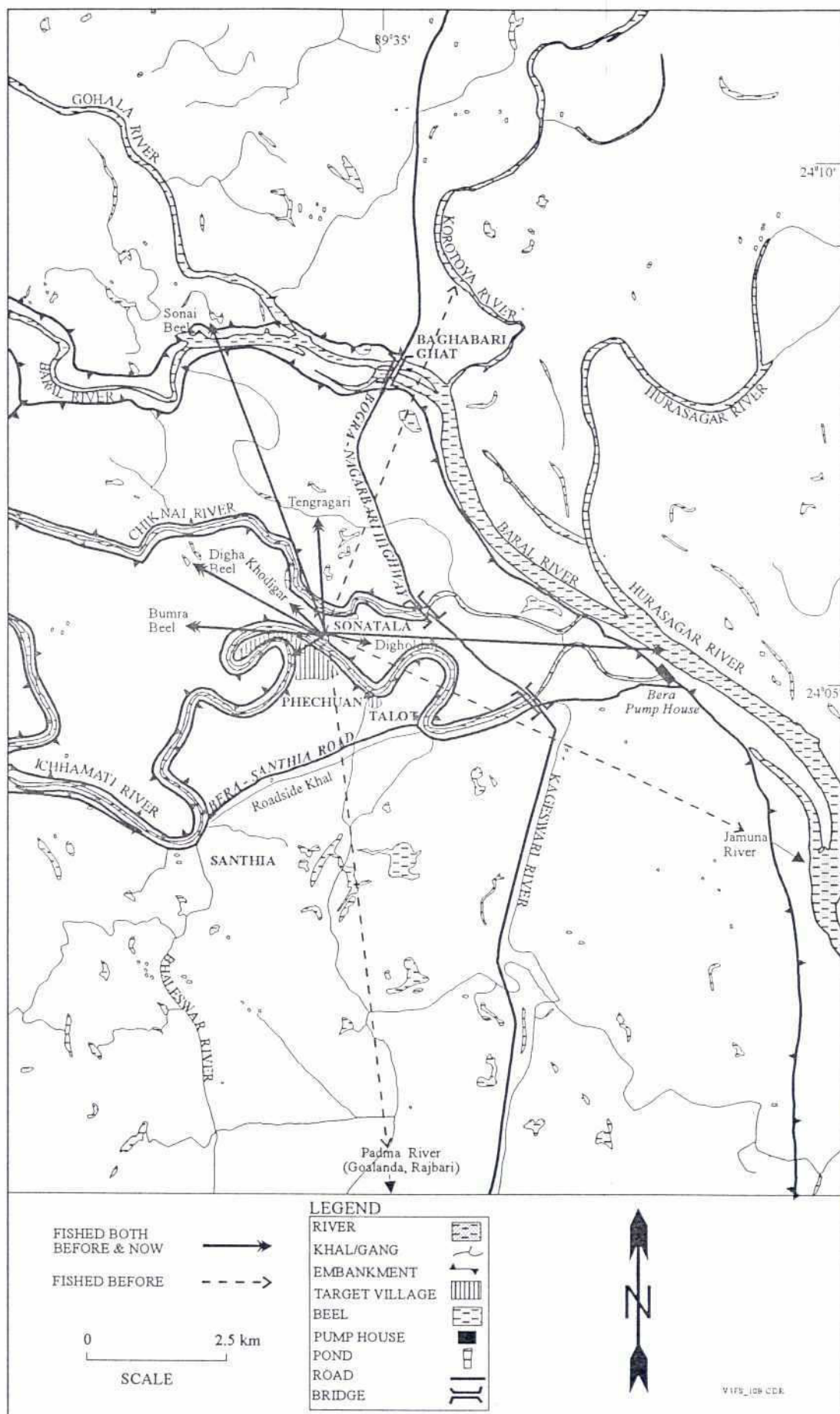
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Figure 13
Ahmmedpur
Waterbodies fished: past & present



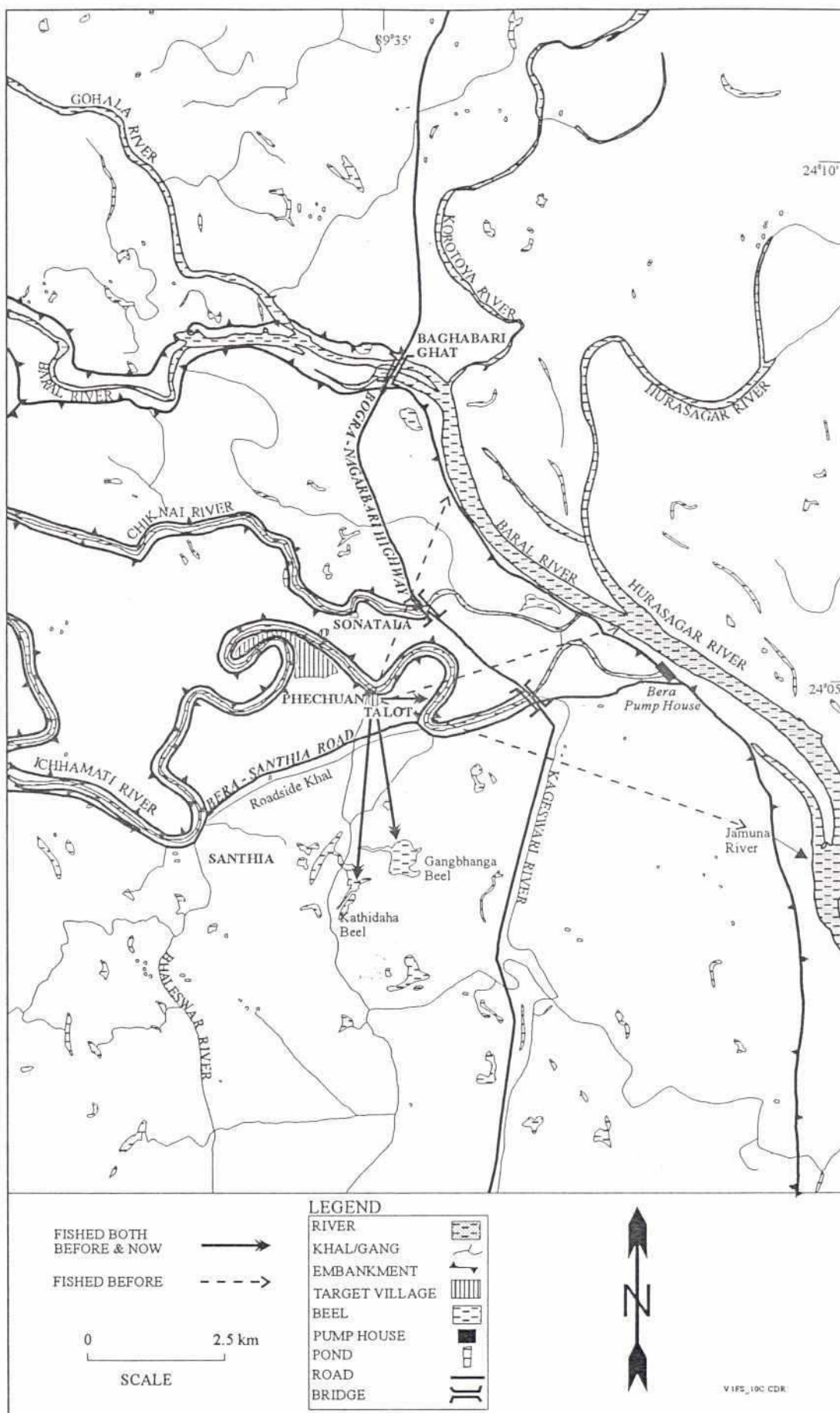
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Figure 14
Sonatala
Waterbodies fished: past & present



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Figure 15
Talot
Waterbodies fished: past & present



Ichhamati is the principal reason for this change. The comparison can be made with fishing communities located on the Old Hurasagar River to the north of the PIRDP. There are several *malo* communities in the area, set back a considerable distance from the main river channel who can be seen heading out onto the main rivers at practically all times of the year. During the rainy season they fish for hilsa on the Padma and Meghna with drifting gillnets while during the winter they are involved in *berjal* fishing for *ketchki* and other river fish. Sonatala fishermen had very similar patterns until the construction of the PIRDP and the removal of their access route to the main river. Short of shifting the location of their village, they could do little but change their fishing grounds or change occupation.

3.8 Occupations and incomes

Ahmmedpur

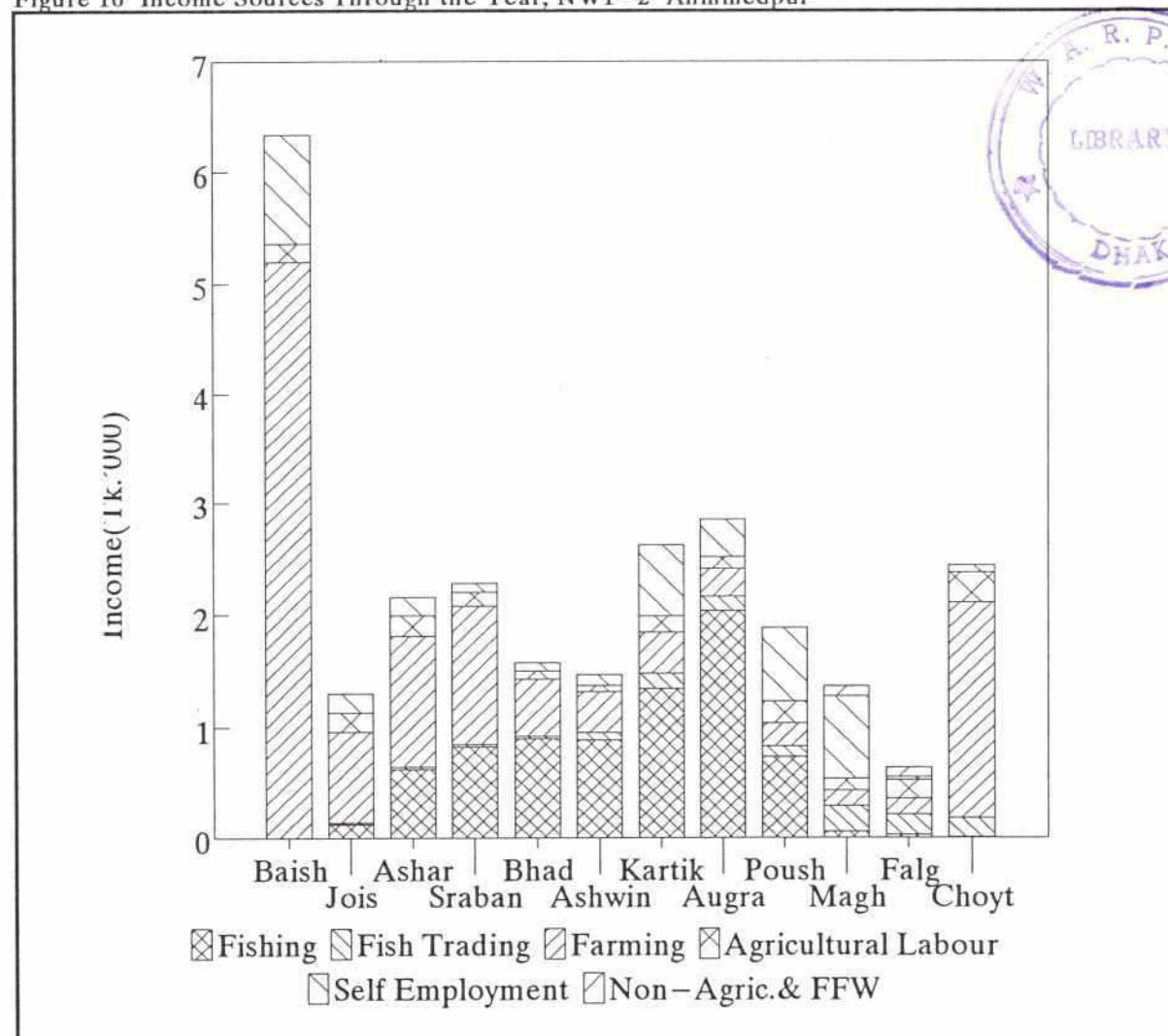
In Ahmmedpur, the group of non-traditional fishermen studied are all relatively recent entrants to fisheries and all continue to be seasonally dependent on agricultural employment. The status of the particular group looked at in the village needs to be understood in context. The 54 households in the fishing group are just part of a large village where many others are also involved in fisheries activities, although not as intensively as the "fishermen" living in Dakhin Char. It is reported that the relatively high cash income which can be earned from fishing has steadily worn down people's opposition to the involvement of local Muslims in fishing, to the point that people from almost all social strata in Ahmmedpur are now engaged in fishing. The rise in prices for fish has apparently more than compensated for falling catches.

As seen in Table 17, fishing income is limited to the flooding season with the peak during the drawdown period. During the winter, most households shift over to share-cropping of *rabi* crops and *boro* rice. In Figure 16, the concentrated peak in income from agriculture in the month of *baishak* (April/May) is clearly highlighted. While income during this period may be high, little else is effectively available during the rest of the year, encouraging many people to move into fishing during the rainy season. A few households also take up fish trading, purchasing fish from the *katha* and *kua* being harvested during *magh* (January/February) and *falgun* (February/March) and taking them to Kashinathpur market.

Table 17 Income Sources Through the Year, by Fishing Category, NW1-2 Ahmmedpur UNIT: TK.

FISH CAT	ACTIVITY	BAISH	JOIS	ASHAR	SRABA	BHAD	ASHWI	KARTI	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
HFC2	Fishing	-	-	893	1,025	1,230	460	2,110	5,205	2,105	-	-	-	13,028	67.1
	Fish Trading	-	-	-	-	-	120	300	290	175	590	475	415	2,365	12.2
	Farming	150	-	-	865	-	-	-	-	-	-	-	2,700	3,715	19.1
	Agricultural Labour	-	-	-	-	-	-	-	-	-	-	140	175	315	1.6
	Total	150	-	893	1,890	1,230	580	2,410	5,495	2,280	590	615	3,290	19,423	100
HFC3	Fishing	-	183	502	728	742	1,085	995	577	102	84	38	14	5,050	16.6
	Fish Trading	-	19	25	31	35	39	56	55	60	68	55	59	500	1.6
	Farming	7,513	1,198	1,707	1,403	744	530	531	360	307	211	216	1,569	16,288	53.7
	Agricultural Labour	237	255	265	185	110	85	216	153	284	148	182	314	2,433	8.0
	Self Employment	1,421	241	234	114	107	136	918	493	950	1,086	36	86	5,821	19.2
	Non-Agric. & FFW	-	-	-	-	-	-	-	-	-	129	121	-	250	0.8
	Total	9,171	1,896	2,733	2,461	1,738	1,875	2,716	1,638	1,703	1,726	648	2,042	30,342	100
Com - munity	Fishing	-	125	625	822	895	888	1,346	2,034	733	58	26	9	7,562	28.1
	Fish Trading	-	13	17	21	24	64	133	129	96	232	187	171	1,087	4.0
	Farming	5,195	821	1,170	1,234	510	363	364	247	210	144	148	1,925	12,330	45.8
	Agricultural Labour	162	175	182	127	75	58	148	105	194	101	169	271	1,766	6.6
	Self Employment	974	165	160	78	73	93	629	338	651	744	24	59	3,988	14.8
	Non-Agric. & FFW	-	-	-	-	-	-	-	-	-	88	83	-	171	0.6
	Total	6,331	1,299	2,154	2,282	1,577	1,466	2,620	2,853	1,884	1,367	637	2,435	26,904	100

Figure 16 Income Sources Through the Year, NW1-2 Ahmmedpur



The income data makes it clear that there are two distinct groups even within the so-called "fishing" community in Ahmmedpur. On the one hand, a larger group of households (69% of the 54 households enumerated) divide their time between agriculture and fishing. Most of this group have small landholdings of their own or are able to share-crop in plots which, almost universally are planted to HYV *boro* which provides over 50% of total household incomes. This group earn above-average incomes even compared to the surrounding agricultural communities, at over Tk.30,000 per year. The 16.6% of this coming from fisheries provides practically the only source of income during the flood season.

The other group, making up the remaining 31% of the community, are almost **totally** dependent on fishing except for the month of *choytra* (March/April) when they obtain some income from the minimal holdings of *boro* and *rabi* crop land which they own or share-crop in. For this group, fisheries is by far the most important source of earnings, accounting for over 67% of their income. 72% of this is obtained during the drawdown and early dry season from *kartik* (October/November) to *poush* (December/January).

Even for this more fisheries-dependent group, their earnings are above-average at over Tk.19,000 per year ; the sort of earnings seen among small landholders in many parts of the country. It is clear that, once the social implications of taking up fishing professionally are overcome, it provides a very viable source of livelihood for landless households who decide to make the shift.

Sonatala and Talot

For the two traditional Hindu fishing communities on the Ichhamati River, fisheries resources have declined and the traditional fishermen have found themselves increasingly in competition with the far larger community of Muslim farmers and labourers for a decreasing resource.

From Tables 18 and 19 and Figures 17 and 18, it can be seen that many fishermen have diversified their livelihood strategies, although fishing remains the mainstay of the communities. Fish trading is a logical option which many households are pursuing, particularly in Talot and particularly during the latter part of the year, when relatively small waterbodies (*beel*, *maital*, ponds or *katha* and *kua*) which absorb relatively little labour, produce a large amount of fish. Fish trading opportunities at this time of the year correspondingly increase.

Table 18 Income Sources Through the Year, by Fishing Category, NW2-2 Sonatala

FISH CAT.	ACTIVITY	BAISH	JOIS	ASHAR	SRABA	BHAD	ASHWI	KARTI	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
HFC1	Fishing	1,398	1,019	959	1,009	934	1,066	1,199	1,201	769	1,403	1,540	1,507	14,005	81.6
	Fishing Labour	—	69	97	—	—	143	155	—	63	—	—	—	526	3.1
	Fish Trading	—	—	—	—	28	44	43	—	—	—	—	—	116	0.7
	Farming	5	—	—	—	—	—	4	—	4	9	—	—	22	0.1
	Non-Agric.& FFW	—	313	313	313	313	313	313	313	313	—	—	—	2,500	14.6
	Total	1,403	1,401	1,369	1,322	1,275	1,566	1,714	1,514	1,149	1,412	1,540	1,507	17,169	100
HFC2	Fishing	202	215	206	246	297	54	126	294	232	214	214	180	2,480	21.8
	Fishing Labour	312	259	342	—	—	370	714	592	445	451	389	348	4,222	37.1
	Fish Trading	145	129	142	169	191	220	289	182	151	332	267	181	2,398	21.1
	Farming	—	—	—	20	—	30	—	—	—	—	—	—	50	0.4
	Non-Agric.& FFW	352	137	101	90	95	116	132	—	80	390	384	340	2,217	19.5
	Total	1,011	740	791	525	583	790	1,261	1,068	908	1,387	1,254	1,049	11,367	100
HFC3	Fishing	705	—	—	(1,838)	1,988	2,000	1,800	475	—	1,093	893	893	8,008	34.2
	Fish Trading	215	185	250	285	240	340	475	400	248	475	363	305	3,780	16.1
	Farming	570	1,410	680	680	825	823	1,030	940	1,030	—	—	—	7,988	34.1
	Self Employment	468	388	260	228	243	285	263	300	265	355	313	305	3,670	15.7
	Total	1,958	1,983	1,190	(645)	3,296	3,448	3,568	2,115	1,543	1,923	1,569	1,503	23,446	100
Com-munity	Fishing	814	568	535	380	775	734	805	737	458	863	905	875	8,448	55.0
	Fishing Labour	133	143	191	—	—	224	377	253	219	192	166	149	2,047	13.3
	Fish Trading	85	75	87	103	120	151	194	120	91	192	153	110	1,480	9.6
	Farming	63	151	73	81	88	101	112	100	112	4	—	—	884	5.8
	Self Employment	50	41	28	24	26	30	28	32	28	38	33	33	391	2.5
	Non-Agric.& FFW	150	204	189	184	186	195	202	146	180	166	164	145	2,113	13.8
	Total	1,295	1,182	1,103	772	1,195	1,435	1,718	1,388	1,088	1,455	1,421	1,312	15,363	100

Figure 17 Income Sources Through the Year, NW2-2 Sonatala

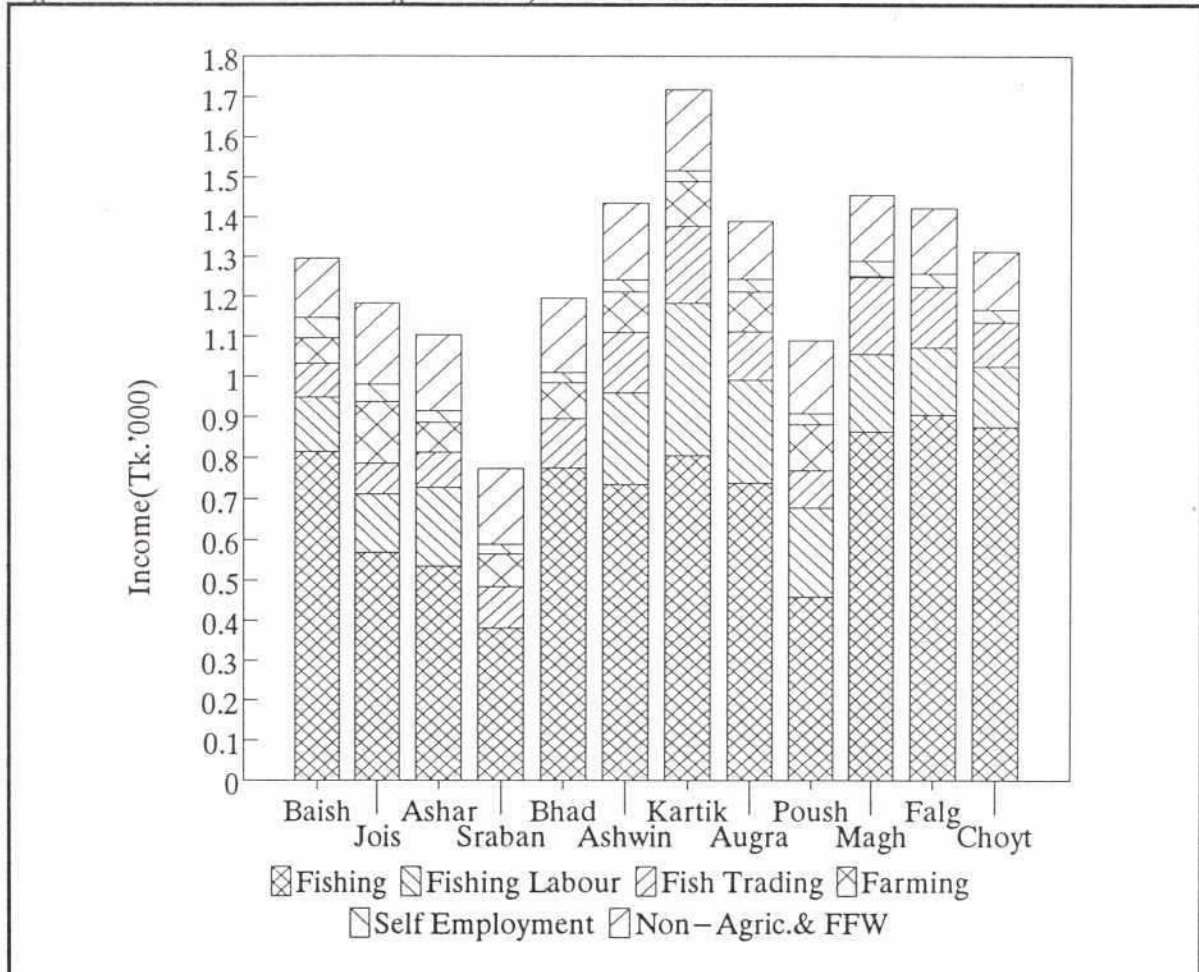
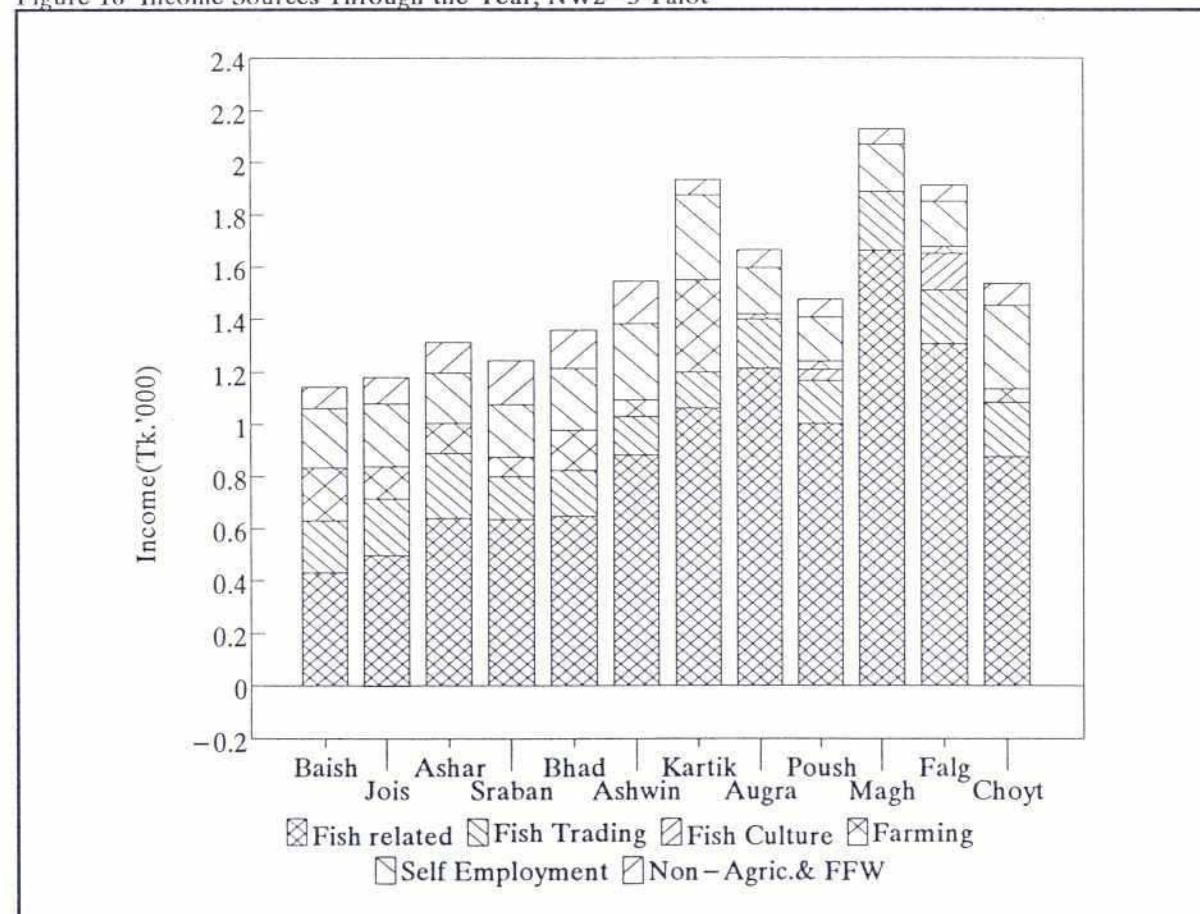


Table 19 Income Sources Through the Year, by Fishing Category, NW2-3 Talot

UNIT: TK.

FISH CAT.	ACTIVITY	BAISH	JOISTH	ASHAR	SRABA	BHAD	ASHWI	KARTI	AUGRA	POUSH	MAGH	FALG	CHOYT	TOTAL	%
HFC1	Fishing	131	235	245	319	358	346	360	496	545	860	786	533	5,215	49.8
	Fishing Labour	249	162	214	178	187	244	324	207	214	170	173	199	2,521	24.1
	Fish Culture	—	(5)	—	—	—	—	—	—	86	—	286	—	366	3.5
	Farming	179	—	—	—	121	—	—	9	14	—	—	—	323	3.1
	Self Employment	150	155	140	179	174	259	285	143	160	125	140	130	2,040	19.5
	Total	709	547	599	676	840	849	969	855	1,019	1,155	1,385	862	10,465	100
HFC2	Fishing	—	624	656	469	421	685	1,328	1,106	319	2,026	1,061	645	9,340	36.1
	Fishing Labour	550	273	235	198	255	463	576	993	900	770	725	713	6,649	25.7
	Fish Trading	88	188	225	—	—	—	—	—	—	—	—	200	700	2.7
	Farming	218	335	306	147	228	136	1,290	10	98	—	105	9	2,880	11.1
	Self Employment	—	188	150	56	188	175	221	—	—	231	169	356	1,734	6.7
	Non-Agric.& FFW	310	388	443	650	565	635	238	268	265	231	233	328	4,551	17.6
	Total	1,166	1,996	2,015	1,520	1,657	2,094	3,653	2,377	1,582	3,258	2,293	2,251	25,854	100
HFC3	Fishing	240	185	497	352	334	344	174	386	556	1,080	1,031	460	5,639	21.6
	Fishing Labour	168	99	229	504	476	825	757	912	691	651	458	206	5,976	22.9
	Fish Trading	683	660	749	647	685	566	534	724	641	869	792	609	8,158	31.3
	Farming	240	150	149	151	150	111	88	42	—	—	—	190	1,271	4.9
	Self Employment	610	454	330	390	394	467	492	422	347	240	240	630	5,016	19.2
	Total	1,941	1,548	1,954	2,044	2,039	2,313	2,045	2,486	2,235	2,840	2,521	2,095	26,060	100
Com-munity	Fishing	125	322	416	366	368	433	561	625	490	1,216	920	543	6,384	34.6
	Fishing Labour	306	174	223	267	279	450	500	590	513	448	388	333	4,471	24.3
	Fish Trading	198	218	250	166	176	146	137	186	165	223	204	208	2,278	12.4
	Fish Culture	—	(2)	—	—	—	—	—	—	42	—	139	—	178	1.0
	Farming	204	125	117	77	156	64	354	18	32	—	27	51	1,224	6.6
	Self Employment	230	240	191	201	234	291	322	178	167	182	173	317	2,727	14.8
	Non-Agric.& FFW	80	100	114	167	145	163	61	69	68	59	60	84	1,170	6.3
	Total	1,143	1,177	1,311	1,244	1,358	1,547	1,935	1,666	1,477	2,128	1,911	1,536	18,432	100

Figure 18 Income Sources Through the Year, NW2-3 Talot



The *malo* of Sonatala remain most reliant on fishing. The more deep-rooted nature of their *caste* identification with the profession may explain this. It is relatively rare to see communities or even sections of communities which are still dependent on fishing and fish related activity for over 80% of their livelihood as is the case for the 67 households in Sonatala falling into the HFC 1 and 2 categories. The only substantial degree of diversification for some of these households has been into fish trading which has always played a role in the community in any case.

Only for the richest *malo* is involvement in farming or alternative occupations a real option.

The picture in Talot is generally more diversified and also more highly stratified. Those households most dependent on fishing, in the HFC 1 category, earn very low incomes (Tk.10,400 per year). These make up almost 50% of the fishing community.

Comparing them to the other categories, they suffer from two principal constraints ; ownership of smaller gear not adapted to fisheries on the deeper parts of the *beel* leased by the local *samity* and lack of diversification into other livelihoods. They remain dependent on fishing and fishing labour for over 70% of their income. Other groups in the community have been able to secure other sources of income and employment, stabilising earnings through the year.

The role of fish trading is notable in determining the higher and more dependable earnings of people in the HFC 3 category. The 7 households in this group earn, on average, over Tk.8,000 per year from this source. It is notable that these few families, acting as *arotdar* and *nikari* for the community, also own the large gears which reap the most earnings during the *beel* harvesting in *magh* and *falgoon* (January to March).

3.9 Conclusions

The burden of changes in fisheries inside the PIRDP has clearly fallen particularly heavily on the traditional fishing communities within the area. Many of their key fishing grounds have been radically altered and have become unsuitable for the types of fishing operation commonly carried out by the traditional fishing community. Many previously perennial *beel* have become seasonal and been turned over to agricultural use. This has also meant a loss

of access control which has been exacerbated by the influx of Muslim farmers and labourers into fishing as a seasonal occupation.

Impacts are not evenly distributed within the traditional fishing community. The wealthy *mohajan* who control most of the larger gear and are often also involved in the fish marketing network, are able to diversify out of fishing as the resource base and security of access decline. The poorer fishermen, operating with smaller gears and as labourers on the large operations, bear the brunt of the decline in fisheries.

Many Hindu fishermen have migrated out and those that are left are generally having increasing difficulty in defending the fisheries on the few perennial waterbodies left to them. Successful maintenance of access control usually depends on patronage by politically influential individuals and good connections with the bureaucratic elite governing waterbody lease distribution. The isolation of rivers inside the PIRDP from those outside has seriously affected access to waterbodies for riverine fishing communities.

The importance of access arrangements in determining the distribution of fisheries benefits is highlighted by the relatively high fisheries incomes earned by Muslim fishermen in Ahmedpur from waterbodies where Hindu fishermen used to fish. In the case of Gandahasti *beel*, the numerical superiority of Muslim agriculturists shifting into fishing and the lack of political and bureaucratic backing for Hindu fishermen has resulted in them being pushed off waterbodies which might still have provided them with an adequate living. Muslim fishermen now exploiting these waterbodies earn comparatively good incomes from fishing in these areas. The only constraint on fishing activity by these non-traditional fishermen seems to be the traditional antagonism, particularly among local opinion leaders, to the idea of Muslims being engaged in fishing.

Purely from the distributional point of view, this change is an improvement, with fisheries benefits being shared among a wider cross-section of people in local communities. Even when traditional fishermen do control adequate leased areas of *jalmahal*, it is clear that a few gear owners and people located at key points in the fish trading / fisheries credit nexus tend to derive a disproportionate amount of benefit. It is equally apparent that only people with these types of resources and influence at their command are able to ensure controlled access to *jalmahal* and some reservation of fishing rights for traditional fishermen.

4. CONCLUSIONS AND THE IMPLICATIONS FOR FUTURE FLOOD CONTROL SCHEMES

The embankments around which have been constructed around the Pabna Irrigation and Rural Development Project have obstructed the fish migration from rivers outside to the *beel* and floodplains inside. This has primarily affected high-value species such as the major Indian carps and large indigenous catfish. But this fishery is in decline everywhere, partly due, no doubt, to the cumulative effect of flood control schemes, but also due to changes in land use and shifts in the patterns of fisheries exploitation.

The floodplain resident fish species do not seem to have been negatively impacted to any great extent. The reduction in area of perennial waterbody would be expected to negatively influence these species, but data from the FAP 17 Fish Catch Assessment Survey do not indicate any major difference in abundance between areas outside and areas inside the project.

There have, however, been major changes in the distribution of that resource among different groups living in floodplain communities.

Trends in the socio-economics of fisheries exploitation

The social group worst affected by these changes has been, not surprisingly, the traditional fishermen whose livelihood depended, almost entirely, on the fishery. As traditional fishing grounds on *beel* or rivers have either shrunk or become seasonal, many traditional Hindu fishermen have migrated. Communal pressure has also played an important role in this movement. Even in areas where fisheries production has remained high, such as Gandahasti *beel*, traditional fishermen have lost secure access to fishing grounds as no leases are offered on these seasonal waterbodies. Traditional fishermen are now restricted primarily to fishing those areas where they can maintain a degree of control over the resource; as everywhere else, they are at a disadvantage in competing with Muslim seasonal fishermen unless they can attract the support of local influentials, support which is seldom disinterested.

The reduction of the area of perennial (and therefore leased) waterbodies has, conversely, encouraged more people to take up fishing. The benefits of the fishery may therefore actually be more widely distributed. Many Muslim small farmers and landless have come to rely heavily on fishing on floodplain and *beel* during the period of inundation and flood recession

from *ashar* (June/July) to *augrahayen* (November/December). However, strong social and cultural taboos on fisheries involvement still limit their numbers. People either take up fishing as a serious source of livelihood or limit themselves to subsistence fishing in areas close to homesteads.

Landowners are becoming increasingly involved in the exploitation of fisheries as they acquire ownership of *maital* or natural ditches and depressions in the floodplain and *beel* or excavate *kua* for irrigation water storage and fish production. This is also leading to a progressive restriction of fisheries activity around privately owned areas, especially during the drawdown but also, occasionally, during the floods themselves. Competition for the resource is increasing and those able to lay any claim to ownership of the fisheries resource are doing so.

Socio-economic status of the groups affected and their dependence on fisheries

Fishing is considered a low-status occupation almost everywhere in Bangladesh. This social stigma has, in the past, acted as a powerful brake on the involvement of large numbers of people in commercial fishing. It is now breaking down due to population pressure and the general increase in competition for all rural resources, though its' effects are still evident in the socio-economic structure of the fishing community.

In the villages around Gandahasti *beel* there is a clear dichotomy between households who fish occasionally and mostly for consumption, and those which depend on fisheries for a substantial part of their income. For the former, fishing is a highly seasonal and very occasional activity. It contributes to household consumption and saves expenditure, but is often supplemented with purchased fish. Overall, the contribution to household livelihood is limited and social status is not compromised by the type of fishing which they carry out.

The other group, made up of both landless households and small landowners, which has far higher levels of dependence on fishing, is certainly the largest socio-economic group currently dependent on fisheries in the area. These households have had to make a clear decision to take up fishing as an occupation, at considerable cost in terms of their social position within the community. Not surprisingly, once they become involved in fishing, it tends to become an important activity for them.

For the landless in this latter group, fishing can account for as much as 67% of their annual

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income. Similar clusters of Muslim fishing households were reported in most of the villages around the study area. An even larger number of agriculturists combine farming of their own smallholdings or share-cropping with seasonal fishing. Fishing generally accounts for 15% to 20% of their annual income. These figures, based on data for Muslim fishing households from Ahmmedpur and Char Boalia, can be taken as representative of many other communities around the *beel*. Most neighbouring villages were reported to have similar clusters of households who have taken up fishing as a major source of livelihood. About 20%-25% of the households in local communities are reliant on these seasonal fisheries, and fisheries is the main occupation of about one third of these.

Any important changes in the fisheries resource, or in the management mechanisms governing that resource, would directly impact this large segment of the local population. It needs to be remembered that this entire fishing community has only come into being due to the open-access nature of the resource in the neighbouring *beel*.

Implications for the Flood Action Plan

In general, the impact of the PIRDP has been to diminish the area of perennial waterbody. As formal mechanisms of access regulation tend to be focussed on perennial waterbodies, this has resulted in more floodplain and *beel* areas becoming open-access and has played a role in stimulating higher levels of fisheries involvement in these areas. By contrast, in the Ichhamati River, the enhancement of the fisheries resource as part of the mitigation measures for the scheme has included, as an integral part of the programme, a significant tightening in restrictions on fishing.

These two cases illustrate well two important impacts which flood control scheme are liable to have on the **distribution** of benefits from fisheries. It needs to be born in mind that these changes are not **limited** to flood control schemes, but that flood control will play a role in encouraging them. On the one hand, without mitigation measures, high-value capture fisheries will tend to decline where flood control results in less flooded area and a reduction in depth and duration of flooding. The interruption of migratory routes from the main rivers into *beel* will also affect above all the more valuable migratory species. This change will result in fewer areas being subject to leasing and the withdrawal of traditional fishermen to perennial water areas where they can maintain better control over fishing effort. At least in the short-term, this will generally encourage more non-fishermen to move in to exploit the lower value fishery resource which remains, generally leading to an expansion of fishing

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effort and, probably an **increase** in production as more of the available resource will probably be caught. The benefits would also be distributed over a far greater proportion of the community than was the case when fishing was dominated by traditional fishing communities.

There is probably a limit on the sustainability of this pattern of distribution. Tenure rights to land in *beel* areas tend to gradually be extended to the water which covers that land during the floods. This coupled with the accelerating pace of submersible pond, or *kua*, development will lead to the concentration of fisheries benefits in the hands of landowners. The implications for the fisheries resource itself are unclear. On the one hand, the *kua* may improve the floodplain environment by creating many small areas of deeper water on the floodplain which may compensate to some extent for the overall decrease in depth. However, *kua* are often harvested by complete dewatering using low-lift pumps. This method apparently leads to a far more complete catch of all fish left at the end of dry season, leaving fewer fish to repopulate the *beel* and floodplain during the next flooding season. The long-term impacts on the fisheries resource are therefore ambiguous.

Where mitigation measures, such as restocking of *beel* or rivers, are introduced to compensate for fisheries losses, these almost invariably concentrate on the higher value carps. To make economic sense, these measures normally need to be accompanied by stricter enforcement of fisheries regulations and the establishment (or re-establishment) of *jalmahal* where fishing effort can be controlled. This would, theoretically, restore the fishery to its earlier condition, where traditional fishermen dominate the commercial fishery and seasonal or occasional fishermen derive marginal benefits from subsistence fishing. On the Ichhamati River near Pechuan, this is exactly what has taken place although the level of conflict which has been generated may make it very difficult to maintain in the long-term.

Experience with stocking programmes in floodplains and *beel*, such as the IDA-funded Third Fisheries Project, has been quite different. Enhancement of the resource leads, not surprisingly, to an upsurge in interest in fishing and an acceleration of attempts by landowners to establish tenurial rights over the fisheries resource. The excavation of submersible ponds increases and fishing by anyone except those able to claim some kind of property rights over the resource is rapidly suppressed and fisheries benefits are concentrated in the hands of landowners at the expense of both traditional and non-traditional fishermen.

GLOSSARY

Most of the following are Bangla words found in this report. Some other terms specific to the region encountered during the course of FAP 17 research have also been included.

Our main intention with this glossary is **not** to do a definitive taxonomy of Bangla terms concerned with fisheries and aquatic resources. This would in any case be impossible as terminologies and usages change radically from region to region and even from village to village. The aim is to highlight the different **meanings** some of these words and terminologies may have in different parts of the country.

The words are written in the Roman alphabet which is rather poor as a vehicle for communicating the Bangla terms. The versions given here make no pretence at being definitive. There is no standard procedure for transliterating Bangla and marked differences in the regional pronunciation of words mean that different renderings of the spelling of the same word may be equally "correct" in terms of the sound of the word. We hope that our versions will be generally understood.

Terms used to describe fishing castes/groups

		Regions where term used		
<i>barman</i>	-	NC/NW/ NE/SW	-	Hindu caste fishermen generally associated with riverine fishing. Very close to <i>malo</i> with intermarriage. Apparently a "genuine" fishing caste.
<i>haldar</i>	-	NC/NW/SW	-	Among non -fishermen, refers to Hindu fishermen in general. Among non-riverine Hindu fishermen, used to refer to <i>malo</i> or <i>barman</i> Hindu caste fishermen who traditionally fish on the Padma and Ganges. Among <i>malo</i> and <i>barman</i> fishermen, refers to the lead fishermen or skipper of a riverine fishing team (the haldar). Always refers to Hindu fishermen.

<i>jele/jaola/</i> <i>jeola</i>	-	NC/NW/ NE/SW	-	Generic terms for fishermen.
<i>jiani</i>	-	NW/SW	-	Derogatory term used to refer to Muslim professional fishermen, particularly around Chalan <i>beel</i> .
<i>malo</i>	-	NC/NW/SW	-	Hindu caste fishermen very close to <i>barman</i> .
<i>rajbangshi</i>	-	NC/NW/SW	-	Hindu caste fishermen. Apparently relatively recent entrants to fisheries. Possibly a tribal group from Northern Bihar/West Bengal which moved onto the plains last century and took up fishing as occupation. Often, but not exclusively, fishing on "closed" water-bodies such as <i>beel</i> and floodplains.

Terms used to describe actors in fish trading system

		Regions where term used		
<i>aratdar</i>	-	NC/NW/ NE/SW	-	Fish wholesaler. A key figure in the marketing chain. Generally the source of credit inputs into the marketing system, advancing money to other actors in the system to ensure fish supply. Usually based in district level wholesale markets.
<i>chalani</i>	-	NC/NW/ NE/SW	-	People who transport fish from district wholesale markets to higher level markets. Limited to the carriers.

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<i>furial</i>	-	NC/NW/ NE/SW	-	Someone who transports fish from the landing to a primary market or secondary shipment point. In the <i>haor</i> often used for the fish traders taking fish from the <i>beel</i> side after landing to the road where it is loaded on buses or trucks for transport to towns or larger marketing centres.
<i>mahajan</i>	-	NC/NW/ NE/SW	-	A very generic but very important term. Most commonly used for moneylenders, but effectively means almost any rich, influential person in rural areas i.e. closer to its' literal meaning "great man". These people usually lend money as well. In fisheries, it is commonly used to refer to the leaseholder of a particular waterbody, the owner of or major shareholder in a particular fishing operation. Also used for many <i>arotdar</i> who are generally money-lenders in their own right.
<i>nikari</i>	-	NC/NW/ NE/SW	-	A generic term for fish traders. Occasionally used for Muslims involved in fisheries activities of any kind; trading, fish culture and fishing.
<i>paikar</i>	-	NC/NW/	-	Fish trader.

Terms used to describe different types of waterbody

		Regions where term used		
<i>beel</i>	-	NC/NW/ NE/SW	-	Officially, a "backswamp" or depression. Can be either perennial or seasonal. In reality used for a wide variety of fresh waterbodies (ox-bow lakes, old riverbeds, <i>khal</i> , even manmade channels). Often refers to flooded areas with no obvious deeper section or depression which used to have perennial areas of water in them.
<i>chak</i>	-	NC/NW/ NE/SW	-	Floodplain. Often used for a portion of floodplain. Tends to be used for floodplains with fairly clearly defined boundaries.
<i>gang</i>	-	NC/NW/ NE/SW	-	River. Colloquial word for <i>nadi</i> . Frequently used for smaller rivers.
<i>gari</i>	-	NW	-	Used for a range of waterbodies in <i>beel</i> areas, especially Chalan <i>beel</i> . Normally refers to small rivers and <i>khal</i> . Apparently also used for man-made ditches and borrow-pits.
<i>gopat</i>	-	NW/SW	-	Grazing land within homestead area of village generally under community ownership.
<i>jala</i>	-	NC/NW	-	General term for waterbody, used for waterbodies like <i>beel</i> , <i>khal</i> , ponds but not for rivers. Comes from the word <i>jal</i> used in Hindu communities for water.
<i>jalmahal/ jalkor</i>	-	NC/NW/ NE/SW	-	A "water estate", now referring to any area of <i>khas</i> waterbody controlled by the government and normally leased out for fisheries.

<i>kua</i>	-	NC/NW/SW	-	Man-made fish-pit excavated in the floodplain or <i>beel</i> . Deeper than a <i>danga</i> . In SW, sometimes used for borrow-pits near homesteads or roads.
<i>khal</i>	-	NC/NW/ NE/SW	-	Man-made or natural channel, small river or canal.
<i>maital</i>	-	NC/NW/SW	-	Small natural or man-made ditch. In NC and NW usually used for ditches and borrow-pits near homesteads. In SW, also used for ditches and fish-pits in <i>beel</i> and floodplain.
<i>nadi</i>	-	NC/NW/ NE/SW	-	River.
<i>nal</i>	-	NW	-	A few cases found in NW in the Chalan <i>beel</i> area where it apparently means a small channel like a <i>khal</i> .
<i>pukur</i>	-	NC/NW/ NE/SW	-	Man-made pond, usually of fairly regular shape and near homestead. In SW, also widely used for man-made, sub-mersible ponds (<i>kua</i>) excavated in <i>beel</i> or floodplain.

Terms used to describe administrative divisions and human settlements

		Regions where term used	
<i>mauza</i>	-	NC/NW/ NE/SW	The lowest recognised administrative unit. It is not the same as a village. Some <i>mauza</i> in the <i>haor</i> area have no villages in them at all although a <i>mauza</i> can cover anything from a single village or hamlet to twelve or more separate villages.
<i>para</i>	-	NC/NW/ NE/SW	Usually a sub-division of a village or <i>gram</i> . Sometimes constitutes a village or hamlet in its own right. Fishing communities frequently live in their own <i>para</i> , often referred to as the <i>jele para</i> .
<i>thana</i>	-	NC/NW/	Equivalent of a sub-district or county. Groups together between 10 and 20 unions. Seat of the <i>thana nirbahi</i> committee which plays important role in allocating fisheries leases and, under the NFMP, in the identification and licensing of "genuine fishermen".
union	-	NC/NW/ NE/SW	The lowest level of government administration. Usually groups together anything between five and thirty <i>mauza</i> . Important for fisheries as it is the lowest level at which <i>khas</i> land and waterbodies can be administered.



